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Appendix 1
Chicago Wilderness Terrestrial Community Classification System

This community classification system for The Chicago Wilderness region has several purposes: 1) to facilitate the understanding of biodiversity (genes, species, communities); 2) to serve as a tool for the assessment of the status of communities (how much is left, how fragmented, how degraded are they, threats, etc.); and 3) to aid land managers in their work of restoring and maintaining diverse native ecosystems.

Introduction

The most influential early systems for classifying the Chicago region's natural communities for conservation purposes were those of Curtis (1959) and White (1978). Both cases, depended on finding and describing "undisturbed" sites. These systems were of tremendous value to conservation. But they worked best for prairie and closed forest communities—not as well for the open oak communities that were so characteristic of this region and which are of special conservation concern today. The fire-dependent ancient timbered lands of the tallgrass region have been more carefully considered during the decades since the work of Curtis and White. The Nature Conservancy, the USDA Forest Service, the Midwest Oak Ecosystems Recovery Plan, the Illinois DNR (Bowles, 1996) and others have developed a variety of approaches to handle the region's oak communities. These differ from Curtis and the Illinois Inventory in two ways. First, they add additional categories (for example woodlands) and they clarify the definitions of some of their original components (for example savannas and shrublands). Second they seek to be more applicable to degraded lands (including restorable lands).

The community descriptions as presented here are based upon relatively high quality sites (i.e. sites which are less disturbed (closer to presettlement condition), and have a relatively high proportion of their species intact). Sites which are disturbed or degraded tend to carry a lower portion of their original character and biota, and thus are less likely to smoothly fit the community description. However, it is still important to identify these degraded sites as a degraded variant of their original community type (rather than describing such areas as "new community types" or as "non-communities"). The more degraded a site becomes, the less it will tend to have in common with the high quality community description, and the more one may be forced to rely on peripheral information to correctly identify a given area. For example, a very degraded mesic savanna may have 85% tree canopy cover, and no presence of grasses or sedges. This will make site identification difficult if one simply relies on the literal description of high quality "mesic savanna". However, if one notices that the site in question has large, scattered bur oaks with large lower branch scars, and the site is on a very gently sloping moraine, one may determine that the site is a degraded mesic savanna.

The community descriptions are a summary of average conditions. In reality, ecologists have found that no two sites are exactly alike. Therefore, classification is an exercise in aggregating unique sites which have some features in common. By presenting average, or typical, or modal information, the community descriptions presented here only indicate what one is going to find in many cases, but not all cases. It is impractical or unrealistic to define communities based on exact criteria, such as "high quality mesic savannas all have at least 5% coverage by bur oak". Such rules always seem to have exceptions, and therefore, it is best to simply describe the average or most typical community characteristics.

It is important to be aware of the affects of past land uses on the structure and species composition of modern communities. For example; presents of large lower branches, nearly sweeping the ground, on oak trees are very likely the result of historic pasturing on the site and not indicative of presettlement community structure. Frequent fires would have fire pruned such lower branches. Abundance of some understory or canopy trees may be the result of grazing selection by various species of domestic livestock. Ironwood (*Ostrya virginiana*) and Hawthorne (*Crataegus* spp.), understory species, are grazing increasers as is white ash (*Fraxinus americana*). Such grazing impacts can also be seen in the herbaceous layer as well. Pennsylvania sedge (*Carex pensylvanica*) and spring beauty (*Claytonia virginica*) increase under light grazing while May apple (*Podophyllum peltatum*) is an increase under heavy grazing pressure.

Deer browsing is also an important factor to be aware of, especially as it relates to natural communities within large urban areas. In these areas deer herds are usually uncontrolled and communities are highly fragmented resulting in intense browsing pressure. Deer browsing has been shown to be a strong influence on the structure and species composition of natural communities. Deer selectively browse certain species such as oaks while having less impact on ash, maple, and a number of shrub species. Deer have a tremendous influence on the herbaceous layer as well. Many palatable species such as orchids and trilliums are greatly reduced in number or eliminated while others, such as *Dentaria laciniata,* are greatly increased.

It is important to realize that no communities possess discrete or definite boundaries, especially on larger less fragmented sites. Therefore, any of these communities is transitional between other communities, especially on similar substrates or with similar physiognomic or moisture conditions. For example; a dry-mesic sand prairie is transitional between dry and mesic sand prairie. This transitional characteristic is especially true when either; physiognomy, moisture, substrate, or combinations of these characters are the same. Because of this transitional nature of communities, any one community description needs to include those sites which would almost meet the requirements for the next wetter community and those sites which would almost meet the requirements for the next drier community as well as those which fall exactly in the middle of the community type. It is important to be aware of the transitional properties of classification. The system presented here is of a coarser scale than some classification systems which will serve to make some delineation of community less difficult. It should be easier to separate a wet community from a mesic community than it is to separate one which is wet from one which is wet-mesic.

Community descriptions include lists of dominant and characteristic species of both plants and animals. Dominant species are those which express the most influence on the rest of the community. In the case of wooded communities, this would refer to the largest most frequently occurring trees. In herbaceous communities, this would refer to species exhibiting the greatest cover and frequency. Characteristic means those species, which although not necessarily abundant, have a relatively high probability of being found when in the community and a relatively low probability of being found when not in the community. These lists best describe the community when being found as a group of species rather than as individual species.

The classification system below was synthesized from the systems currently most used in the Chicago region including all those listed above.

Major vegetation types: forest, shrubland, grassland

Our forested communities include all communities that are dominated by trees (that is the various forest, woodland and flatwoods types), with an average canopy cover of 50% or greater. There are three characteristics: (1) wetness (that is whether an area is wet, mesic (as it is used here, mesic refers to average moisture, the soil being moist for most of the growing season) or dry), (2) upland/floodplain, distinguished by the absence or presence of regular flooding, and (3) forest/woodland, originally 100-80% canopy for forests and 80-50% canopy for healthy woodlands (but the canopy coverage of modern examples does not define these communities; the communities are defined by the remnant biota). The woodland and forest communities occur mostly on loamy soils although some may occur on gravel. Another forested community, flatwoods, is the result of specialized soil conditions and the influence of ground water at or near the surface. Flatwoods occur on level or nearly level topography. Floodplain forests are classified separately from upland forests because periodic flooding greatly affects the soil, fauna, and flora in floodplains.

The grassland communities include the prairies, shrublands, and savannas (those communities which developed with less than 50% tree cover). Compared to forest types, there are more, relatively good, examples of grassland subtypes (with the exception of savannas) that have been carefully studied by conservation biologists. As a result these grassland community descriptions have been developed from a larger base of knowledge. Grasslands, also unlike wooded lands, do not have the structural complexity and post settlement disturbance factors to complicate their classification. Shrublands were a substantial component of the Chicago region's original landscape. However no high quality examples of most types have survived, and they have been relatively little studied. This community type may express itself more clearly after more land is restored.

Levels of the community classification are defined as follows; Forested communities, prairies, etc. are community classes. Within community classes, using prairie as an example, the natural communities are fine-textured-soil, sand, gravel, dolomite. Within natural community types, dry-mesic, mesic, etc. are subtypes.

Forested communities

Upland forest

(Developed under 80-100% canopy cover.) This natural community has a multi-layered structure with canopy, sub-canopy, shrub, and herbaceous layers. Microtopographic–microclimatic variation, fire return frequency and intensity, soil moisture, wind throw and its frequency, and disease outbreaks allowed for the development of structural and compositional features characteristic of upland forests. Canopy tree species are well represented in varying age classes from seedling to canopy sized individuals. The fire return period is presumed longer for this community than for other woodland or savanna types. Longer fire return period and lower fire intensities would result from fire barriers provided by woodlands, savannas, and large rivers or lakes on the south and west sides of these communities. Three subtypes based on soil moisture fit into the upland forest category.

- Dry-mesic. This is an oak dominated, multi-layered community with a higher incidence of disturbance from fire than the next two subtypes. The under story is dominated by shade and partial shade tolerant herbaceous species. Topographic features such as moraine slopes and/or soil types contribute to better drainage. Due to the exposure to droughty conditions and higher fire frequency, there is less or no significant presence of sugar maple.

  Dominant plants: *Quercus alba;* Sub-dominant plants: *Quercus rubra, Quercus velutina*

  Characteristic plants: *Amelanchier arborea, Carya ovata, Fraxinus americana, Ostrya virginiana, Poa sylvestris, Ribes missouriense, Trillium flexipes, Viburnum prunifolium*

  Characteristic animals:

- Mesic. Soil that have moisture available for most of the growing season results in a dense overstory and a high importance of sugar maple and, in undisturbed stands, an under story of shade-tolerant species. These forests occur on north-facing slopes, in ravines, and on level soil with moderately high available moisture and in situations where topographic features, such as large rivers and lakes, afforded these sites protection from frequent or intense fires. The *Acer* spp. component of this type typically occupied small fire refugia but have spread widely since settlement. Although fire frequency was less than in dry-mesic forests, the fire frequency was thought to have allowed for the reproduction of oak and other light demanding species which are gradually lost in the absence of fire.

  Dominant plants: *Acer saccharum, Quercus rubra;* Sub-dominant plants: *Acer nigrum, Ostrya virginiana, Tilia americana*

  Characteristic plants: *Actaea rubra, Adiantum pedatum, Aralia racemosa, Carex laxiculmis, Carex woodii, Caulophyllum thalictroides, Circaea lutetiana, Dicentra cucullaria, Dryopteris goldiana, Hepatica acutiloba, Jeffersonia diphylla, Orchis spectabilis, Staphylea trifolia, Trillium grandiflorum, Uvularia grandiflora, Viburnum acerifolium*

  Characteristic animals: Wood thrush, ovenbird

- Mesic forest (variant). A variant of the mesic forest occurs in the eastern portion of the Chicago Wilderness region, especially in Indiana, where *Fagus grandifolia* becomes a co-dominant with sugar maple.

  Dominant plants: *Acer saccharum, Fagus grandifolia*

  Characteristic plants: *Carex careyana, Carex leptonervia, Carex plantaginea, Cornus rugosa, Dryopteris noveboracensis, Galium lanceolatum, Lindera benzoin, Lonicera canadensis, Panax trifolius, Panicum commutatum ashei, Pyrola asarifolia purpurea*

  Characteristic animals: ovenbird, red-eyed vireo

- Wet-mesic. This community experiences high moisture levels and poor drainage due to level topography. The moist silty loamy soil conditions are associated with shallow drainageways and seepage areas. These forests are functionally, compositionally, and structurally different from floodplain forests.

  Dominant plants: *Quercus rubra, Acer saccharum;* Sub-dominant plants: *Juglans nigra, Ulmus americana*

  Characteristic plants: *Carex davisii, Carpinus caroliniana, Celtis occidentalis, Cornus alternifolia, Impatiens capensis, Quercus macrocarpa, Ulmus rubra*

  Characteristic animals:

Floodplain forest

(>80% canopy cover.) Floodplain forests are on the floodplain of rivers and streams. The communities are [determined] shaped by the frequency and duration of flooding, nutrient and sediment deposition, and by the permeability of the soil. The canopy cover is similar to upland forest but with more open understories due to the frequent flooding. The soil moisture classes range from wet-mesic to wet

- Wet-mesic. This is the most common floodplain forest community. This subtype receives less frequent and intense flooding than wet floodplains. As a result the understory is more well developed with a richer herbaceous layer.

  Dominant plants: This forest is usually a mixture of trees, with no clear dominants.

  Characteristic plants: *Acer negundo, Acer saccharinum, Actinomeris alternifolia, Asarum canadense, Celtis occidentalis, Chaerophyllum procumbens, uglans nigra, Laportea canadensis, Lindera benzoin, Lysimachia ciliata, Mertensia virginica, Sambucus canadensis, Smilax tamnoides, Ulmus americana, Ulmus rubra*

  Characteristic animals: massasauga rattlesnake, barred owl, red-shouldered hawk, acadian flycatcher, yellow-throated vireo, prothonotary warbler

- Wet. Flooding in this community is so frequent or prolonged that the diversity of trees is lowered. The under story and often the overstory are open. Nettles and vines are often prominent.

  Dominant plants: Any of the following species may be locally dominant; *Acer saccharinum, Populus deltoides, Salix nigra*

  Characteristic plants: *Acer negundo, Ambrosia trifida, Boehmeria cylindrica, Carex grayi, Cinna arundinacea, Echinocystis lobata, Elymus virginicus, Fraxinus pennsylvanica, Laportea canadensis, Pilea pumila, Rudbeckia laciniata, Urtica procera, Vitis riparia*

  Characteristic animals: massasauga rattlesnake, barred owl, red-shouldered hawk, acadian flycatcher, yellow-throated vireo, prothonotary warbler

Flatwood

(50-80% canopy cover or less.) Flatwoods occur on level or nearly level soil that has an impermeable or slowly permeable layer (Aquiclude) which causes a shallow, perched water table. The plants and animals must adapt to seasonally wet conditions from the perched water table; and then they must withstand summer dry conditions because the slowly permeable soil layers stop replenishment of soil moisture from capillary action and restrict rooting and burrowing depth. Because soil moisture fluctuates so widely by the season, the moisture class is not in the natural community name. Plants typical of dry and dry-mesic soil grow on slight rises, and depressions contain ephemeral and seasonal ponds. The temporary, fishless, ponds provide breeding habitat for amphibians and support diverse aquatic invertebrates. Many flatwoods had a higher component of savanna vegetation in presettlement times.

- Northern. This community is found associating with the Valparaiso, Tinley, and Lake Border Morainic Systems on poorly drained, nearly level ground. Vernal ponds are characteristic.

  Dominant plants: *Quercus bicolor, Ulmus americana, Fraxinus nigra*

  Characteristic plants: *Aster ontarionis, Cardamine bulbosa, Carex bromoides, Carex crus-corvi, Carex lupulina, Carex muskingumensis, Carpinus caroliniana var. virginiana, Cephalanthus occidentalis, Cinna arundinacea, Corylus americana, Fraxinus pensylvanica subintegerrima, Glyceria striata, Habenaria psycodes, Illex verticillata, Impatiens capensis, Iris virginica var. shrevei, Onoclea sensibilis, Ranunculus flabellaris, Rubus pubescens, Saxifraga pensylvanica, Scutellaria lateriflora, Ulmus rubra, Viburnum rafinesquianum*

  Characteristic animals: Appalachian eyed-brown butterfly, blue spotted salamander, tiger salamander, wood frog, tree frog, spring peeper, chorus frog, wood duck, solitary sandpiper, red-headed woodpecker

- Sand. This is a flatwoods community which develops on soils with two distinct layers: a meter or more of acidic sand over silty clay. This community is not well pronounced in northeastern Illinois and is more typically found in the southern portion of the Chicago Wilderness Region. In the region these communities are found associated with the Chicago Lake Plain and old glacial lake beds in the southwestern portion of the region. Where natural firebreaks occur, sand flatwoods occur rather than shrub prairie or wet-mesic prairie. In the absence of fire, these prairie communities can succeed to sand flatwoods.

  Dominant plants: *Quercus palustris, Acer rubrum;* Sub-dominant plants: *Quercus alba, Quercus rubra, Fraxinus americana*

  Characteristic plants: *Eleocharis tenuis var. verrucosa, Maianthemum canadense, Mitchella repens, Nyssa sylvatica, Osmunda cinnamomea, Vaccinium angustifolium*

  Characteristic animals:

Woodland

(Originally 50-80% canopy cover.) Woodlands developed under a canopy cover intermediate between savanna and forest. Many original woodlands today have canopy cover greater than 80% (and thus appear to fit the forest structure category) due to fire suppression. Such sites can be most easily recognized by failure of the canopy tree species to reproduce with few if any canopy tree species represented in the seedling or sapling layer. These communities may have had a well developed shrub layer which has become shade suppressed in modern times. A conservative woodland shrub and herbaceous layer may be present in the best quality remnants. Woodlands may differ from savannas in having significantly higher populations of spring ephemerals.

- Dry-mesic. These are woodlands situated on well drained soils and or the tops or south-facing slopes of moraines. These soils and topographic conditions permit for better drainage and drier soil conditions, and greater fire frequency.

  Dominant plants: *Quercus alba;* Sub-dominant plants: *Fraxinus americana, Quercus rubra, Quercus macrocarpa*

  Characteristic plants: *Agrimonia pubescens, Anemonella thalictroides, Aster shortii, Carex rosea, Carex cephalophora, Carex pensylvanica, Corylus americanus, Gallium triflorum, Geranium maculatum, Heiraceum scabrum, Helianthus decapetalus, Krigia biflora, Luzula multiflora, Silene stellata, Solidago ulmifolia, Trillium recurvatum, Viburnum prunifolium*

  Characteristic animals: white-footed mouse(*Peromyscus leucopus*), eastern chipmunk, great crested flycatcher, eastern wood pewee, downy woodpecker, fox squirrel

- Mesic. These woodlands occur on more level terrain with loamy soils of a higher moisture content than dry-mesic sites.

  Dominant plants: *Quercus rubra;* Sub-dominant plants: *Acer nigrum, Quercus alba*

  Characteristic plants: *Asclepias exaltata, Carex hirtifolia, Carex jamesii, Caulophylum thalictroides, Cirsium altissimum, Geranium maculatum Lithospermum latifolium, Panicum latifoliaum, Podophyllum peltatum, Prenanthes alba, Prunus virginiana, Taenidia integerrima, Trillium flexipes, Viburnum lentago*

  Characteristic animals: red-headed woodpecker, yellow-billed cuckoo, indigo bunting, Baltimore oriole, blue-gray gnatcatcher, eastern wood pewee, great crested flycatcher, Cooper's hawk, rose-breasted grosbeak blue-winged warbler

- Wet-mesic. These woodlands often interdigitate with northern flatwoods.

  Dominant plants: *Quercus bicolor, Salix nigra;* Sub-dominant plants: *Fraxinus pennsylvanica, Quercus macrocarpa, Quercus coccinea*

  Characteristic plants: *Arisaema dracontium, Cardamine douglassii, Carex grisea, Cinna arundinacea, Floerkea proserpinacoides, Isopyrum biternatum, Juglans nigra, Menispermum canadensis, Phlox divaricata, Polemonium reptans, Ranunculus septentrionalis, Ribes americanum, Sanicula gregaria*

Savanna communities

(10-50% canopy cover.) Savannas are wooded communities with graminoid groundcover. They developed under an average tree canopy cover less than 50% but greater than 10%. A savanna may have shrubby areas, and the tree canopy may locally be greater or less than the above limits. Savannas often have soils that are transitional between forest and prairie, and they have distinctive plants and animals. These communities were maintained by fire in presettlement times. They were among the most widespread and characteristic communities in Illinois, but few high quality stands remain. Most remnants have obviously been changed. The least-disturbed remnants are on sandy land that still is frequently burned, and on the very driest slopes where woody encroachment has been slowest. Two savanna natural communities can be named: fine-textured-soil savanna and sand savanna. Individual savanna subtypes are distinguished by soil moisture.

Fine-textur ed-soil savanna

This typical savanna natural community occupies fine-textured-soil on till plains and lowlands. Savannas occurred as an ecotonal belt along streamside forests, as "islands" in prairie or forest, and on extensive areas of hilly land. Three subtypes based on soil moisture are described.

- Dry-mesic. In this community, soil moisture levels are analogous to dry-mesic upland forest. Grass height and the composition of the herbaceous vegetation are analogous to that of dry-mesic prairie.

  Dominant plants: *Quercus macrocarpa, Quercus velutina;* Sub-dominant plants: *Juglans nigra, Quercus alba, Quercus coccinea*

Characteristic plants: *Andropogon scoparius, Corylus americana, Helianthus divaricatus, Silene stellata, Smilax lasioneura, Sorghastrum nutans*

Characteristic animals: eastern bluebird, red-headed woodpecker, field sparrow, fox squirrel, prairie deer mouse (*Peromyscus maniculatus bairdii*)

- Mesic. This community is found at the base of moraine ridges and (rarely) as islands in wetland vegetation.

  Dominant plants: *Quercus macrocarpa;* Sub-dominant plants: *Quercus alba, Quercus coccinea*

  Characteristic plants: *Andropogon gerardi, Andropogon scoparius, Heliopsis helianthoides, Lathyrus venosus, Sorghastrum nutans, Thaspium trifoliatum*

  Characteristic animals: silvery blue butterfly, red-headed woodpecker, eastern bluebird, northern flicker, eastern kingbird, black-billed cuckoo, blue-winged warbler

- Wet-mesic. These communities often interdigitate with northern flatwoods.

  Dominant plants: *Quercus macrocarpa, Quercus bicolor* (often lacking in western sections); Sub-dominant plants: *Quercus coccinea*

  Characteristic plants: *Veronicastrum virginicum*

  Characteristic animals: hobomok skipper, silvery checker spot

Sand savanna

The soils are very sandy, with little humus. Sand savannas are associated with dune and swale topography and beach ridges. The undulating topography presumably limited the severity of fires and allowed a savanna to develop instead of a sand prairie. The herbaceous vegetation of a sand savanna is quite similar to that of sand prairies. Three sand savanna subtypes are distinguished by soil moisture.

- Dry. This community occurs on excessively drained soils of dunes.

  Dominant plants: *Quercus velutina*

  Characteristic plants: *Carex pensylvanica, Andropogon scoparius, Koeleria cristata, Lupinus perennis, Opuntia* sp., *Stipa spartea*

  Characteristic animals:

- Dry-mesic. There is some development of an A horizon in this community, because of its low topographic position or because it occurs on north-facing or east-facing slopes. These topographic positions and slope aspect provide higher soil moisture, cooler temperatures, and higher relative humidity which reduce fire intensity and frequency.

  Dominant plants: *Quercus velutina, Quercus alba*

  Characteristic plants: *Aster linariifolius, Carex pensylvanica, Comandra richardsonii, Helianthus divaricatus, Phlox pilosa, Stipa spartea*

  Characteristic animals: olympia marble-wing, karner blue butterfly, Indian skipper.

- Mesic. This subtype is found only in Indiana and in close proximity to the shore of Lake Michigan. This type tends to occur in between ridges where microclimatic conditions tend to be more humid and soils wetter.

  Dominant plants: *Quercus alba, Quercus velutina, Betula papyrifera*

  Characteristic plants: *Andropogon gerardi, Aralia nudicaulis, Maianthemum canadense, Cypripedium reginae, Salix humilis*

  Characteristic animals:

Shrubland communities

Shrublands, known also as barrens, were derived by drought-induced landscape-level fires in woodlands or savannas. Windstorms and canopy-clearing fires combined to reduce these communities to grub sprouts and shrubs interspersed with grasses and sedges. Animal- and wind-borne seed dispersal accounted for additional shrub invasion. Shrubland formation was favored in landscape positions with fire intensities reduced from that in prairies, as on the leeward sides of wetland, at woodland/savanna edges, on coarse droughty substrates, and on more rolling topography. Canopy coverage in shrublands is <10%, as in prairies. Structure is characterized by a temporally and spatially dynamic mosaic of shrubs, grubs (multiple-stemmed resprouted trees), grasses, forbs, and small tree saplings. Shrub and grub coverage ranges from 30% to 80%.

Fine-textured-soil shrubland

These shrublands occurred on rugged glacial moraines and kame complexes, and intervening undulating ground moraine and outwash plains, respectively. They were most often associated with the western edges of brushy woodlands, from which they were derived as hot fires followed prolonged droughts. Small impenetrable copses of fire-tolerant shrubs alternated with larger less densely woody areas and grassy openings. Two subtypes based on soil moisture are recognized.

- Dry-mesic. Located on well-drained uplands, these shrublands were especially characterized by copses of hazelnut and plum, and numerous oak grubs. A matrix of upland prairie, savanna, and woodland graminoids provided the major fuel for the maintenance fires which prevented succession to woodland. Diversity was very high in thinly wooded openings, and augmented by the intrusion of tongues of prairie during the hottest fires.

Dominant plants: *Andropogon scoparius, Corylus americanus, Danthonia spicata, Prunus americana, Pyrus ioensis, Quercus coccinea, Quercus macrocarpa, Salix humilis*

Characteristic plants: *Apocynum androsaemiifolium, Ceanothus americanus, Lathyrus venosus, Polygala senega, Pteridium aquilinum, Helianthus divaricatus*

Characteristic animals: silvery blue, coral hairstreak, Edward's hairstreak, blue racer, bobwhite, field sparrow, lark sparrow, yellow-breasted chat, Bell's vireo

- Wet-mesic. Wet mesic shrublands occupied poorly drained undulating lowlands, often lying between wetlands, which acted to reduce fire frequency, and woodland or savannas. Wetland shrubs, such as willows and dogwoods, were the principal woody component of these shrublands. Tall thick grassy openings acted as fuels for occasional high intensity fires. Diversity was highest on slightly better drained inclusions.

  Dominant plants: *Calamagrostis canadensis, Cornus stolonifera, Elymus virginicus, Quercus macrocarpa, Salix glaucophylloides, Salix petiolaris, Spiraea alba*

  Characteristic plants: *Asclepias purpurascens, Aster lateriflorus, Coreopsis tripteris, Gentiana quinquefolia, Heliopsis helianthoides, Onoclea sensibilis*

  Characteristic animals: acadian hairstreak, silvery checkerspot, common yellowthroat, willow flycatcher, woodcock, yellow warbler

Sand shrubland

Dune slopes and swale margins of glacial lake plains were the principal location of sandy shrublands. Droughty soils allowed development of a larger graminoid component, facilitating hotter and more frequent fires than on fine-textured-soils. The shrub and grub component was consequently thinner and shorter in stature. Two subtypes based on soil moisture are again recognized.

- Dry-mesic. The extremely well-drained slopes and crests of sand dunes are optimal dry-mesic sand shrubland locations. Black oak grubs, and in the Kankakee Sand Areas region, sassafras copses, are the common woody components, interspersed with prairie grasses, sedges, and forbs characteristic of drier sand savannas and sand prairies. Thinly vegetated patches of sand structurally resembling central Illinois and Wisconsin inland sand barrens communities and lake Michigan foredunes are present in areas of windblown sand or heavy grazing/browsing. Annuals, mosses, earth stars and lichens characterize these microenvironments, which burn infrequently compared to the dominant fire-maintained grass/shrub matrix. Several species of sand savanna and sand prairie reptiles occur in dry-mesic sandy shrublands.

  Dominant plants: *Andropogon scoparius, Corylus americana, Quercus velutina, Salix humilis, Sassafras albidum, Sorghastrum nutans*

  Characteristic plants: *Asclepias amplexicaulis, Lupinus perennis, Opuntia humifosa, Phlox bifida, Staphylea trifoliata*

  Characteristic animals: Edward's hairstreak, karner blue, bull snake, eastern hognose snake, six-lined racerunner, lark sparrow

- Wet-mesic. This community subtype is equivalent to the shrub prairie recognized by the Illinois Natural Areas Inventory, described as dominated by shrubs, prairie grasses, and a continuous ground layer of mosses. This shrubland is virtually restricted to the older better leached acid sands of the Chicago lake plain and Kankakee River sand area. Diversity is high and noted for acid, nutrient-poor soil indicators, including heaths, eastern orchids, and even bog species.

  Dominant plants: *Andropogon gerardi, Gaylusaccia baccata, Panicum virgatum, Polytrichum* spp., *Rubus hispidus, Salix humilis, Spirea tomentosa, Vaccinium angustifolium,*

  Characteristic plants: *Aronia prunifolia, Bartonia virginica, Osmunda regalis, Parthenium integrifolium, Pedicularis canadensis, Vaccinium angustifolium, Viola lanceolata*

  Characteristic animals: acadian hairstreak, willow flycatcher, woodcock, yellow-breasted chat, yellow warbler

Prairie communities

This community class includes communities dominated by grasses on mineral soil. Trees may be present, but less than 10% of the area has a tree canopy. Four natural communities are recognized: fine-textured-soil prairie, sand prairie, gravel prairie, dolomite prairie.

Fine-textured-soil prairie

This natural community is termed simply fine-textured-soil prairie because it includes the typical, "black-soil" prairies. Soils are deep and fine-textured, usually silt loam or clay loam derived from loess or glacial till, although the prairies may occur on alluvium. Prairie communities in some other natural communities (for example mesic sand prairie) may also have soils with deep, dark A horizons, so the term black soil is not applicable solely to this natural community. Soil moisture for these prairies ranges from dry to wet.

- Dry. Rare for the Chicago region, elevated topographic position provides better drainage than the other two subtypes of this community. Grass heights are usually under three feet.

  Dominant plants: *Andropogon scoparius, Carex bicknellii, Stipa spartea*

  Characteristic plants: *Amorpha canescens, Euphorbia corollata, Helianthus occidentalis, Parthenium integrifolium, Petalostemum candidum, Prenanthes aspera, Zizia aptera*

  Characteristic animals:

- Mesic. Available moisture being present throughout the growing season allows for maximum plant species diversity and maximum grass and forb height. The grass layer may be only 1 meter tall if *Sporobolus heterolepis* dominates, but it is sometimes 2 meters tall.

  Dominant plants: *Andropogon gerardi, Sorghastrum nutans, Sporobolus heterolepis*

  Characteristic plants: *Asclepias sullivantii, Baptisia leucophaea, Eryngium yuccifolium, Heuchera richardsonii, Liatris pycnostachya, Lithospermum canescens, Petalostemum candidum, Silphium laciniatum, Silphium terebinthinaceum*

  Characteristic animals: Franklin's ground squirrel, bobolink, meadowlark

- Wet. Surface water is present during the winter and spring, and the soil is nearly always saturated. Plant species diversity is lower than in other prairie natural communities.

  Dominant plants: *Calamagrostis canadensis, Carex pellita, Carex sartwellii, Spartina pectinata*

  Characteristic plants: *Cacalia tuberosa, Eupatorium maculatum, Eupatorium perfoliatum, Hypoxis hirsuta, Iris virginica var. shrevei, Lysimachia quadriflora, Lythrum alatum, Oxypolis rigidior, Phlox glaberrima, Prenanthes racemosa, Senicio pauperculus*

  Characteristic animals:

Sand prairie

Soils in this natural community are coarse-textured: sand, loamy sand, and sandy loam can support sand prairie. However, prairies on sandy loam are considered sand prairie only if they are acidic enough to have characteristic plants. Sand prairies are found on sandy outwash plains, lake plains, and valley trains, and the soil moisture varies from dry to wet.

- Dry. The soil lacks a dark A horizon, and grass is less than 1 meter tall. Dry sand prairies are rather rare because the proper topographic position for dry sand usually also reduces fire severity enough to allow a savanna to develop.

  Dominant plants: *Andropogon scoparius, Calamovilfa longifolia, Koeleria cristata*

  Characteristic plants: *Arenaria stricta, Artemisia caudata, Callirhoe triangulata, Lithospermum croceum, Monarda punctata, Opuntia compressa*

  Characteristic animals:

- Mesic. This subtype has a deep A horizon in acid sand. Mosses and low shrubs are common, although the shrubs are not dominant. Characteristic mesic prairie forbs such as *Echinacea pallida, Ratibida pinnata,* and *Silphium laciniatum* are rare or absent.

  Dominant plants: *Andropogon gerardi, Andropogon scoparius, Sorghastrum nutans, Stipa spartea*

  Characteristic plants: *Aletris farinosa, Aronia melanocarpa, Aronia prunifolia, Aster umbellatus, Calopogon tuberosa, Helianthus mollis, Liatris aspera, Parthenium integrifolium, Rubus hispidus, Scleria triangulata, Solidago speciosa, Viola pedata*

  Characteristic animals: Fowler's toad, regal fritillary

- Wet. Surface water is present in this subtype for as much as one-third of the year. Wet sand prairie is floristically very similar to wet fine-textured-soil prairie.

  Dominant plants: *Andropogon gerardi, Calamagrostis canadensis, Juncus* spp., *Spartina pectinata, Thelypteris palustris.*

  Characteristic plants: *Osmunda cinnamomea, Osmunda regalis, Rhexia virginica, Viola lanceolata, Xyris torta*

  Characteristic animals:

Gravel prairie

This natural commuity includes prairies on gravel or very gravelly soil. The soils are usually calcareous. Because the gravel provides rapid permeability, the soil moisture classes range from dry to mesic.

- Dry. These prairies are on steep gravel slopes, and the grasses average less than 1 meter in height.

  Dominant plants: *Andropogon scoparius, Bouteloua curtipendula*

  Characteristic plants: *Arenaria stricta, Asclepias lanuginosa, Aster ptarmicoides, Aster sericeus, Linum sulcatum, Lithospermum incisum, Ranunculus rhomboides*

  Characteristic animals: ottoe skipper, gorgon checkerspot, grasshoppers in the genus *Arphia, Pseudopomala brachyptera* (grasshopper), plains froghopper

- Mesic. Soil moisture is relatively high because of the low topographic position. The height of the grass and the diversity of plant species approach that of fine textured mesic prairie. Calciphilic plants are common because the gravel is usually calcareous.

  Dominant plants: *Andropogon gerardi, Sorghastrum nutans, Sporobolus heterolepis*

  Characteristic plants: *Gentiana puberulenta, Psoralea tenuiflora, Scutellaria parvula, Satureja arkansana, Valeriana ciliata*

  Characteristic animals: Aphrodite, scurfy pea flower moth, leadplant flower moth, *Ammoea lacticlava* (beetle)

Dolomite prairie

Dolomite prairies occur where dolomite is less than 1.5 meters below the surface. Certain common prairie plants are absent because of the shallow soils and high pH. Many other species are restricted to dolomite prairies, but some of these (such as *Desmanthus illinoensis, Eleocharis compressa,* and *Satureja arkansana*) are not restricted to specific natural communities. The subtypes range from dry to wet.

- Dry. The soil is extremely shallow to negligible in this subtype, and patches of dolomite pavement are common.

  Dominant plants: *Andropogon scoparius, Bouteloua curtipendula*

  Characteristic plants: *Blephilia ciliata, Kuhnia eupatorioides, Muhlenbergia cuspidata, Penstemon hirsutus*

  Characteristic animals:

- Mesic. The soil depth is 15 or more centimeters over dolomite. As bedrock depth decreases, the natural community intergrades with mesic fine-textured-soil prairie, but deeply rooted forbs such as *Baptisia leucantha, Baptisia leucophaea, Silphium laciniatum,* and *Silphium terebinthinaceum* are absent from mesic dolomite prairie.

  Dominant plants: *Andropogon gerardi, Sorghastrum nutans, Sporobolus heterolepis*

  Characteristic plants: *Galium boreale, Petalostemum foliosum*

  Characteristic animals:

- Wet. The soil is usually quite shallow over bedrock and is frequently saturated, or surface water is present. This is a very rare subtype even in extensive dolomite areas because depressions usually have a deep enough soil layer to support a sedge meadow at this moisture level.

  Dominant plants: *Andropogon scoparius, Calamagrostis canadensis, Carex pellita, Deschampsia caespitosa, Spartina pectinata*

  Characteristic plants: *Cacalia plantaginea, Solidago ohioensis, Solidago ridellii*

Wetland communities

Wetland communities have saturated or flooded soils for all or most of the year. This condition excludes or greatly reduces oxygen availability to plant roots and soil dwelling animals and decomposers. This oxygen deficiency is the most important factor determining the function and composition of wetlands. Important factors differentiating the six wetland natural communities recognized are fire frequency, water source, water chemistry, and topographic location.

Marsh

Marshes are hydrologically cyclical wetlands dominated by emergent reed, graminoids, and cyperoids, and aquatic plants. Structure and water levels are determined by the interaction of short-term precipitation patterns, muskrat activity, and fire frequency. Spatial variation in vegetation and wildlife composition varies with water depth. The stages of the marsh cycle form a continuum from closed 100% cover by emergent vegetation to a ponded state in which open water covers all but the marsh's shallow edges. Maximum structural and compositional diversity is reached at the 50% open water: 50% emergent vegetation hemi-marsh stage, in which these two structural features are completely interspersed to maximize the internal water: vegetation interface.

- Basin. Basin marshes occur in glacial kettles, potholes, and swales on morainal deposits and outwash and lacustrine plains. They are most often found in community complexes with savannas or prairies. Hydrological input is from run-off and some groundwater sources. The closed emergent–hemi-marsh–pond cycle of stages is most typical of this marsh type.

  Dominant plants: *Carex aquatilis, Carex lacustris, Carex utriculata, Leersia oryzoides, Scirpus acutus, Sparganium eurycarpum, Typha latifolia, Zizania aquatica*

  Characteristic plants: *Acorus calamus, Bidens cernua, Equisetum fluviatile, Lysimachia thyrsiflora, Polygonum coccineum, Sagittaria latifolia, Scutellaria lateriflora, Sium suave*

  Characteristic animals: broad-winged skipper, purplish copper, Blanding's turtle, muskrat, yellow-headed blackbird, least bittern, sora, Virginia rail

- Streamside. Streamside marshes are restricted to the floodplains of creeks and rivers. They border the streams themselves or occupy connected backwaters and abandoned oxbows. The standard marsh hydrological cycle is supplemented and modified by multiple, or at least annual, stream flooding. This flow through action by flooding removes and deposits sediment, nutrients, plant propagules, and small animals. This short term instability is counter-balanced by greater long term water level stability for marshes closest to the streamcourse.

  Dominant plants: *Carex lacustris, Carex trichocarpa, Echinocloa walteri, Leersia oryzoides, Scirpus acutus, Scirpus fluviatilis, Typha latifolia*

  Characteristic plants: *Hibiscus palustris, Lobelia cardinalis, Rudbeckia laciniata, Scutellaria lateriflora, Sicyos angulatus*

  Characteristic animals: Blanding's turtle, map turtle, green heron, sora, Virginia rail

Bog

Bogs are glacial relict wetlands restricted to hydrologically isolated kettles. Precipitation, naturally nutrient-poor, is the sole source of water. This factor, the cool basin microclimate, and the nutrient- and water- absorption properties of its dominant groundcover, Sphagnum moss, combines to crate a highly anaerobic, cold nutrient-deficient acidic substrate of Sphagnum peat with little biochemical decay. Prehistoric fires at bog edges and slow but gradual neutralization by calcareous seepages from mineral rich bordering glacial outwash have converted the rims and even interior portions of many bogs to marshes and sedge meadows. Three developmental stages in bog succession are recognized as distinct subtypes, but all are characterized by relict boreal wetland vegetation.

- Graminoid. Graminoid bogs are the first stage in bog development. They form a floating mat of Sphagnum peat either on the edges of kettle lakes or as remnant inclusions in other floating graminoid communities. Small shrubs and sedges add vertical structural complexity to this community.

  Dominant plants: *Betula pumila, Carex aquatilis, Carex lasiocarpa, Chamaedaphne calyculata, Dryopteris thelypteris, Polytrichum commune, Sphagnum* spp.

  Characteristic plants: *Dulichium arundinaceum, Drosera rotundifolia, Menyanthes trifoliata, Pogonia ophioglossoides, Salix pedicellaris, Sarracenia purpurea, Viola pallens*

  Characteristic animals: willow flycatcher, yellow warbler

- Low shrub. This community exists as the second stage of bog succession on thick floating Sphagnum peat or, in only two Chicago Region sites, as grounded peat mats with thin floating edges along an encircling moat. A dense mat of low statured leatherleaf heath on Sphagnum dominate the low diversity core of the moat bordered low shrub bogs. Diversity increases considerably toward the moat edge where the community closely resembles the graminoid bog subtype.

  Dominant plants: *Chamaedaphne calyculata, Polytrichum commune, Sphagnum* spp.

  Characteristic plants: *Aronia prunifolia, Eriophorum virginicum, Osmunda cinnamomea, Rhus vernix, Rubus hispidus, Vaccinium macrocarpon, Viola pallens*

  Characteristic animals: willow flycatcher, yellow warbler

- Forested. This community exist on fairly well consolidated peat. Hummocks (which tend to be more acid) and small, wet depressions are characteristic. Two distinct layers are added to the forb-sedge herbaceous stratum: a tree layer of deciduous tamarack (greater than 20% coverage) and a stratum of tall shrubs. This subtype includes both forested bogs with a markedly acid upper peat horizon and those with only scattered areas of acidity. The latter have been termed “half bogs” or “forested fens” by some authorities.

  Dominant plants: *Carex disperma, Carex oligosperma, Carex trisperma, Ilex verticillata, Larix laricina, Rhus vernix, Sphagnum* spp.

  Characteristic plants: *Carex canescens, Carex chordorrhiza, Cypripedium acaule, Lycopodium lucidulum, Osmunda cinnamomea, Osmunda regalis, Vaccinium corymbosum*

  Characteristic animals: Nashville warbler, veery

Fen

Fens are created and maintained by the continuos internal flow of mineralized groundwater emanating from bordering upland calcareous sand and gravel glacial outwash formations. An impervious layer of till below the outwash gravel lenses forces cold, oxygen-deficient, mineralized groundwater to seep laterally at the bases of upland slopes. Peat enriched with magnesium and calcium carbonates forms the fen substrate, which supports many calcophile, plants adapted to high concentrations of dissolved alkaline minerals.

- Calcareous floating mat. This community exist as a thin floating, bed of peat in glacial lake basins. Diffused calcareous seepage from bordering upland and fire created this community from graminoid bogs, which they resemble in composition. The mat supports a tall matrix of sedge and grasses, low-statured boreal relict shrubs and boreal herbs, and in some cases, calcophiles typical of graminoid fens.

  Dominant plants: *Calamagrostis canadensis, Carex aquatilis var. elatior, Carex lasiocarpa, Carex prairea*

  Characteristic plants: *Aster borealis, Hypericum virginicum fraseri, Menyanthes trifoliata, Potentilla palustris, Salix candida, Salix pedicellaris, Utricularia intermedia*

  Characteristic animals: swamp sparrow

- Graminoid. Sloping peat is either at the edge of a moraine/outwash formation or, more rarely, is a raised island in a marsh or sedge meadow. In the latter case, this has been attributed to an upwelling of groundwater. Dominant plants are a mixture of mesic to wet prairie grasses and sedges. Although the peat is quite elevated, it resists decay due to the high level of calcium and magnesium carbonate. Diversity is quite high since both mesic and wet prairie species can occur side by side in addition to numerous calciphilic and hydrophilic species. Frequently fire helps maintain the grassland structure of graminoid fens, which overlap physically and compositionally with calcareous sedge meadow.

  Dominant plants: *Andropogon gerardi, Carex haydenii, Carex prairea, Carex sterilis, Potentilla fruticosa, Sorghastrum nutans, Sporobolus heterolepis*

  Characteristic plants: *Cirsium muticum, Gentiana procera, Lobelia kalmii, Lysimachia quadriflora, Muhlenbergia glomerata, Parnassia glauca, Selaginella apoda, Solidago ohioensis, Solidago uliginosa, Valeriana ciliata*

  Characteristic animals: Baltimore checkerspot, mulberrywing skipper, swamp metalmark, elfin skimmer, *Nanothemis bella* (dragonfly).

- Forested. This community is a relict northern evergreen cedar swamp restricted to deep, spring-fed forested ravines. White cedar and other wetland trees (>20% coverage), wetland shrubs, and sedges from a complex multi-layered community harboring typical fen calcophiles, sedge meadow species, and many boreal wetland cedar swamp species. Fallen cedar trunks resprout new trees and in decay crate a hummocky terrain and substrate for other specie, as in many old growth mesic forests. Only one example of this community, divided by a tollway, remains in the Chicago Region.

  Dominant plants: *Carex leptalea, Carex sterilis, Cornus alternifolia, Fraxinus nigra, Symplocarpus foetidus, Thuja occidentalis*

  Characteristic plants: *Caltha palustris, Conioselinum chinense, Cornus rugosa, Geum rivale, Habenaria hyperborea, Polymnia canadensis, Rubus pubescens, Solidago patula, Angelica atropurpurea*

  Characteristic animals: mottled sculpin (in associated spring runs)

Sedge meadow

Sedge meadows are sedge dominated grasslands with wet prairie grass co-dominants on organic or sand substrates. Groundwater seepage and/or shallow flooding are the principal hydrological factors, and frequent fire is needed to retain their open structure. They are structurally homogeneous dense matrices of either tussock-forming sedges, which are often on calcareous organic substrates and grade into fens, or shallowly flooded rhizomatous sedge stands which grade into marshes.

  Dominant plants: *Calamagrostis canadensis, Carex lacustris, Carex prairea, Carex sartwellii, Carex stricta*

  Characteristic plants: *Angelica atropurpurea, Aster puniceus, Bromus ciliatus, Campanula aparinoides, Chelone glabra, Epilobium leptophyllum, Eupatorium maculatum, Lathyrus palustris, Lycopus uniflorus, Viola nephrophylla*

  Characteristic animals: Baltimore checkerspot, eyed brown, black dash skipper, dion skipper, American bittern, sandhill crane, sedge wren, swamp sparrow, pigmy shrew

Panne

Pannes are unique interdunal wetlands on calcareous moist sands of the lake plain within one mile of Lake Michigan. Rhizomatous sedges and sedge relatives dominate this open structured wetland, which has considerable floristic overlap with fens and calcareous seeps.

- Panne. This community has considerable floristic overlap with the graminoid fen and the calcareous seep. Competition is not as intense as in fens, because the pane's sod is not dense.

  Dominant plants: *Calamagrostis canadensis, Carex buxbaumii, Carex sartwellii, Cladium mariscoides, Juncus balticus var. littoralis, Potentilla fruticosa, Rhynchospora capillacea, Scirpus americanus*

  Characteristic plants: *Agalinis purpurea, Carex viridula, Eleocharis olivacea, Gentiana crinita, Linum medium var. texanum, Triglochin maritima, Utricularia cornuta*

  Characteristic animals: Fowler's toad

Seep and spring

This community subclass occurs where groundwater flows to the surface. A seep is an area with saturated soil caused by water flowing to the surface in a diffuse rather than concentrated flow. Seeps may have local areas of concentrated flow, and the water usually collects in spring runs. Seeps are usually smaller than 0.1 acre, and are most common along the lower slopes of glacial moraines, ravines, and terraces. A spring, as opposed to a seep, has a concentrated flow of groundwater from a definite orifice. The various communities in this subclass are separated on the basis of water chemistry.

- Neutral. This common seep type most often occurs on small muck deposits in ravine woodlands and forests. It is saturated by circumneutral water and structurally a mix of trees, shrubs, and sedge/forb components.

  Dominant plants: *Carex hystricina, Carex interior, Cornus alternifolia, Symplocarpus foetidus, Impatiens capensis, Pilea pumila*

  Characteristic plants: *Angelica atropurpurea, Caltha palustris, Cystopteris bulbifera, Fraxinus nigra, Solidago patula, Viola cucullata*

  Characteristic animals: brook stickleback, mottled sculpin

- Calcareous. Groundwater is so highly calcareous that tufa (recrystallized calcium and magnesium carbonate deposits) forms. Many "neutral" seeps are slightly calcareous, but the distinction is drawn when tufa is present, forest cover is absent, and peat deposits (usually) adjoin the seep. Calcareous seeps occur in close association with various fen communities. They are cyperoid dominated communities with high floristic overlap with graminoid fens and pannes. Some calcareous seeps are known to have formed in tile blowout areas of partially drained fens.

  Dominant Plants: *Carex sterilis, Deschampsia caespitosa, Eleocharis rostellata, Rhynchospora capillacea, Silphium terebinthinaceum*

  Characteristic plants: *Berula erecta, Cladium mariscoides, Juncus brachycephalus, Scleria verticillata, Tofieldia glutinosa, Triglochin palustris*

  Characteristic animals: Hine's emerald, pickerel frog, mottled sculpin

- Acid. The acid seepage water flows through sand, usually at the edge of dune or beach ridges. Some muck deposits can accumulate. Ferns, grasses, and shrubs form a structurally multilayered community.

  Dominant plants: *Glyceria striata, Osmunda cinnamomea, Symplocarpus foetidus*

  Characteristic plants: *Athyrium filix-femina, Dryopteris spinulosa, Osmunda regalis, Physocarpus opulifolius*

  Characteristic animals: brook stickleback

Cliff communities

Vertical exposure of resistant bedrock as well as unconsolidated materials are included in this community. Soils are generally non-existent, and natural communities have been delimited on the basis of substrate. Aspect and degree of shading are also significant, but have not been used to separate communities due to practical considerations.

- Eroding bluff. This natural community is associated with eroded high bluffs consisting of glacial till along the shore of Lake Michigan. Because this community is maintained by continual lake erosion the plant community is not well developed.

  Dominant plants:

  Characteristic plants: *Aster pilosus, Danthonia spicata, Fragaria virginiana, Potentilla simplex, Rudbeckia hirta, Solidago nemoralis*

  Characteristic animals:

- Dolomite cliff. Aspect and substrate characteristics are important determinants of species composition and abundance. In general, the north and east-facing slopes support the most vegetation. Another important factor is the degree of shading from the adjacent forest.

  Characteristic species: *Cystopteris bulbifera, Physocarpus opulifolius, Aralia racemosa, Campanula rotundifolia, Pellaea glabella*

  Characteristic animals: ciff swallow

Lakeshore communities

Lake-deposited sands form the substrate for this community. Depending on the age of the deposit and the successional development, three natural communities are formed. These natural communities are limited to the shoreline and near shore areas of Lake Michigan.

- Beach. Soil development is minimal because the sand is recently deposited. Two basic subdivisions can be distinguished: the nearly bare zone of sand nearest the lake and the better-vegetated grassland farther away.

  Dominant plants: *Ammophila breviligulata, Calamovilfa longifolia, Elymus canadensis*

  Characteristic plants: *Cakile edentula, Corispermum hyssopifolium, Euphorbia polygonifolia*

  Characteristic animals: Piping plover, sanderling

- Foredune. This natural community is characterized by the beginnings of soil development. Fairly dense cover of low shrubs and grasses is present. There is some overlap with dry sand prairie.

  Dominant plants:

  Characteristic plants: *Andropogon scoparius, Arctostaphylos uva-ursi, Juniperus horizontalis*

- High dune. This is a more well developed natural community than the previous two located on tall steep slopes behind the foredune.

  Dominant plants:

  Characteristic plants: *Amelanchier arborea, Artemisia caudata, Hamamelis virginiana, Quercus velutina, Sassafras albidum, Smilacina stellata, Solidago caesia*

Cultural communities

This division includes communities that were created by human disturbance. In terms of natural quality, they are Grade D or E. All Grade E communities are cultural communities, but not all Grade D communities are cultural. If land is Grade D because the original natural community has been destroyed by human activities and the land has recovered somewhat, then it is a cultural community. However, if the original natural community was not removed, or if secondary succession has progressed to the stage where, for example, a recently clearcut forest is now a Grade D forest, it is not a cultural community, because the original community was not completely altered. The cultural communities are described briefly below.

- Cropland. This includes row crops and forage crops.

- Unassociated woody gr owth. Mixes of shrubs and trees which owe their existence to recent human (i.e. post settlement) land use practices. Unassociated woody growth is so named because its constituent species do not naturally occur together, either historically, or as associates in long term self-perpetuating communities. However, all of the native constituent species do occur in other natural community types. Most unassociated woody growth communities develop as woody plants colonize Eurasian meadows, abandoned farm fields, prairies, sedge meadows, or cut-over forest, woodland, and savanna. Other than a comparison with the original natural community which the unassociated woody growth ultimately replaced, there is no standard by which to assess unassociated woody growth. The diversity of herbaceous flora tends to be exceedingly low in the unassociated woody growth, as there are no processes occurring which promote survival of such flora. Without a stabilizing herbaceous layer, the presence of the unassociated woody growth can promote soil erosion and degraded water quality.

- Grass. Old fields dominated by Eurasian cool season grasses are and example of this type.

- Shrub. Thickets of buckthorn, gray dogwood, and introduced honeysuckle are examples of this type.

- Tree. Dense stands of Norway maple, black locust, green ash, and American elm are examples of this type.

- Tree plantations. Orchards, arboretums, and other tree plantations are in this artificial community.

- Developed land. Any sort of land that has been highly modified or has structures is placed in this class. It includes strip-mined land, roadways, buildings, and cemeteries.

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Appendix 2
Crosswalk between Chicago Wilderness Communities and the National Standard for Community Types

Chicago Wilderness name	The Nature Conservancy name	G-rank
Dry-mesic upland forest	White oak-red oak dry-mesic forest	G4?
Mesic upland forest	North-central maple-basswood forest*	G4?
	Beech-maple glaciated forest	G3G4
Wet-mesic upland forest	North-central maple-basswood forest*	G4?
Wet-mesic floodplain forest	Central green ash-em-hackberry forest	G?
Wet floodplain forest	Silver maple-elm-(cottonwood) forest	G4?
Northern flatwood	Northern (Great Lakes) flatwood	G2
Sand flatwood	Pin oak-swamp white oak sand flatwood	G2?
Dry-mesic woodland	Northern dry-mesic oak woodland	G3G4
Mesic woodland	Red oak-sugar maple-elm forest	G?
Wet-mesic woodland	Swamp white oak woodland	G1
Dry-mesic fine-textured-soil savanna	North-central bur oak openings*	G1
Mesic fine-textured-soil savanna	North-central bur oak openings*	G1
Wet-mesic fine-textured-soil savanna	Bur oak terrace woodland	G1
Dry sand savanna	Black oak/lupine barrens*	G3
Dry-mesic sand savanna	Black oak/lupine barrens*	G3
	Lakeplain mesic oak woodland	G2
Mesic sand savanna		
Dry-mesic fine-textured-soil shrubland	Hazelnut barrens	G1?
Wet-mesic fine-textured-soil srubland	Dogwood-mixed willow shrub meadow	G3G4
Dry-mesic sand shrubland	Midwest dry-mesic sand prairie*	G3
Wet-mesic sand shrubland	Hardhack shrub prairie	G1Q
Dry fine-textured-soil prairie	Midwest dry-mesic prairie	G2G3
Mesic fine-textured-soil prairie	Central mesic tallgrass prairie	G2
Wet fine-textured-soil prairie	Central wet-mesic tallgrass prairie	G2G3
	Central cordgrass wet prairie	G3?
Dry sand prairie	Midwest dry sand prairie	G2G3
Mesic sand prairie	Mesic sand tallgrass prairie	G2
	Midwest dry-mesic sand prairie*	G3
Wet sand prairie	Lakeplain wet-mesic prairie	G2
	Central wet-mesic sand tallgrass prairie	G2G3
	Lakeplain wet prairie	G2G3
	Central cordgrass wet sand prairie	G3?
Dry gravel prairie	Midwest dry gravel prairie	G2
Mesic gravel prairie	Midwest dry-mesic gravel prairie	G2
Dry dolomite prairie	Midwest dry limestone-dolomite prairie	G2
Mesic dolomite prairie	Midwest dry-mesic Limestone-dolomite prairie	G2?
Wet dolomite prairie	Midwest wet-mesic dolomite prairie	G2?
Basin marsh	Bulrush-cattail-burreed shallow marsh	G?
Streamside marsh	Midwest mixed emergent deep marsh	G5
	River bulrush marsh	G?
Graminoid bog	Northern poor fen	G3G4

Low shrub bog	Leatherleaf bog	G5
Forested bog	Central tamarack poor swamp	G4?
Calcareous floating mat	Midwest calcareous floating mat	G?
Graminoid fen	Cinquefoil-sedge prairie fen*	G3G4
Forested fen	White cedar seepage swamp	G3G4
Sedge meadow	Lake sedge meadow	G4G5
	Tussock sedge wet meadow	G4?
Panne	Interdunal wetland	G2?
Neutral seep	Skunk cabbage seepage meadow	G4?
Calcareous seep	Cinquefoil-sedge prairie fen*	G3G4
Sand seep	Midwest sand seep	G2?
Eroding bluff	Small eroding cliffs	G?
Dolomite cliff	Alkaline moist bluff-cliff	G5
Beach	Great Lakes sea-rocket strand beach	G2G4
Foredune	Great Lakes beachgrass dune*	G3G5
High dune	Great Lakes beachgrass dune*	G3G5
	Central water lily aquatic wetland	G4G5
	Dogwood-willow-blueberry swamp	G4?
	Northern buttonbush swamp	G4

[1] Based on community descriptions, The Nature Conservancy community types have been matched to Chicago Wilderness Community types. It should be noted that this is not a simple one to one match; often a Chicago Wilderness type covers more than one TNC type and vice versa.

[2] The Nature Conservancy has developed a system to reflect global rarity of the communities. The first three categories here are defined as follows:
G1 = Critically imperiled globally (typically 5 or fewer occurrences)
G2 = Imperiled globally (typically 6 to 20 occurrence)
G3 = Vulnerable (typically 21 to 100 occurrences)
G#G# = range of ranks; insufficient information to rank more precisely
? denotes inexact numeric rank

* Signifies that the TNC community type corresponds to more than one Chicago Wilderness community type and therefore is found elsewhere in the crosswalk.

Appendix 3
Glossary of Scientific and Common Names Used in Text

Acadian hairstreak . . . . . *Satyrium acadia*
Alewife . . . . . *Alosa pseudoharengus*
American bittern . . . . . *Botaurus lentiginosus*
American burnet . . . . . *Sanguisorba canadensis*
American bur-reed . . . . . *Sparghanium americanum*
American burying beetle . . . . . *Nicrophorus americanus*
American pondweed . . . . . *Potomageton americana*
American redstart . . . . . *Setophaga ruticilla*
Amur maple . . . . . *Acer ginnala*
Aphrodite fritillary . . . . . *Speyeria aphrodite*
Appalachian eyed- brown . . . . *Lethe appalachia* or *Satyrodes appalachia*
Ash . . . . . *Fraxinus* sp.
Asiatic honeysuckle . . . . . A complex of *Lonicera* sp.

Baltimore checkerspot . . . . . *Euphydryas phaeton*
Basswood . . . . . *Tilia americana*
Beach pea . . . . . *Lathyrus japonicus* var. *glaber*
Belfrag's stinkbug . . . . . *Chlorochroa belfragei*
Bell's vireo . . . . . *Vireo bellii*
Bellwort . . . . . *Uvularia grandiflora*
Black oak . . . . . *Quercus velutina*
Black oat grass . . . . . *Stipa avenacea*
Black tern . . . . . *Chlidonias niger*
Black walnut . . . . . *Juglans nigra*
Blanding's turtle . . . . . *Emydoidea blandingii*
Bluebell dragonfly . . . . . *Nannothemis bella*
Blue-spotted salamander . . . . . *Ambystoma laterale*
Bluntnose minnow . . . . . *Pimephales notatus*
Bobolink . . . . . *Dolichonyx oryzivorus*
Bog birch . . . . . *Berula pusilla*
Broad winged skipper . . . . . *Poanes viator*
Brown creeper . . . . . *Certhia americana*
Buffalo berry . . . . . *Sherperdia canadensis*
Buffalo clover . . . . . *Trifolium reflexuum*
Buff-breasted sandpipers . . . . . *Tryngites subruficollis*
Bugseed . . . . . *Coriospermum hysopifolium*
Bulblet bladder fern . . . . . *Cystopteris bulbifera*
Bullsnake . . . . . *Pituophis catenifer*
Bulrush . . . . . *Scirpus hattorianus*
Bush honeysuckle . . . . . *Lonicera*
Byssus skipper . . . . . *Problema byssus*

Caddisflies . . . . . Order Trichoptera
Carp . . . . . *Cyprinus carpio*
Cattail . . . . . *Typha latifolia*
Cerulean warbler . . . . . *Dendroica cerulea*
Channel catfish . . . . . *Ictalurus punctatus*
Chara . . . . . *Chara* sp.
Cobweb skipper . . . . . *Hesperia metea*
Common juniper . . . . . *Juniperus communis*
Common reed . . . . . *Phragmites communis*
Cottonwood . . . . . *Populus deltoides*
Creek chub . . . . . *Semotilus atromaculatus*
Crown vetch . . . . . *Coronilla varia*

Darter . . . . . *Family Percidae*
Deer . . . . . *Odocoileus virginianus*
Dion skipper . . . . . *Euphyes dion*
Dog violet . . . . . *Viola conspersa*
Dogwood . . . . . *Cornus florida*
Dune thistle . . . . . *Cirsium pitcheri*
Dusted skipper . . . . . *Atryonopsis hianna*
Dwarf scouring rush . . . . . *Equisetum scirpoides*

Eastern box turtle . . . . . *Terrapene carolina*
Eastern chipmunk . . . . . *Tamias striatus*
Eastern hognose snake . . . . . *Heterodon platirhinos*
Eastern kingbird . . . . . *Tyrannus tyrannus*
Eastern newt . . . . . *Notophthalmus viridescens*
Eastern pipistrelle . . . . . *Pipisetrellus subflavus*
Eastern racer . . . . . *Coluber constrictor*
Eastern rat snake . . . . . *Elaphe obsoleta*
Elm . . . . . *Ulmus* sp.
Eurasian water milfoil . . . . . *Myriophyllum spicatum*
European buckthorn . . . . . *Rhamnus cathartica*
Eyed brown . . . . . *Lethe eurydice*

False bugbane . . . . . *Trautvetteria caroliniensis*
Fern moths . . . . . *Callopistria cordata* and *C. mollissima*
Fernleaf pondweed . . . . . *Potamogeton robbinsii* (???= fern pondweed)
Few-seed sedge . . . . . *Carex oligosperma*
Forked aster . . . . . *Aster furcatus*
Four-toed salamander . . . . . *Hemidactylium scutatum*
Fowler's toad . . . . . *Bufo fowleri*
Frosted elfin butterfly . . . . . *Incisalia irus*

Garlic mustard . . . . . *Alliaria petiolata*
Giant reed . . . . . *Phragmites communis*
Globe mallow . . . . . *Sphaeralcea angusta*
Glossy buckthorn . . . . . *Rhamnus frangula*
Goby . . . . . *Neogobius melanostomus*
Graham's crayfish snake . . . . . *Regina grahamii*
Grasshoppers . . . . . Order Orthoptera
Grass-leaved arrowhead . . . . . *Sagitaria graminea*
Gray fox . . . . . *Urocyon cinereoargenteus*
Gray squirrel . . . . . *Sciurus carolinenis*
Great copper . . . . . *Lycaena xanthoides*
Great grey copper . . . . . *Lycaena xanthoides dion*
Green frog . . . . . *Rana clamitans*
Greenfruit bur-reed . . . . . *S. chlorocarpum*

Grote's dart moth . . . . . *Loxagrotis grotei*
Gypsy moths . . . . . *Lymantria dispar*

Hairy puccoon . . . . . *Lithospermum caroliniense*
Hairy rock cress . . . . . *Arabis hirsuta*
Hall's bulrush . . . . . *Scirpus* sp.
Hazel . . . . . *Corylus americana*
Henslow' sparrow . . . . . *Ammodramus henslowii*
Hepatica . . . . . *Hepatica americana*
Hill's thistle . . . . . *Cirsium hilli*
Hobomok skipper . . . . . *Poanes hobomok*
Horizontal juniper . . . . . *Juniperus horizontalis*
Hornyhead chub . . . . . *Nocomis biguttatus*

Impatiens . . . . . *Impatiens* sp.
Indian skipper . . . . . *Hesperia sassacus*
Indiana bat . . . . . *Myotis sodalis*
Ironweed . . . . . *Vernonia fasciculata*
Ivory sedge . . . . . *Carex eburnea*

Jack pine . . . . . *Pinus banksiana*
Japanese hedge parsley . . . . . *Torillus japonicus*

Kalm St. John's wort . . . . . *Hypericum kalmianum*
Karner blue butterfly . . . . . *Lycaeides melissa samuelis*
King rail . . . . . *Rallus elegans*
Kirtland's snake . . . . . *Clonophis kirtlandii*
Knapweed . . . . . *Centaurea maculata*

Lake perch . . . . . .
Lamprey . . . . . *Petromyzon marinus*
Largemouth bass . . . . . *Micropterus salmoides*
Lark sparrow . . . . . *Chondestes grammacus*
Leafhoppers . . . . . *Family Cicadellidae*
Leafy prairie clover . . . . . *Dalea foliosa*
Leafy spurge . . . . . *Euphorbia eschula*
Little bluestem . . . . . *Andropogon scoparius*
Loggerhead shrike . . . . . *Lanius ludovicianus*

Maple . . . . . *Acer* sp.
Marram grass . . . . . *Ammophila breviligulata*
Marsh valerian . . . . . *Valeriana uliginosa*
Marsh wren . . . . . *Citothorus palustris*
Massasauga . . . . . *Sistrurus catenatus*
Mouse colored lichen moth . . . *Pagara simplex*

Narrow-leaf cattail . . . . . *Typha augustfolia*
Nodding trillium . . . . . *Trillium cernuum*
Northern cranesbill . . . . . *Geranium*??
Northern cricket frog . . . . . *Acris crepitans*
Northern fern geometer . . . . . *Petrophora subaquaeria*
Northern harrier . . . . . *Circus cyaneus*
Northern hog sucker . . . . . *Hypentelium nigricans*
Northern leopard frog . . . . . *Rana pipiens*
Northern water snake . . . . . *Nerodia sipedon*
Norway maple . . . . . *Acer platanoides*

Oak . . . . . *Quercus* sp.
Ottoe skipper . . . . . *Hesperia ottoe*

Pacific salmon . . . . . .
Painted turtle . . . . . *Chrysemys picta*
Pale false foxglove . . . . . *Agalinis skinneriana*
Pale vetchling . . . . . *Lathyrus ochroleucus*
Paw paw . . . . . *Asimina triloba*
Paw paw sphinx moth . . . . . *Dolba hylaeus*
Persius duskywing skipper . . . . *Erynnis persius persius*
Phlox flower moth . . . . . *Schinia indiana*
Pickerel frog . . . . . *Rana palustris*
Pike . . . . . *Esox lucius* (?northern pike)
Pileated woodpecker . . . . . *Dryocopus pileatus*
Pipevine swallowtail . . . . . *Battus philenor*
Pitcher's thistle . . . . . *Cirsium pitcheri*
Plains leopard frog . . . . . *Rana blairi*
Prairie bush clover . . . . . *Lespedeza leptostachya*
Prairie white fringed orchid . . . *Platanthera leucophaea*
Prothonotary warbler . . . . . *Protonotaria citrea*
Pugnose shiner . . . . . *Notropis anogenus*
Purple loosestrife . . . . . *Lythrum salicaria*
Purple cliff brake . . . . . *Pellaea glabella*
Purple-fringed orchid . . . . . *Platanthera psycodes*
Purplish copper . . . . . *Lycaena helloides*

Queen of the prairie . . . . . *Filipendula rubra*
Queen snake . . . . . *Regina septemvittata*

Raccoon . . . . . *Procyon lotor*
Rattlesnake master borer moth . . *Papaipema eryngii*
Red oak . . . . . *Quercus rubra*
Red-headed woodpecker . . . . *Melanerpes erythrocephalus*
Redhorse . . . . . *Moxostoma* sp.
Redroot . . . . . *Ceanothus herbaceous*
Red-shouldered hawk . . . . . *Buteo lineatus*
Red-veined prairie leafhopper . . *Aflexia rubraneura*
Reed canary grass . . . . . *Phalaris arundinacea*
Regal fritillary . . . . . *Speyeria idalia*
Rice grass . . . . . *Oryzopsis asperifolia*
River otter . . . . . *Lutra canadensis*
Round-leaved sundew . . . . . *Drosera rotundiflora*
Royal fern borer . . . . . *Papaipema speciosissima*
Ruddy turnstones . . . . . *Arenaria interpres*

Sago pondweed . . . . . *Potamogeton pectinatus*
Sand cherry . . . . . *Prunus pumila*
Sand cress . . . . . *Arabis lyrata*
Sand reed grass . . . . . *Calamovilfa longifolia*
Sandhill crane . . . . . Grus canadensis
Savanna blazing star . . . . . *Liatris scariosa var. nieuwlandii*
Scrub oak . . . . . apparently *Quercus velutina*??
Sculpin . . . . . Family Cottidae
Sea rocket . . . . . *Cakile edentula*
Semipalmated plovers . . . . . *Charadrius semipalmatus*

Sensitive fern borer . . . . . *Papaipema inquaesita*
Shadbush . . . . . *Amelanchier arborea*
Shore St. John's wort . . . . . *Hypericum adpressum*
Short-eared owl . . . . . *Asio flammeus*
Silver bordered fritillary . . . . . *Boloria selene*
Silvery blue . . . . . *Glaucopsyche lygdamus*
Silvery checkerspot . . . . . *Chlosyne nycteis*
Slender rock brake . . . . . *Cryptogramma stelleri*
Smallmouth bass . . . . . *Micropterus dolomieu*
Smooth green snake . . . . . *Liochlorophis vernalis*
Spotted salamander . . . . . *Ambystoma maculatum*
Spotted turtle . . . . . *Clemmys guttata*
Spring peeper . . . . . *Pseudacris crucifer*
Stonefly . . . . . Family Perlidae
Stoneroller . . . . . *Campostoma* sp.
Striped shiner . . . . . *Luxilus chrsocephalus*
Suckers . . . . . Family Castostomidae
Sugar maple . . . . . *Acer saccharum*
Summer tanager . . . . . *Pirangarubra*
Swamp metalmark . . . . . *Calephelis muticum*
Sweet clover . . . . . *Melilotus*
Sycamore . . . . . *Platanus occidentalis*
Sycamore sallow moth . . . . . *Lithophane signosa*

Tartarian honeysuckle . . . . . *Lonicera* sp.
Teasel . . . . . Family Dipsaceae
Trailing arbutus . . . . . *Epigaea repens*
Tuliptree . . . . . *Liriodendron tulipifera*
Two-spotted skipper . . . . . *Euphyes bimacula*

Upland sandpiper . . . . . *Bartramia longicauda*

Veiny pea . . . . . *Lathyrus venosus*

Walking fern . . . . . *Camptosorus rhizophyllus*
Water arum . . . . . *Calla palustris*
Water celery . . . . . *Vallisneria americana*
Water parsnip . . . . . *Sium suave*
Water star weed . . . . . *Elodea* ??
Water stargrass . . . . . *Heteranthera dubia*
Watercress . . . . . *Nasturtium officinale*
Western chorus frog . . . . . *Pseudacris triseriata*
Western meadowlark . . . . . *Sturnella neglecta*
Western ribbon snake . . . . . *Thamnophis proximus*
Whip-poor-will . . . . . *Caprimulgus vociferus*
White ash . . . . . *Fraxinus americana*
White footed mice . . . . . *Peromyscus leucopus*
White oak . . . . . *Quercus alba*
White pine . . . . . *Pinus strobus*
White stem pondweed . . . . . *Potamogeton praelongus*
Wild plum . . . . . *Prunus americana*
Willow flycatcher . . . . . *Empidonax traillii*
Winged polygala . . . . . *Polygala paucifolia*
Wood frog . . . . . *Rana sylvatica*
Woodland vole . . . . . *Microtus pinetorum*

Yellow birch . . . . . *Betula lutea*
Yellow breasted chat . . . . . *Icteria virens*
Yellow-billed cuckoo . . . . . *Coccyzus americanus*
Yellow-headed blackbird . . . . . *Xanthocephalus xanthocephalus*

Zebra mussels . . . . . *Dreissena polymorpha*
Zebra swallow-tail butterfly . . . . *Eurytides marcellus*

Appendix 4
Preliminary Results of Community Workshop Assessments

Quantity ranking

Very high risk
(of cessation of contributing ecosystem values due to number of acres remaining, percent remaining vs. pre-European settlement extent, number of occurrences, number of sufficiently large occurrences, amount under protection)

fine-textured-soil prairie
sand prairie
gravel prairie
dolomite prairie
streamside marsh
forested fen
graminoid fen
calcareous seep
sand seep
wet-mesic fine-textured-soil savanna
mesic sand savanna

High risk
wet-mesic upland forest
mesic fine-textured-soil savanna
dry sand savanna
calcareous floating mat
sedge meadow
panne
neutral seep
northern flatwood
sand flatwood

Moderate risk
dry-mesic upland forest
mesic upland forest
dry-mesic woodland
mesic woodland
wet-mesic woodland
wet-mesic floodplain forest
wet floodplain forest
basin marsh
bog
dry-mesic fine-textured-soil savanna
dry-mesic sand savanna

Condition ranking

Poor
(rapidly losing biodiversity or little of good quality remaining)

fine-textured-soil prairie
sand prairie
gravel prairie
dolomite prairie
dry-mesic woodland
mesic woodland
wet-mesic woodland
dry-mesic fine-textured-soil savanna
mesic fine-textured-soil savanna
wet-mesic fine-textured-soil savanna
streamside marsh
forested fen
graminoid fen
calcareous seep
sand seep
mesic upland forest
wet-mesic upland forest

Fair
(quite a bit of biodiversity remaining but declining or moderate amount remaining)

wet-mesic floodplain forest
wet floodplain forest
northern flatwood
sand flatwood
dry sand savanna
basin marsh
bog
calcareous floating mat
sedge meadow
neutral seep
dry-mesic upland forest

Good
(much biodiversity survives and fairly stable, but not all of high quality)

dry-mesic sand savanna
mesic sand savanna
panne

Biological importance

(based on species richness, numbers of E/T species, habitat significance, levels of species conservatism, special habitat features, and ecological functions)

High importance
fine-textured-soil prairie
sand prairie
gravel prairie
dolomite prairie
flatwood
woodland
fine-textured-soil savanna
sand savanna
marsh
fen
sedge meadow
panne
calcareous seep

Medium importance
upland forest
floodplain forest
bog

Low importance
sand seep
neutral seep

Distribution assessment

Good/best examples in Chicago Wilderness Region
(significantly contributing to global conservation)

fine-textured-soil prairie
sand prairie (dune and swale)
dolomite prairie
gravel prairie ??
woodland
fine-textured-soil savanna
sand savanna (lake plain)
basin marsh
calcareous floating mat
graminoid fen
panne

Wide spread
(good examples in the region but also good examples elsewhere)

upland forest
floodplain forest
flatwood???
streamside marsh
sedge meadow
calcareous seep

Edge of range
(better opportunity to conserve elsewhere)

bog
forested fen
sand seep
neutral seep

Appendix 5

Chicago Wilderness Aquatic Classification: Streams

Stream category	Physical description	Ecological description	Indicator fish species	Macroinvertebrate species	Plant species	Example stream
Headwater streams	**1st order/small drainage area Little or no pool development**	**Low habitat heterogeneity Low trophic complexity High P/R**				
Continuous flow	cool temp/stable temp, DO		sculpins, dace caddis fly, stone fly	*Orconectes propinquus*	water cress, chara water parsnip, berula	
• Course substrate						Black Partrige Creek Silver Creek
• Fine substrate						Rob Roy
Intermittant flow	highly variable flow, temp	colonizers, aesivation flood avoidance, abiotic high reproductive rates	bluntnose minnow striped shiner			Mill Creek headwaters
• Course substrate						
• Fine substrate						
Low order	**2nd-4th order Small to medium-sized creeks More stable temp, DO Riffle and pool development**	**More complex habitat Increased trophic complexity More allochthonous input Biotic factors seasonallly imp.**				
High gradient	>5 ft/mile course substrate cobble, gravel		darters/stonerollers horneyhead chub suckers/sm bass			Tyler Creek Buck Creek Long Run Creek
Low gradient	<5 ft/mile fine substrate silt, sand		creek chub bluntnose minnow redfin shiner/sunfish		sago pond weed water star weed American pond weed	Lily Cache Skokie River Plum Creek Mill Creek
Mid order	**5th-8th order Large creeks to medium rivers Stable flow, temp High habitat diversity**	**Most complex habitat Predators abundant Diverse energy sources Highest biological diversity**				
High gradient	>3 ft/mile gradient course substrate		smallmouth bass northern hogsucker redhorse	*Orconectes propinquus*		Lower Fox River Kankakee River Kishwaukee River
Low gradient	<3 ft/mile gradient fine substrate		largemouth bass bluegill/sunfish pike, carpsuckers channel catfish	*Orconectes virilis*		Upper Fox River Upper Des Plaines

Chicago Wilderness Aquatic Classification: Lakes

Lake category	Physical description	Ecological description	Dominant fish species	Macroinvertebrate species	Plant species	Herps	Example lake
Natural							
Lake Michigan	cool water temp large, stable	oligotrophic	sculpin, barbot yellow perch salmonids (i, native) ale wifes (i), smelt (i)	zebra mussels (i)			
Glacial							
• Kettle	isolated basin, mostly shallow warmwater, high in watershed, stratification common	stable, biotic factors important, low trophic complextiy, low species diversity	brown bulhead lake chubsucker warmouth	*Procambarus*	water shield, eel grass	common map turtle, mudpuppy	Lake Elizabeth Cedar Lake Defiance Lake
• Flow through	connected to stream system, high watershed/ surface area, turnover, minimal stratification	high habitat and species diversity, high trophic complexity	northern pike, largemouth bass, yellow bass, bluegill, pugnose minnow	mussels (floater)	lotus, grass-leaved pondweed	blandings turtle	Fox Chain o Lakes Loon Lake
Bottomland	adjacent to large stream seasonally flooded, shallow	seaonal recruitment abiotic factors dominant	topminnows, pike bullheads, bowfin	snails abundant	emergent plants, lotus, duckweed, algal blooms		Lyons Marsh Saganashkee Slough
Vernal pond/pool	seasonally inundated depression, generally small	fishless, abiotic dominant, low trophic diversity	n/a	*Phallicambarus photians Cambarus, Procambarus*	sedges, stranded aquatics, mermaid weed	high diversity salamanders newts	Ryerson Woods Deer Grove, Busse
Manmade							
Naturalized	old, mature shoreline no intensive management	long-term stability, successionally advanced				high diversity	Sag Quarry Bluff Spring Fen Quarry
Other	dug, dammed etc., recent intensively managed	unstable communities, no advanced succession					Busse Lake Beck Lake

Appendix 6
Priority Groups of Endangered and Threatened Plant Species in Chicago Wilderness

List based on Illinois and Indiana Natural Heritage Database. Wisconsin to be incorporated. Where species are listed as endangered or threatened in both states but only one state is noted in this list, it means the species does not occur in the CW region of the other state or was not judged to be a priority in the CW region by the state representatives who compiled the list. Ongoing revision is essential to this process and this document.

Priority group 1

Globally rare species (based on TNC ranking); includes federal listed and former candidate species (C1/C2).
Agalinis auriculata (IN)
Agalinis skinneriana (IL, IN)
Aster furcatus (IL, IN)
Cirsium hillii (IL, IN)
Cirsium pitcheri (IL, IN)
Dalea foliosa (IL)
Hymenoxys acaulis glabra (IL)
Hypericum adpressum (IL, IN)
Lespedeza leptosachya (IL)
Lycopodiella subappressa (IN)
Platanthera leucophaea (IL, IN)
Rhus aromatica arenaria (IN)
Scirpus hallii (IN)
Scirpus purshianus (IN)
Solidago simplex gillmanii (IN)
Talinum rugospermum (IN)
Tomanthera auriculata (IL)

Priority group 2

Great Lakes endemic species or those whose critical range is within Chicago Wilderness Region.
Arenaria patula (IL) (dolomte prairie; quasi-endemic, disjunct from glades further south)
Cirsium pitcheri (IL; IN–recovery plan in progress)
Dalea foliosa (IL) (dolomte prairie; quasi-endemic, disjunct from glades further south)
Hypericum kalmianum (IL; not listed in IN but occurs there)
Isoetes butleri (IL) (dolomte prairie; quasi-endemic, disjunct from glades further south)
Lathyrus maritimus glaber (IN) (*L. japonicus glaber* IL) quasi-endemic in Great Lakes region–recovery plan in progress in IL
Salix syrticola (IL) (*Salix cordata* IN)
Sphaeralacea angusta (*Malvastrum hispidum*) (IL) ???

Priority group 3

Species that are disturbance dependent (early successional) or that do not fall within a well-defined community type.
Corydalis sempervirens (IN)
Fuirena pumila (IN)
Geranium bicknellii (IL, IN)
Juncus pelocarpus (IN)
Lathyrus maritimus glaber (IN) (*Lathyrus japonicus glaber*–recovery plan in IL)
Lechea intermedia (also taxonomic questions) (IL)
Myosotis laxa (IN)
Oenothera perennis (IL, IN)
Plantago cordata (IL–may be extirpated in region)
Polygala incarnata (IL)
Polygonum careyi (IN)
Ranunculus cymbalaria (IN)

Scirpus hallii (IN)
Sisyrinchium montanum (IL, IN)
Strophostyles leiosperma (IN)
Tomanthera auriculata (IL) *Agalinis auriculata* (IN)
Trifolium reflexum (IL)

Priority group 4

Species that have fewer than 50% of their EOs in protected sites in state indicated: either Level 1 (Nature Preserves) or Level 2 (other public lands).
Agalinis skinneriana (IN)
Amelanchier sanguinea (IL)
Ammophila breviligulata (IL)
Androsache occidentalis (IN)
Arabis glabra (IN)
Bidens beckii (IL)
Buchnera americana (IN)
Carex crawei (IN)
Carex richardsonii (IN)
Cimicifuga racemosa (IL)
Eleocharis geniculata (IN)
Eleocharis microcarpa (IN)
Fimbristylis puberula (IN)
Hudsonia tomentosa (IN)
Hypericum pyramidatum (IN)
Juncus articulatus (protected, but only known from 1 site) IN
Linum striatum (IN)
Ludwigia sphaerocarpa (IN)
Lycopodiella verticillatum (IN)
Orobanche fasciculata (IN)
Panicum verrucosum (IN)
Potamogeton richardsonii (IN)
Psilocarya scirpoidees (IN)
Ranunculus cymbalaria (IL)
Rynchospora globularis recognita (IN)
Sanguisorba canadensis (IL)
Selaginella rupestris (IN)
Shepherdia canadensis (IL)
Sisyrinchium atlanticum (IL)
Sparganium americanum (IL)
Sparganium chlorocarpum (IL)
Sphaerlacea angusta (IL)
Spiranthes lucida (IL)
Spiranthes magnicamporum (IN)
Symphoricarpos albus albus (IL)
Talinum rugospermum (IN)
Valerianella chenopodifolia (IL)

Priority group 5

Species with particular taxonomic or reproductive problems and/or needing life history research; species whose survival or reproductive success is seriously compromised by external factors such as herbivory, hydrology, canopy closure, poaching, etc. Most species in Priority Group 1 can also be added to this Group.
Ammophila breviligulata (stiff competition with *Elymus arenarius*–IL)
Asclepias lanuginosa (reproductive problem–IL)
A. ovalifolia (reproductive problem–IL)

Aster furcatus (reproductive problem–IL)
Botrychium matricariaefolium (hydromesophytic woods–disturbed hydrology–IN)
B. simplex fern taxonomic research–IL, IN)
Carex debilis rudgei (lakeplain swamps/hydromesophytic forest–disturbed hydrology–IN)
C. folliculata (mesophytic swamps–disturbed hydrology–IN)
C. leptonervia (hydromesophytic forest–disturbed hydrology–IN)
Chrysosplenium americanum (hydromesophytic forest–disturbed hydrology–IN) *Cirsium hillii* (reproductive questions–IL, IN)
Cypripedium parviflorum (purple loosestrife invasion/browse/poaching–IL)
C. reginae (deer browse threat to reproductive success–IL)
Filipendula rubra (reproductive problem; non-seed producing–IL)
Hymenoxys acaulis glabra (reproductive problems–IL)
Lathyrus ochroleucus (reproductive problems: nonflowering/seeding populations–IL, IN)
Lathyrus venosus (fire suppression/closed canopy–IN)
Lycopodium tristachyium (closed canopy–N)
Malaxis unifolia (IN)
Orobanche fasciculata (parasitic–IL, IN)
Phlox bifida stellaria (fire suppression/closed canopy–IN)
Platanthera ciliaris (IL, IN)
P. psycodes (deer browse threat to reproductive success–IL)
Rubus setosus (taxonomic questions–IL, IN)
Scirpus hattorianus (habitat compromise–IL)
Shepherdia canadensis (IL, IN)
Trillium cernuum macranthus (deer browse/canopy closure–IL, IN)

Priority group 6

Species that may be adequately protected or stable but are restricted to rare communities within CW in state indicated.
Note: Communities used here are still to be cross-walked with the CW community classification system.
Arenaria patula (dolomite prairies–IL)
Bidens beckii (aquatic; glacial lakes–IL)
Cakile edentula (lakeshores, beaches–IL)
Calla palustris (bogs–IL, IN)
Cardamine pratensis var. *palustris* (fens, calcareous floating mats–IL)
Carex atherodes (wet meadows/shallow marshes–IN)
C. bebbii (calcarious fens and prairies–IN)
C. brunescens (bogs–IL, IN)
C. canescens disjuncta (bogs–IL)
C. chordorrhiza (bogs–IL)
C. conoidea (calceous prairies/dolomite prairies–IN)
C. cryptolepis (fens–IN)
C. disperma (bogs–IL)
C. garberi (pannes- IL, IN)
C. intumescens (flatwoods–IL)
C. limosa (sphagnum bogs–IN)
C. oligosperma (bogs–IL)
C. trisperma (bogs–IL)
C. tuckermanii (flatwoods–IL)
Castilleja sessiliflora (lakeshore sand prairie–IL)
Ceanothus herbaceous (sand savannas–IN, IL)
Chaerophyllum procumbens shortii (mesophytic wooded bluffs–IN)
Chamaedaphne calyculata (bogs–IL)
Cornus canadensis (bogs–IL, IN) edge of range
Cypripedium acaule (bogs–IL)
Drosera rotundifolia (bogs–IL)
Eleocharis melanocarpa (moist sandy prairies–IN)
E. olivacea (pannes–IL)

E. pauciflora (pannes/seeps–IL)
E. rostellata (calcareous seeps and springs–IL)
Epilobium angustifolium (bogs–IN)
Eriocaulon septangulare (lake border with calcareous soils–IN)
Eriophorum virginicum (bogs–IL)
Gentiana puberulenta (black soil prairies–IN)
Isoetes butleri (dolomite prairies–disjunct from glades further south–IL)
Juncus scirpoides (wet sandy soils/wet prairies- IN)
Juniperus horizontalis (lakeshore, foredunes–IL)
Lathyrus ochroleucus (dry oak woods/savannas–IN)
L. venosus (dry prairies/savannas–IN)
Larix laricina (bogs–IL)
Liatris scariosa var. *nieuwlandii* (savannas–IL)
Platanthera ciliaris (bogs–IIN)
P. hyperborea (pannes, fens–IN)
P. psycodes (flatwoods–IL)
Potamogeton gramineus (aquatic/glacial lakes–IL)
P. praelongus (aquatic/glacial lakes–IL)
P. pulcher (aquatic/shallow acid waters–IL, IN)
P. robbinsii (aquatic/glacial lakes–IL, IN)
P. strictifolius (aquatic/calcareous lakes and ponds)
Potentilla anserina (pannes/calcareous flat marshes–IN)
Rhynchospora alba (pannes/calcareous seeps and springs/bogs–IL)
Ribes hirtellum (bogs–IL)
Salix serissima (bogs–IL)
Scirpus cespitosus (calcareous springs and seeps–IL)
Scirpus smithii (bog or sandy pond shores–IL, IN)
Scirpus hallii (sand ponds–IN)
Scleria reticularis (sandy soil/marshes–IN)
Sphaerlacea angusta (*Malvastrum hispidum*) (dolomite prairies–IL)
Sparganium androcladum (clean water lakes–IN)
Thuja occidentalis (bogs/forested springy fens/eroded bluffs–IL)
Tofielda glutinosa (pannes/seeps–IL)
Triglochin palustris (seeps/springs/marl flats–IL, IN)
Utricularia cornuta (calcareous seeps/pannes–IL, IN)
U. geminiscapa (bogs–IN)
U. intermedia (calcareous seeps/pannes–IL)
U. minor (calcareous seeps/pannes–IL, IN)
U. subulata (pannes–IN)
Vaccinium macrocarpon (bogs–IL)
V. oxycoccos (bogs–IL)
Valerianella chenopodifolia (limestone bluffs and riparian areas–IL, IN)

Appendix 7
Tools for Communication and Education Ef forts

Tools for educators	Description	Purpose / audience
Biodiversity Kit	Problem-based program with sample scenarios for exploring local biodiversity. Includes 148-page Educator's Guide.	To engage K-8th graders in searches for viable solutions to biodiversity threats.
Chicago Tribune Educational Services supplement, "Chicagoland Ecosystem"	Sixteen-page newspaper supplement for educational use with activities for grades 4-9.	To help students understand biodiversity and its local implications.
Chicago Wilderness Atlas Education Package	Integrated educational tool that includes *Chicago Wilderness: An Atlas of Biodiversity,* "Natural Wonders" poster with educational activities and *Tribune* Educational Services supplement.	For educators and students to learn about the natural communities of the Chicago region.

Tools for individuals, agencies and organizations	Description	Purpose / audience
Chicago Wilderness: An Atlas of Biodiversity	Full-color, 64-page book describing the natural communities of the region.	For the general public, educators, media, elected officials, corporate and community leaders.
Chicago WILDERNESS Magazine	Quarterly magazine celebrating the rich natural heritage of the region.	To convey the messages of local biodiversity protection in a popular format; for all general audiences.
Chicago Wilderness "Portable Resources"	Fifteen-minute video called "This is Chicago Wilderness"; colorful and informative tabletop display; slide show presentation.	To give organizations the means for both internal and external communication about Chicago Wilderness.
Chicagoland Environmental Network (CEN)	Public point-of-contact for volunteer opportunities and events, managed by Brookfield Zoo.	To provide means for public to become informed about and involved in local conservation activities.
Chicago Wilderness Web Site at www.chiwild.org	Comprehensive resource for news and issues related to biodiversity protection, managed by Chicago Academy of Sciences.	To increase public awareness and provide forum for scientists, educators and land managers to share information.

Appendix 8
Chicago Wilderness Member Organizations: Their Mission and Significant Regional Achievements

(As of June 1999. For an up-to-date listing of members, visit www.chicagowildnerness.org.)

Federal agencies	Mission	Significant regional achievements
U.S. Army Corps of Engineers, Chicago District	Maintains seven harbors, operates the Chicago Lock, designs and constructs flood control and shoreline protection projects, regulates discharge into waters of the U.S., including wetlands, does work for other agencies, and assists in emergencies. Key local projects include the Chicago Shoreline Protection Project, Chicagoland Underflow Project reservoirs, Upper Des Plaines Flood Damage Reduction Project and Waukegan Harbor Feasibility Study.	
U.S. Department of Energy, Argonne National Laboratory	Research and development in the basic sciences, energy, and environmental management.	1500-acre site surrounded by forest preserve. Vegetation communities of the site have been mapped using field surveys, remote sensing, and a Geographic Information System. Initiated the restoration of its oak woodland and prairie communities removing invasive non-native species and enhancing reproduction of native species. In addition, establishment of a 6-acre native tallgrass prairie has begun on a former building site. Argonne staff has been involved in prairie restoration and research programs in the Chicago area and a number of colleges and universities have participated in ecological research on the Argonne site.
U.S. Dept. of Energy, Fermi National Accelerator Laboratory	Research exploring the fundamental nature of matter and energy	Fermilab's National Environmental Research Park program makes land available for externally funded environmental research projects. To date, over 40 projects have been proposed, and several are currently underway.
Environmental Protection Agency, Region 5	Protecting human health and preserving our natural resources; preventing and abating pollution; education; setting and enforcing environmental standards, assisting states and local govts.	
U.S. EPA Great Lakes National Program Office	Oversees implementation of the U.S./Canada Great Lakes Water Quality Agreement to "restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin ecosystem."	Efforts include monitoring and reporting on conditions in the basin ecosystem, and also funding demonstration projects (e.g., habitat protection, restoration)
Urban Resources Partnership	Partnership of seven federal agencies to provide technical assistance or funding for projects in urban areas.	Works with communities and non-profit community focused projects with "on the ground" natural resources and educational opportunities for under served communities. Has sponsored projects such as community gardens and ecosystem restoration.
USDA Forest Service	Caring for the land and serving the people.	Through unique partnerships with state and local natural resource agencies, works in Northeastern Illinois to manage forests, prairies, and related natural resources for long term community and ecological sustainability and improved quality of life of all citizens. The Chicagoland area is home to three USDA Forest Service offices—the Midewin National Tallgrass Prairie in Wilmington and the joint North Central Research Station/Northeastern Area Sate and Private Forestry offices in Evanston.
USDA Natural Resources Conservation Service	To provide assistance for conservation on private lands.	A natural resources agency that provides science-based information, products, and services, and works with other groups and agencies on watershed planning, flood protection and wildlife habitat, etc.
USDI Fish and Wildlife Service	Protect and enhance fish and wildlife resources for the American people.	Works with partners to restore wetlands and trust resources; manages land in the national wildlife refuge system. In the Chicago area has been involved about 100 wetland restoration or enhancement, or research projects.

USDI National Park Service, Rivers Trails and Conservation Assistance Program	Conserves natural and cultural resources of the Park System for enjoyment, education and inspiration of this and future generations.	The Chicago Rivers Demonstration Project, an NPS collaborative effort led by Friends of the Chicago River, was initiated in 1992 to enhance the natural and recreational resources of the Chicago and Calumet Rivers.
USDI National Park Service, Indiana Dunes National Lakeshore	Preserves more than 10,000 acres of shoreline, wetlands, oak woodlands, savanna and bog.	More than 15 miles of Lake Michigan shoreline are managed. Includes more than 1440 species of vascular plants as well as critical habitat for 2 federally listed species.

State agencies	Mission	Significant regional achievements
Illinois Department of Natural Resources	Conserves, preserves and enhances Illinois' natural resources; provides outdoor recreation for public.	Develops recreational facilities; protects natural areas; manages game and fish populations; protects endangered plant and animal species. Partnered with US Forest Service to restore Midewin National Tallgrass Prairie. Developed C-2000 Ecosystem Program to fund watershed restoration projects. IDNR was instrumental in Redwing Slough, a wetland protection and stewardship project in Lake County, and the Urban Fishing Program, which gives youngsters an alternative to gangs and drugs.
Illinois Natural History Survey	Conducts research on natural resources to assure maintenance of State's biodiversity. Through its research and education programs, the Survey fosters responsible management and appreciation of the state's biological resources. The Survey's collections of plant and animal specimens are among the largest and oldest in North America and are used by researchers from all over the world.	
Illinois Nature Preserves Commission	Works to protect high-quality natural areas and habitats of endangered and threatened species.	Works with private and public landowners through voluntary efforts. Statewide, 278 sites totaling approximately 35,000 acres have been dedicated as Illinois Nature Preserves, including 102 sites totaling 15,140.28 acres in northeastern Illinois' six counties.
Indiana Department of Natural Resources	Protect, enhance, preserve, and wisely use natural, cultural, and recreational resources	Manages numerous properties, including museums and wildlife areas. In May 1995, the Indiana Natural Resources Commission adopted a Resolution to formally recognize the importance of the Lake Michigan coastal region to the state and to rededicate the professional staff of the Commission and the DNR in service to the region.

Local agencies	Mission	Significant regional achievements
Chicago Park District	To enhance the quality of life throughout Chicago by becoming the leading provider of recreational and leisure opportunities; providing safe, inviting and beautifully maintained parks and facilities; and creating a customer-focused and responsive park system.	Thousands of children and families participate in a wide range of natural resource-focused programs and ongoing restoration and management of lagoons, wetlands, prairies, and other ecosystems located throughout Chicago parks.
City of Chicago, Department of Environment	Conserve natural resources; education; prevent pollution	Operates the North Park Village Nature Center, a 61-acre preserve and environmental education facility on Chicago's northwest side that offers natural resources based community service and outreach programs in Chicago schools and hundreds of other programs annually.
Crystal Lake Park District	Provide safe programs, parks, facilities and services and to preserve and protect open land and water areas. District's Nature Center reconnects people with nature via educational programming and exhibits.	

Downers Grove Park District	Year-round recreation programs; parks, open space, and natural areas.	Restores and maintains 160 total acres at the Belmont Prairie State Nature Preserve and Lyman Woods, participates in the DuPage County River Sweep, and offers interpretive programs.
Forest Preserve District of Cook County	Protect, and restore areas with scientific, ecological, recreational, and historic values; creates an interconnected system of forest preserves that will be a national model of urban/open-space preservation.	
Forest Preserve District of DuPage County	To acquire open land and manage it to protect and enhance its natural values for public recreation, education and pleasure.	Has acquired nearly 23,000 acres (10% of land in the County). Completed extensive natural cover and habitat inventory for all properties. Maintains records on GIS database. Pursues an aggressive Natural Areas Management Program on 9,000 acres of quality natural areas.
Forest Preserve District of Kane County	Protect, and restore areas with scientific, ecological, recreational, and historic values.	Maintains about 7,500 acres of open space at the western fringe of the Chicago Wilderness. Maintains 12 Preserves protected under the Nature Preserve Ordinance of 1983, and many other areas of preservation and restoration.
Forest Preserve District of Will County	Protect, and restore areas with scientific, ecological, recreational, and historic values.	The Old Plank Road Trail, a 10-foot wide asphalt trail designed for non-motorized recreational use, currently runs from Park Forest to New Lenox. The trail is being extended to Park Road, in Joliet Township, which should be completed by November 1999; the total trail length will then be 19 miles. The trail is scheduled to be completed to downtown Joliet in 2001 and will measure 22 miles.
Geneva Park District	Provide recreational programs, and open space.	Offers programs and classes for adults and youth at Peck Farm Park, a nature interpretive site; holds environmental education field trips for schools, and community groups.
Kane-DuPage Soil and Water Conservation District	Provide natural resource information and assist with natural resource concerns.	SWCD programs include an annual conservation plant sale, fish sales for pond stocking, a well-water testing program and various education programs for youth and adult audiences.
Lake County Forest Preserves	To preserve a dynamic and unique system of natural and cultural resources, and to develop innovative educational, recreational and cultural opportunities of regional value, while exercising environmental and fiscal responsibility.	Own 21,000 acres of land with a goal of 26,000 acres, or 40 acres per 1,000 residents, by the year 2005. Earned voter approval of $85 million for land acquisition, habitat restoration, trails and other improvements this decade. Used by 75 percent of Lake County's population, with over 2.5 million visitors per year. Protecting 85 to 90 percent of lands for nature preservation and restoration. Increased natural resource management by 300 percent since 1993, with 12,000 acres now managed. Created 7,000-acer Des Plaines River Greenway protecting 88 percent of riverbank in Lake County and connecting many large Forest Preserves including dedicated Illinois Nature Preserves.
Lake County Stormwater Management Commission	The combination of explosive growth and wet topography has heightened the need for stormwater management. The Commission, composed of six municipal members and six County Board members, is responsible for implementing the Comprehensive Stormwater Management Plan, which was adopted in 1990 and a county wide watershed development ordinance adopted in 1992.	
Long Grove Park District	Preserve natural areas, and open space.	Holds over 400 acres of open space, including an Illinois Nature Preserve; Owns Woodland Nature Center devoted to nature education for both adults and children, and is working to enhance the habitat of one population of the prairie white fringed orchid. Acts as a depository agency for easement grants.
McHenry County Conservation District	Preserve and restore natural areas and open spaces for education, recreation, and environmental benefits	Biodiversity activities are centered around: 1) the permanent protection of existing natural areas through purchases or easements, 2) restoration of ecosystems, to pre-European settlement conditions, and 3) the provision of environmental education through workshops, school field trips, interpretive walks and a variety of other programs.

Metropolitan Water Reclamation District of Greater Chicago	Protecting Lake Michigan and area waterways.	Provides sewage treatment with seven water reclamation plants, and prevents pollution of rivers and the lake with the "Deep Tunnel." Operates five urban waterfalls and the Centennial Fountain.
North Cook County Soil and Water Conservation District	The mission of the North Cook County Soil and Water Conservation District is to provide for the Conservation of the natural resources of the District.	Agreement with the Army Corp to review Soil Erosion and Sediment Control plans on construction sites requiring Army Corp permits; host an environmental competition for high school students called the Envirothon; watershed planning facilitation; and soil erosion and sediment control workshops for municipalities.
Northeastern Illinois Planning Commission	Comprehensive, long range planning agency for the six–county region.	Facilitates intergovernmental cooperation. Provides regional guidance for stormwater management, water quality, stream, lake, and wetland protection, and conservation development. Develops forecasts for population, households and employment. Develops regional plans or water resources, open space and greenways, e.g., co-authored the Northeastern Illinois Regional Greenways Plan. Develops the Regional Growth Strategy and co-develops regional plans for transportation.
Oakbrook Terrace Park District	Meeting recreation needs.	Acquire, develop and maintain resources to facilitate recreational experiences and open space.
Schaumburg Park District	Education about natural history and the relationships of people to the land.	Manages over 225 acres of passive-use areas that encompass a wide range of habitat types and hundreds of native plant and animal species. A living history farm presents a glimpse of local land use during the late 1800s.
St. Charles Park District	Provides diverse programs, parks; preserves and protects open spaces, natural areas.	The Park District is actively managing and restoring six natural areas encompassing approximately 500 acres. Two of the natural areas are dedicated Illinois State Nature Preserves. Nature education is offered in a variety of venues to all ages.

Private not-for -profit org. Advocates for conser vation / sustainable development	Mission	Significant regional achievements
Center for Neighborhood Technology	Promoting public policies, which support sustainable, just and vital urban communities.	Campaign for a Sustainable Chicago, vision of a city in which environmental restoration fueled equitable economic revitalization. Defines its work in terms of interrelated strategies: information and communications, assets and opportunities, and collaborative learning and action.
Chicago Audubon Society	The Chicago Audubon Society is an environmental organization with a particular interest in birds and their habitats. As a chapter of the National Audubon Society, its objective is protection of the environment through education, stewardship, conservation and community interaction. The ideological and hands-on support of its members is the Society's major resource.	
Citizens for Conservation	Saving Living Space for Living Things through protection, restoration and stewardship of land, conservation of natural resources and education.	Helped preserve more than 2,000 acres in the Barrington area and owns more than 270 acres; some as open space others being restored to fen, bog, sedge meadow, prairie, marsh and savanna. Flint Creek Savanna and Grigsby Prairie are current restoration projects.
The Conservation Fund	Emphasizes the integration of economic and environmental goals.	Through real estate transactions, demonstration projects, education, and community based activities, designs long-term measures to conserve land and water resources. Current projects include working with the Liberty Prairie Reserve to expand open space and provide habitat in Lake County; works with communities and the private sector to implement development techniques that minimize impacts on environment.
DuPage Audubon Society	———	———

Environmental Law and Policy Center of the Midwest	Develop and advocate policies that preserve the environment and foster economic growth.	Won landmark federal court ruling requiring fuller accounting of relationship between proposed new toll roads and continued suburban sprawl;successfully protected Savannah Depot, Illinois largest unfragmented sand prairie, from development; induced state regulators to tighten pollution limits for Illinois waterways.
Fort Dearborn Chapter, Illinois Audubon Society	Protect native flora and fauna of Illinois and the habitats that support them through pollution control, the conservation of energy and all natural resources, a sound ecological relationship between human populations and their environments, and education. Studies all aspects of bird life, including identification and conservation, and hosts workshops that explore other aspects of biodiversity.	
Illinois Audubon Society	Preserves habitat, especially for threatened and endangered species, and conducts educational programs; prevent pollution, curb urban sprawl and safeguard environmental regulations.	
National Audubon Society	Protect habitat critical to our health and health of planet. Works with Chicago-area Audubon chapters and Chicago Wilderness members to conserve and restore nature. Focuses on wildlife, habitat and public education.	
Northwest Indiana Forum Foundation, Inc.	Stimulate private-sector economic growth.	Works for a sustainable northwest Indiana, using partnered environmental, natural resource and restoration efforts such as the Quality of Life Council, the Indiana Harbor and Ship Canal-Grand Calumet River Area of Concern activities and the Indiana Dunes Environmental Learning Center.
Prairie Woods Audubon Society	To conserve the environment, wildlife and natural habitats, education, and fellowship.	Supports two instructors who currently reach more than 5,000 grade school children through environmental education program, including studies on the ecology of prairies, ponds, wetlands, winter survival of animals and a study on owls. Holds monthly meetings and field trips.
Sierra Club, Illinois Chapter	Explore, enjoy and protect wild places of the Earth.	Works on pollution and conservation issues such as preserving large tracts of open space, strengthening water quality standards, reducing/proper disposal of solid waste, and promoting alternative transportation; land use planning
Thorn Creek Audubon Society	Promote the enjoyment and appreciation of birds, to educate adults and children concerning our natural environment, to preserve, protect and restore wildlife habitat, and to create awareness of local environmental issues.	

Private not-for -profit org. Educational/communication /professional/research	Mission	Significant regional achievements
Brookfield Zoo	Creating sustainable and harmonious relationships with nature	Award-winning exhibitory of animals and ecosystems that encourage conservation action and caring. Local and international research and education programs that support conservation efforts. Founder and home of Chicagoland Environmental Network, coalition of local environmental organizations that promotes conservation projects and volunteer opportunities.
Calumet Environmental Resource Center	Environmental and economic "information clearing house"	Houses over 2,500 documents, air photos, and maps on the region for organizations, agencies, and individuals. Helped form Lake Calumet Ecosystem Partnership.
Chicago Academy of Sciences	Scientific literacy for all citizens. Conservation and quality of life exhibits and environmental education programs.	Education outreach programs (e.g., CAos Club; Ecological Citizenship (EcoCit)); science workshops for teachers; lectures; field trips, weekend workshops and other programs for children and adults. Opening Peggy Notebaert Nature Museum in October 1999 focusing on ecology and natural history of the midwest from Great Lakes to prairies.

Chicago Botanic Garden	To stimulate and develop an appreciation and understanding of gardening, botany, and conservation by developing gardens, plant collections, and education and research programs of excellence while providing a continuing aesthetic experience at the Chicago Botanic Garden.	Living museum with 23 gardens, 385 acres total, 75 acres of lakes, 15 acres of prairie, and 100 acres of woods. Over 8,000 taxa of plants and over 900,000 visitors each year. The Skokie River restoration project is a permanent study site for streambank stabilization techniques. Mary Mix McDonald Woods, a flat woods and open oak woodland, is a restoration management project. The Suzanne S. Dixon Prairie is a 15-acre display of 6 regional prairie communities. Our research program on endangered and rare plants for the purposes of conservation and reintroduction includes genetic analysis, propagation, reproductive systems research, monitoring, and seed banking.
Chicago Ornithological Society	Promotes the recreational, educational and scientific aspects of ornithology in the area.	Publishes *The Birder,* a newsletter containing articles on area birds and birding and information on field trips for studying birds in their natural habitats. Holds regular meetings with speakers (both professional and amateur Ornithologists from around the country) who make presentations to COS members on diverse topics related to birding and ornithology. Schedules classes on bird identification. Maintains an e-mail forum (IBET) for Illinois birders to share information.
College of DuPage	Offers more than 100 nature and ecological classes each year including Prairie Ecology; 40 acres of the campus' 279 acres has been designated as nature preserves; 30 scientific papers have been published using data gathered from its preserves; offers biweekly prairie tours to the public during summer.	
Conservation Research Institute	Research and education in the restoration and management of natural ecosystems.	Works to identify factors that are significant in contributing to the biodiversity and stability of woodlands, wetlands, and prairies—to help planners, government agencies, and land owners manage remnant and restored land effectively.
The Field Museum	A research and educational institution devoted to understanding and preserving natural and cultural diversity.	Regional inventory, monitoring, and research programs that focus on species, communities, and landscape processes of conservation concern. Education programs, public exhibits, and other outreach on the region's biological diversity.
Hammond Environmental Education Center	Education about the effect every day choices on the environment.	Provides hands-on environmental learning activities for children and adults. Holds lecture series, teacher training workshops, and a summer day camp. Displays showing recycling efforts from industry; federal and state agencies, and environmental organizations are available.
Illinois-Indiana Sea Grant College Program	Fosters the creation and stewardship of an enhanced and sustainable environment and economy along southern Lake Michigan and in the Great Lakes region through research, education and outreach. Currently has active research and outreach programs in the areas of biological resources, coastal business and environment, and water quality.	
Indiana Dunes Environmental Learning Center	Promote appreciation for and understanding of natural resources at south end of Lake Michigan.	Establishment of residential environmental education facility in partnership with Indiana Dunes National Lakeshore, with school programs for 4th-6th grades and high school, plus teacher training and nonschool programs for all ages including adults, plus Environmental Education Consortium and other outreach activities.
Indiana University Northwest	Teaches courses on ecological science and environmental problems; performs research on metapopulation ecology, population ecology of amphibians and reptiles, prairie restoration and enhancement of species diversity in small prairie remnants; establishes native prairie habitats along the Little Calumet River; offers public slide presentations on Chicago Wilderness natural areas.	
Irons Oaks Environmental Learning Center	Environmental education for local school districts.	37-acre nature preserve in the south suburbs of Chicago. The Land Management Plan provides for prairie restoration and removal of non-native vegetation from the oak forest.

Jurica Nature Museum	Small natural history museum located on the campus of Benedictine University. Includes specimens displayed in natural habitats. Offers field trips, a free discovery box loan program and winter workshops for elementary school teachers.	
Lincoln Park Zoo	Education, wildlife preservation, and recreation.	The nation's oldest zoo, receives more than three million visitors annually. Houses 1,000 mammals, reptiles and birds; conducts local and international conservation efforts, programs for students and teachers, and special events. Participates in nearly 40 Species Survival Plans (guidelines for captive breeding, monitoring) endangered species (e.g., lowland gorillas, Siberian tigers, black rhinos).
Max McGraw Wildlife Foundation	Scientific, educational, and charitable corporation for conservation of natural resources.	Conducts research and conservation education work to improve wildlife and fisheries management and conservation techniques. Provides funds in support of research, education, and related conservation.
Morton Arboretum	Encourage planting and conservation of trees and other plants through plant collections, research, and education.	A 1,700-acre arboretum displays more than 3,600 kinds of plants from the north temperate zone. Collections are combined with 700 acres of oak woodland, reconstructed prairie, rare species habitat, and wetlands. Actively involved in research on rare plants and on the nature of presettlement vegetation.
John G. Shedd Aquarium	Enjoyment and conservation of aquatic life through education, research and public display.	Funded and provided staff for an investigation into the decline of the Illinois cricket frog population, worked with the Illinois EPA to create an exhibit about non-point source pollution, and is also involved in several Species Survival Plans and breeding programs.
Sustain, The Environmental Information Group	Works for sustainable environment through innovative communication strategies such as media support, graphic design work, internet support, and consulting.	
The Wetlands Initiative	Restoring our nation's wetland resources to reduce flooding, improve water quality, and expand wildlife habitat and conduct research and education.	Educating landowners about the importance of wetlands and proper stewardship of what they own; restoration of wetlands in Lake, Cook and Will Counties, and research into the structure of wet dolomite prairie. Current projects include working with the Cook County Forest Preserve to create the plan for wetland restoration at Poplar Creek, Skokie Lagoon, and Tinley Creek, and working with the US Forest Service to identify and restore the wetlands of Midewin National Tallgrass Prairie.
Wild Ones Natural Landscapers, Ltd.	Promotes biodiversity and environmentally sound landscaping practices.	Rescues plants from natural areas being destroyed and helps preserve gene pools by keeping these plants in gardens, or donating them to restoration organizations. Provides lectures, field trips, workshops, seeds, plants and personal help to its members and the general public.

Private not-for -profit org. Local stewardship and land protection	Mission	Significant regional achievements
Butterfield Creek Steering Committee	An intergovernmental watershed management organization comprising the south suburban municipalities of Homewood, Flossmoor, Olympia Fields, Richton Park, University Park, Glenwood and Chicago Heights.	Developed a plan for the watershed—"A Vision for Butterfield Creek"; developed and adopted a comprehensive watershed management ordinance. Currently pursuing a variety of open space preservation, stream management, education, and habitat enhancement projects.
Calumet Ecological Park Association	Preserve natural lands; highlight cultural resources; revitalize economy in the area.	Establish an urban ecological park in Chicago's Lake Calumet area and northwest Indiana.

Campton Historic Agricultural Lands, Inc.	Land trust, acquires and protects land for open space preservation and education.	Founded in 1977 with the 163-acre donation of the Garfield Farm Museum, CHAL has protected an additional 118 acres, restoring 45 as wetlands, prairie, and woodlands. CHAL considers the historic, natural, agricultural and open-space aspects of properties for protection.
Canal Corridor Association	Economic revitalization conservation of cultural and natural resources.	Works with public/private partnerships, offers technical assistance in historic preservation, land conservation and economic development. In 1984, the Association secured the Congressional designation of National Heritage Corridor, recognizing the significance of the 450 sq.mile area from Chicago to LaSalle/Peru, Illinois.
The Conservation Foundation	Preserve open natural lands, improve rivers and watersheds, conservation education.	The Foundation works in DuPage, Kane, Kendall and Will counties, boasts more than 1,400 members, and coordinates several programs: Land Trust, DuPage River Coalition, Trails Project, Environmental Education Project, West Chicago Prairie Stewardship Group, and the Big Rock Creek Project.
Friends of the Chicago River	Foster the vitality of the Chicago River for the human, animal, and plant communities within its watershed.	Educational projects; recreational projects; and restoration projects. Collaborated with private, government, and non-profit partners in the restoration of wetlands and stream corridors. Developing a watershed management plan for the north branch of the Chicago River and guidelines for re-naturalizing the channelized portions of the Chicago River.
Friends of the Parks	Improve and protect Chicago's parks.	Saved over 70 acres of lakefront parkland from private development; initiated an Adopt-A-Park/Adopt-A-Beach program, in which 65 businesses, schools, community groups and neighbors care for local parks; developed 149 local park advisory councils; mobilized thousands of volunteers to clean and green Chicago's parks on Earth Day, and the Great Lakes Beach Sweep.
Friends of Ryerson Woods	Protect this rare ecosystem for present and future generations.	Sponsors environmental education programs and projects Help manage the needs and uses of the Edward L. Ryerson Conservation Area.
Garfield Park	Enhance and maintain collections and facilities (greenhouses?) through community programs.	A task force formed from representatives from various community, education, and environmental organizations to revitalize the Conservatory after losses of aroid plants following a cold snap in 1994. Offers educational tours of the Conservatory, a Summer Nature Camp, an After School Program, and a Community Gardening and Greening Program.
Lake Forest Open Lands Association	Conservation and restoration of open space within Lake Forest and vicinity.	Has preserved and manages over 700 acres of prairie, savanna, woodlands and wetlands in the Lake Forest area. Recently expanded its scope of environmental education by opening the Lockhart Family Nature Center,educating over 3,000 students and general public annually.
Lake Michigan Federation	Lake Michigan Federation To restore urban aquatic habitat, promote better land and water use practices, and cut toxics that threaten children's health around Lake Michigan.	Advocates for improving citizen access to aquatic habitat in cities, such as wetlands, nearshore bird stopovers, and fish spawning grounds; works for improved water quality; and coordinates thousands of volunteers for cleaning Lake Michigan beaches as part of Coastal Cleanup day every September.
Liberty Prairie Conservancy	Preserve open space, integrate public land acquisition, private conservation, low density development.	Private owners have protected more than 650 acres of land through conservation easements. Protected wildlife corridors; enhanced water quality; preserved farmland; trails for hiking, biking, and horse-back riding; tranquil views to people driving through the Reserve.

Openlands Project	Protect and enhance public open space in northeastern Illinois.	Helped preserve more than 41,000 acres of native habitat and other public spaces, including the Midewin National Tallgrass Prairie. Helped establish the Illinois Prairie Path and the I&M Canal National Heritage Corridor. Its 21st Century Open Space Plan is a comprehensive approach to "green infrastructure" for the region.
Save the Dunes Conservation Fund	To protect and restore the Indiana Dunes region.	Uses education, research, conservation, and legal safeguards to achieve goals. Produced the Grand Calumet River Lagoons Watershed Plan, established a bird-banding station, and conducts regular water quality monitoring.
Save the Prairie Society	Acquire, preserve and restore natural areas and wildlife habitat; conservation education	Incorporated in 1975 to save the 80 acre Wolf Road Prairie from development. Restoring 5 acres of savanna, prairie and stream corridor buffer to the preserve. Provides field trips, nature programs and educational materials. In 1993, launched the Natural Areas Rescue Fund (NARF), a land acquisition project to save imperiled "orphan" natural areas and endangered species in Illinois.
Shirley Heinze Environmental Fund	Preserve, protect, and restore natural lands in the Indiana Dunes region; educate the public on environmental issues; promote clean air and water.	Acquired nearly 600 acres of wetland, prairie, dune, woodland, and dune-and-swale habitat in Northwest Indiana for preservation, restoration, and management as nature preserves. Sponsored more than 100 educational hikes and other programs for the general public, schools, and community groups. Published three books of local environmental interest.
Glenview Prairie Preservation Project	Educate the community about the uniqueness of the native prairie located on the site of the former Glenview Naval Air Station; advocate for the official designation of the prairie as a permanent preserve a public space of sufficient size to maintain the viability, quality, and diversity of the current prairie ecosystem.	
The Grove National Historic Landmark	Historical education and recreation.	A 124-acre facility offers historical, cultural and ecological programs; restore and preserve the grounds, the Interpretive Center, and the historic structures.
The Nature Conservancy	Preserving plants, animals and natural communities by protecting land.	Illinois Chapter has helped protect 82,000 acres of prairie, savanna, woodlands and wetlands. Over 22,000 members in the Chicago region, and supports nearly 6,000 "citizen scientists" through the Volunteer Stewardship Network.
The Trust for Public Land	Acquire open lands for the preservation of native plants, animals, biotic communities, and geological or geographical formations of scientific interest.	

Appendix 9
Examples of Natural Landscaping Installation and Maintenance Cost

Economic benefits to using native landscape tr eatments
The following table represents 1995 costs per acre for the three identified landscape treatments.

Installation and seed costs	Kentucky blue grass	Buffalo grass	Prairie grasses and forbs
Seed	$500	$1,000	$1,200
Ground prep. and installation	$2,000	$500	$500
Watering, mowing, weeding related to installation	$2,000	$500	no weeding first year
	$4,500	$2,000	$1,700
Overseeding (seed and install)***	$900	$550	$500
Annual maintenance costs			
Mowing ($75/week)	$2,400	$750	
Watering	$2,000		
Fertilizing ($90/application)	$270	$90 ***	
Weed control ($50/application)	$100	$100 ***	
Core Aeration	$450		
Prescribed burn and/or mowing			$400 *
Weeding and hand-wicking			$1,200 **
	$5,220	$940	$1,600

* Includes permit application submittal; in most cases, the larger the site the lower the incremental cost of controlled burning, depending on the complexity of the fire plan.

** May or may not be necessary during the first 5 years of establishment.

*** May or may not be necessary during the first 3 years of establishment.

The above figures represent a "typical" seed installation. Installation and maintenance charges may vary based on ground preparation, seeding rate and desired appearance.

Annual maintenance figures are based on a 32 week growing season.

Per acre costs compared over a 10 year period

Year	Treatment	Kentucky blue grass	Buffalo grass	Prairie grasses and forbs
1	install. & maint.	$9,720	$2,940	$1,700 *
2	maint. & overseed	$6,120	$1,490	$1,900
3	maint. & overseed	$6,120	$1,490	$1,900
4	maint. & overseed	$6,120	$1,490	$1,900
5	maintenance	$5,220	$490 **	$1,400
6	maintenance	$5,220	$300	$200 ***
7	maintenance	$5,220	$300	$200
8	maintenance	$5,220	$300	$200
9	maintenance	$5,220	$300	$200
10	maintenance	$5,220	$300	$200
		$59,400	$9,400	$9,800

* No maintenance is required for the first year of prairie grass establishment.

** After fourth year establishment of Buffalo grass, mowing frequency will decrease to 4 times per year or less depending on desired appearance.

*** Following full establishment of the prairie, generally after year 5, annual maintenance will be reduced to an annual burn.

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Appendix 10
Conflict Resolution and Inter governmental Cooperation. A Model for Growth Management.

In this example, suppose a suburban setting contains an arterial roadway . The suburban area is now experiencing development pressures and increased traffic on the arterial roadway. The arterial corridor passes through several towns and through unincorporated areas between the towns. The corridor also includes streams, wetlands, and woodlands, each with valuable plant and animal species. The roadway, which has served the communities well for the past 20 years, now has regular instead of infrequent congestion. Regional growth forecasts indicate a possible doubling of population, households, and employment in the area.

The process

1. Establish an agreed-upon statement of purpose
   The initial step is to get the counties and towns in the corridor to agree that the process is desired, to agree generally on a statement of purpose, and to find the resources necessary to accomplish their purposes. Elected officials should be involved as decision-makers throughout the process to ensure accountability. General-purpose governments (counties and municipalities) initiate the planning process to establish a public purpose and because many or most of the recommendations will fall on the local governments to implement. The statement of purpose usually includes general statements about the goals of the process (for example, traffic mitigation, environmental protection, and adherence to community visions) and an agreement to cooperate to achieve a mutually beneficial future. If the corridor includes rich biodiversity or has potential for biodiversity recovery, then the goal of preserving or recovering biodiversity is included in the purpose statement. Depending on the specific issues in the area, the , counties and towns may also ask park districts and forest preserve districts, and even schools, townships, and library districts, to join the process. The governments, by formal intergovernmental agreement, can form an entity such as a corridor-planning council. At least six of these have already been established in the Chicago Wilderness area. The Illinois Local Land Resource Management Planning Act enables the creation of these entities.

2. Organize the str ucture of the planning pr ocess
   Once there is agreement to pursue the process, a structure should be established designating:
   - A steering committee (most likely elected officials)
   - A technical committee (primarily the staffs of the government members)
   - An advisory committee (neighborhood groups, business interests, environmental interest groups, and several unaffiliated but concerned citizens)

3. Establish and carry out the steps of the planning pr ocess
   Generally, the process includes the following steps. Each step involves review by each of the three committees, thus involving the decision-makers, the technical staff, and the various interest groups. The meetings of these committees should offer opportunities for input from the citizenry. This ensures that all values, views, and constituencies have had a chance to meaningfully influence the decisions.
   1. Visioning through techniques such as visual preference surveys, charrettes, and brainstorming
   2. Establishment of initial goals and objectives
   3. Inventories of existing conditions (natural resources as well as land use, traffic and economic conditions, and other community-development factors such as historic areas) and projections or forecasts of future conditions
   4. Generation of a full range of alternatives
   5. Screening of alternatives to narrow the number to a manageable size. This step also involves using the preliminary evaluation.
   6. Detailed evaluation of the selected alternatives. The goals and objectives established in step 2 are used here so that the alternative plans are evaluated in accordance with the desired end state of the corridor.
   7. Assessment of the impact of each alternative, including cost-effectiveness and implementation considerations
   8. Selection of one alternative
   9. Adoption of the plan and initiation of its implementation

Decision-making

The keys to the planning process are establishing a good vision and establishing clear goals and objectives for the process. These not only help define a good set of alternatives but also provide the framework for a comprehensive evaluation. In our example of a road corridor for a rapidly growing suburban area, planners might traditionally settle on expanded arterial capacity, adding to that care and consideration for avoiding negative impacts on wetlands or woodlands or other natural areas. The traditional solution probably would also include minimizing impacts on already developed neighborhoods or business districts. However, this comprehensive approach requires the consideration of a wider set of alternatives and a greater attention to their impacts.

- A full range of transportation alternatives should be looked at, including introducing or increasing public transportation and providing for and promoting the use of bicycling and walking. If the corridor includes a train station, transit-oriented development can make it convenient for residents to use the rail system instead of driving.
- The planners should consider how to manage access to the road (both now and in the future) to allow the road to function according to its design, instead of letting multiple access points unnecessarily clog the roadway.
- Considerations of urban and suburban design and land-use design should be included to make sure that new developments overload neither the transportation facilities nor other public facilities such as water and sewer systems.

- Providing housing affordable to local workers helps shorten work trips and travel times.
- Mixing land uses in new or current developments allows people to walk or bicycle where they might otherwise drive.
- Aesthetic considerations (historic preservation, landscaping, signage, and lighting standards) are also important so that new development fulfills the vision.

Because our example corridor runs through areas with high-quality natural resources, the impact assessment should not only consider mitigating potential negative impacts but should also consider possibilities that avoid the negative impacts altogether. The vision for the corridor should include enhancement the natural resources (and biodiversity), not simply the mitigation of harm. Avoidance is usually the best initial policy, but it may not always be possible. If the roadway crosses streams or rivers or other natural areas, the crossing structures can be designed or redesigned to minimize impacts or in some cases to improve the situation. If the roadway is to be altered and it happens to be adjacent to a channelized stream, the new roadway design might accomplish a dual purpose by acquiring enough land to allow restoration of that stream through re-meandering and the planting of native vegetation. Opportunities for expanding wetlands should also be considered. The acquisition of additional rights of way for the roadway might also help accomplish this objective. The right of way could also be considered for a greenway corridor, with planting of native vegetation, especially if that corridor is designated in the Regional Greenways Plan. In short, there are ways to accomplish multiple purposes within a corridor-planning process. Rather than simply thinking of the process as a way to choose among cookbook solutions, we can see it as an inclusive process that can ultimately produce plans and programs that meet multiple objectives.

Appendix 11
Recommendations and Action Statements

This appendix provides a chapter by chapter summary of the many recommendations contained in this plan. For their full meaning, they should be read in the context within the text of the chapters.

Chapter 1. Executive Summary
Chicago Wilderness and its Biodiversity Recovery Plan

1. Manage more land to protect and restore biodiversity
2. Preserve more land with existing or potential benefits for biodiversity
3. Protect high-quality streams and lakes through watershed planning and mitigation of harmful activities to conserve aquatic biodiversity
4. Continue and expand research and monitoring
5. Apply both public and private resources more extensively and effectively to inform the region's citizens of their natural heritage and what must be done to protect it
6. Adopt local and regional development policies that reflect the need to restore and maintain biodiversity

Chapter 3.
The Biodiversity Challenge in an Expanding Region

✔ Support the Regional Greenways Plan for northeastern Illinois and the Natural Areas Plan for southwestern Wisconsin. These plans identify actions to protect and manage critical habitats for plants and animals and generally to improve ecosystems. They complement and support the objectives of this Recovery Plan.

✔ Participate in the discussions of the Campaign for Sensible Growth and Metropolis 2020 as they relate to biodiversity conservation.

✔ Support implementation of regional growth strategies by the Northeastern Illinois Planning Commission, the southeastern Wisconsin Regional Planning Commission, and the Northwest Indiana Regional Planning Commission, insofar as these plans seek to reduce the region's excessive rate of land consumption, preserve important open spaces, and promote improved water quality.

Chapter 5.
Terrestrial Communities: Status, Needs and Goals

✔ Increase number of acres under management on public lands

- Allocate more funds to management activities
- Apply generally accepted management techniques, as discussed in Chapter 9, including prescribed burning, hydrological restoration, reintroduction of native species, control of invasive species, and management of deer and other problem wildlife.
- Train more people in management techniques
- Make more effective use of volunteers in management activities
- Educate the public to build support for needed management practices

✔ Increase management and biodiversity planning outside preserves

- Develop and implement strategies to work with landowners
- Work with state and local transportation agencies, utility companies, and railroads to manage communities in rights of way
- Implement Best Management Practices (BMPs) for water quality and water management in ongoing development
- Integrate a biodiversity component into existing BMPs
- Integrate a biodiversity component into watershed planning

✔ Increase public understanding of land-management needs

- Identify all barriers to the effective use of fire
- Inform/educate the public about disturbance and appropriate management
- Train/educate land managers about social barriers and appropriate approaches to sharing information with the public

✔ Communicate information about the effects of management

- Compile information on techniques and effectiveness of management
- Disseminate to land managers and researchers
- Summarize and communicate to the public

- ✔ Increase the number of people qualified to manage land
  - Develop a region-wide standardized burn-training program
  - Implement the training program
  - Support Illinois statewide standards for burn leaders
  - Publicize the training process

- ✔ Implement adaptive management, linking goal setting, implementation, monitoring, and research
  - Develop and implement a region-wide monitoring program based on conservation design, as discussed in Chapter 9.

- ✔ Increase the variety of management approaches to better simulate the effects of natural processes
  - Increase the variety of burns through space, time, and intensity
  - Manage for short-structured grasslands
  - Explore how haying and other mechanical techniques can mimic loss of biomass consumption by grazers

- ✔ Create and manage large preserves
  - Acquire buffer zones around existing preserves
  - Protect and restore natural communities adjacent to existing preserves to connect and enlarge preserves
  - Continue research to determine how large a site must be to maintain target species
  - Direct Section 404 mitigation funds and land-acquisition funds to sites near existing preserves
  - Protect recharge areas for groundwater-fed wetlands and other wet communities

- ✔ Create and manage community mosaics
  - Manage associated uplands with wetlands
  - Mange communities as part of a large system
  - Manage whole watersheds to conserve ecosystem processes
  - Restore communities as part of mosaics

- ✔ Protect priority areas
  - Use existing inventories, such as INAI, the Regional Greenways Plan, and ADID, and conduct additional inventories, to identify priority areas for protection.
  - Assess acquisition opportunities
  - Prioritize opportunities
  - Develop protection strategies for priority areas
  - Look to protect remaining remnants of particularly rare community types, including dolomite and gravel prairies, forested bogs, dolomite cliffs, and pannes.

- ✔ Identify potential large complexes
  - Use tools—hydric soil maps, GIS, large grassland areas project—to identify potential sites
  - Develop criteria to prioritize sites for restoration and acquisition
  - Chicago Wilderness members should facilitate acquisition and management of sites that cross political borders.

- ✔ Understand and mitigate urban threats to metapopulations and gene flow
  - Research , develop, and implement strategies to maintain genetic diversity
  - Study gene flow in plants including the role of dispersers and pollinators
  - Translocate plants or seeds from high-quality areas to larger fair-quality sites
  - Improve translocation techniques for amphibians and reptiles
  - Develop strategies for genetic management in mammals
  - Study barriers to dispersal
  - Plant oaks in space intervening between forest or woodland blocks
  - Remove or mitigate barriers such as roads in key areas
  - Maintain gradients between community types

- ✔ Manage a portfolio of sites
  - Communicate across the region about planned fluctuations in wetlands
  - Vary management from site to site

- ✔ Increase seed supply of local genotypes
  - Land-managing agencies should create nurseries to increase supply for seed
  - Increase demand on nurseries and garden centers to supply local genotypes

✔ Mitigate the threat of salinization

- Search for alternatives to road salt
- Investigate the full impact of salt on plant communities
- Look for ways (especially in the design of road drainage) to keep excessive salt and water out of wetlands

✔ Mitigate the threat from hardening of shorelines and prevent further hardening

Chapter 6. Aquatic Communities; Status, Needs and Goals

✔ Reduce hydrological alteration

- Continue to identify watersheds with streams that have exceptional aquatic biological integrity to inform planning efforts and set priorities.
- Limit development in some high-priority subwatersheds.
- Direct development into areas that limit hydrological alteration.
- Promote cluster development.
- Require storm-water detention that effectively controls the full range of flood events.
- Promote natural drainage as an alternative to storm sewers.
- Create buffer strips and greenways along streams.
- Acquire additional land for conservation.
- Develop storm-water management plans.
- Enforce erosion-control measures on new construction.
- Create or restore streamside wetlands.
- Educate decision-makers about development patterns and the effects of land uses on streams.

✔ Reduce deterioration of habitat quality

- Remove unnecessary dams.
- Retain or restore emergent and near-shore vegetation.
- Re-meander channelized streams.
- Restore riffles, pools, sandbars, and other elements of in-stream habitat.
- Study the effects of riparian management.
- Survey how people use aquatic resources and study the economic impacts of uses such as fishing and recreational boating.
- Use bioengineering solutions to control streambank erosion.

✔ Reduce deterioration of water quality

- Rigorously enforce non-degradation standards.
- Develop and implement best management practices to control soil erosion, sedimentation, and storm water runoff.
- Find alternatives to new and expanded effluent discharges to high-quality streams. For example, route sewage flows to regional facilities and use land treatment.
- Re-examine standards and practices for sewage treatment.
- Promote effluent polishing through constructed wetlands for all discharges to moderate- and high-quality streams.
- Encourage pollution-control regulators to use biocriteria for water quality standards.
- Gain community support for watershed management.
- Evaluate aquatic insects as indicators of water quality.
- Evaluate the need for improved water quality standards.
- Encourage volunteer monitoring.

✔ Lake Recovery and Protection Actions

- Develop specific recovery plans for species and lakes of concern
- Develop better mechanisms to control the invasion of exotic species
- Plan, protect, and manage lakes at the watershed level
- Develop a region-wide process to track and study threats to lakes
- Conduct research to better understand habitat requirements of aquatic species
- Investigate and mitigate the threat of salinization
- Investigate and prepare for the possibility of reintroduction of native species
- Strengthen laws protecting species and their habitats
- Integrate biodiversity concerns into laws, policies, and guidelines
- Clarify ambiguous laws relating to lakes and their management
- Increase public understanding of lake biodiversity issues
- Increase public involvement in lake management and protection

✔ Lake Michigan Recovery and Protection Actions

- Identify information gaps concerning the Lake Michigan shoreline in the region with respect to surviving habitat, and opportunities for habitat restoration, so that practical goals can be developed.

- Identify key site-specific aquatic habitat restoration opportunities to support local and lake-wide biodiversity.
- Identify site-specific opportunities to provide shoreline protection that also provides improved habitat.

Chapter 7
Status of Endangered and Threatened Species: Assessment and Recommendations

✔ Acquire more public land to increase the size and number of available habitats. Among the criteria to consider in purchasing land should be the presence of endangered and threatened species; greater emphasis should be placed on land acquisition as a means of protecting rare species. Priority should be given to creating complexes of communities, since many animal species depend on a variety of habitats.

✔ Legal protection of plants, in contrast to that of animals, is weak. Enact stronger legislation for the protection of rare native plants.

✔ Enlarge and consolidate existing natural communities by creating buffers, or by restoration, to counteract the effects of fragmentation, particularly the isolation of populations of rare species. For some species, such as insects, it is more important to enlarge sites than to create new ones.

✔ Increase the levels of protection for unprotected or semi-protected sites with known occurrences of endangered and threatened species. For example, incorporate such sites into the Nature Preserves system.

✔ Work with private landowners, either individual or corporate, to protect the endangered and threatened occurrences on their property. Use conservation easements and other incentives to protect endangered and rare resources on private land.

✔ In management plans for all sites with endangered and threatened species, include specific provisions to eliminate stresses and threats and to enhance recovery of these species.

✔ To measure effects of management activities on rare species, design monitoring programs (for representative populations) to provide feedback to adapt management activities and approaches.

✔ Institute a region-wide monitoring program for rare species, implemented by trained volunteers as well as agency staff, to enhance and coordinate current efforts to measure population trends. Protocols should be species-based.

✔ Rotate and diversify management treatments in order to maintain a variety of habitats needed by many species.

✔ Create a common Chicago Wilderness database. To avoid duplication of research and effort, managers should have access to centralized information about the needs of rare species and management practices related to them for adaptation to their own sites. Linking with Natural Heritage Databases in Illinois, Indiana, and Wisconsin is critical to this process.

✔ Expand *ex situ* programs for endangered and threatened plant species so that adequate seed or plant material is available for appropriate reintroduction as more sites are restored.

✔ Develop recovery plans for both federal-listed species and state-listed species that have been identified as priorities. The Chicago Wilderness Endangered and Threatened Species Task Force has identified approximately 150 species as priorities for recovery in the region, assigned to six categories (see Appendix 6). The plans should be realistic, suited to the CW region, and workable within county and other regional structures and agencies. Reference should be made to recovery plans already developed or in process for federally listed species as models to be adapted and simplified for state-listed species.

Chapter 8
Preserving Land and Water Resources for Biodiversity

Recommendations for private property owners

✔ Property owners who believe they own important habitats should have inventories of their land made by the staff of local, state, or federal agencies or by experienced citizens associated with local conservation organizations.

✔ Property owners who wish to commit to long-range protection and enhancement of their habitats should first assess the various methods of legal protection (listed in detail below).

✔ Property owners who do not wish to encumber or sell their land, but recognize its habitat value, should pursue habitat-enhancement techniques, participate in larger landscape restoration efforts, inspire neighboring property owners, and share information on uncommon species observed on their property.

✔ Property owners who have already established a strategy to protect and restore their property should assess potential impacts on their habitat from changes to land use on neighboring properties and, based on that assessment, pursue strategies with neighboring property owners to insure protection and expansion of the habitat resources.

✔ Corporate property owners should restore native plant and animal communities on their lands or expand existing restorations wherever possible to expand, link, or enhance nearby habitats. This can provide employee and community benefits and, in some cases, can achieve significant savings on land management.

- ✔ Chicago Wilderness should map and catalog the extent of private properties in the region that could play an important role in broader ecosystem restoration efforts.

- ✔ Chicago Wilderness should establish a process whereby private property owners can become effective participants in broader efforts to restore ecosystems.

Recommended actions for Chicago Wilderness member organizations to facilitate transfer of private property

- ✔ Educate the land-owning public about the options and incentives available for transferring open space to public and not-for-profit conservation agencies.

- ✔ Assure that all areas within the Chicago Wilderness region are served by one or more organizations that will take title to important habitats in order to manage them.

- ✔ Look for funding mechanisms so that lack of resources for ongoing ecological management is no longer an impediment to the donation of important habitat.

Recommendations for local governments

- ✔ Encourage local citizens to offer ideas for habitat preservation and restoration in community visioning exercises.

- ✔ Identify lands with high habitat value and lands with good restoration potential and designate them as natural resource preserves in comprehensive, stretegic, and special-area plans. Consider municipal ownership and management of these lands for open space and biodiveristy values.

- ✔ Designate stream corridors, swales, and hydric-soil networks as open-space links in comprehensive plans and in strategic and special-area plans.

- ✔ Develop five-year capital improvement programs for storm-water management and sewage treatment that minimize infrastructure investment, replacement, and maintenance by using best management practices.

- ✔ Develop general-purpose capital improvement programs that minimize infrastructure investment, replacement, and maintenance using best management practices.

- ✔ Adopt zoning ordinances that incorporate natural-resource overlay zoning districts and hydric-soil overlay districts, which supplement other zoning requirements that apply to specific areas. Adopt zoning ordinances that require developers to protect and restore natural resources, to provide buffers for wetlands and streams, to minimize impervious surfaces, and to cluster home sites.

- ✔ Adopt subdivision regulations that require:
  - Inventory of natural habitats, designation of hydric soils, and location of underground tiles at the sketch-plan stage
  - Design of detention areas to achieve or approach zero discharge for two-year storms
  - Preservation of habitats and hydric soil systems
  - Buffers for wetlands, streams, and drainage corridors
  - Designation of lands with conservation easements or dedication to local government at the preliminary planning stage.

- ✔ Use engineering standards and practices that incorporate measures to protect and restore natural resources, that emphasize infiltration over discharge of storm water, and that are flexible enough to respond to varying environmental situations.

- ✔ Insure the municipal code allows and encourages the restoration of natural plant communities and habitats for native wildlife in residential and commercial landscaping.

- ✔ Use native landscaping on municipal lands and restore existing natural areas to create wildlife habitat, protect water quality, and demonstrate these landscaping practices for residents and businesses.

- ✔ Creatively design annexation and development agreements to protect and restore natural resources to the highest possible degree, including immediate identification and protection of major resources and a process for identification and protection of other resources in later stages

- ✔ Use TIF districts to acquire or restore natural habitats and community open space as part of redevelopment, to provide habitat and implement hydrological best management practices such as those recommended by municipal consultants and by NIPC (1992).

- ✔ Adopt intergovernmental agreements between or among neighboring communities to coordinate protection and restoration of natural resources and of hydrology.

- ✔ Undertake municipal conference initiatives that focus on the protection and restoration of natural resources, the identification of local ecosystems, and the modification of storm-water systems as described above in this section.

- ✔ Chicago Wilderness organizations should develop a training and technical assistance program for municipal and county officials by which they would receive information on how to incorporate biodiversity in their plans, programs, ordinances and regulations.

Chapter 9. Ecological Management, Restoration and Monitoring

Prescribed Burning

- ✔ Land-management agencies should develop a comprehensive training program for crew members and burn leaders that emphasizes prescribed burning in Midwest ecosystems and burning in metropolitan settings.

- ✔ Land-management agencies should procure sufficient equipment and workforce so that enough natural areas can be burned within the appropriate time periods to achieve the goals of this plan.

- ✔ Chicago Wilderness members should work with the Illinois Nature Preserves Commission to monitor and participate in the development of new legislation that affects prescribed burning in Illinois. Similarly, members should work with state Environmental Protection Agencies as they develop air-quality regulations to facilitate prescribed burns.

- ✔ Land-management agencies, in conjunction with other Chicago Wilderness members, should develop outreach programs to educate local officials, fire chiefs, preserve neighbors, etc., about the use of fire in managing natural ecosystems.

- ✔ Chicago Wilderness members should cooperate to improve knowledge about research questions such as:
  - What are the positive and negative effects of prescribed burning on endangered, threatened, and watch species?
  - What is the optimum timing and frequency of fire to conserve designated ecological targets?
  - What are the effects of various prescribed-burning regimes on native shrubs?
  - What are the best uses of fire to control invasive species?

Restoration and management of hydr ology

- ✔ Chicago Wilderness members and local agencies should create a database of current hydrological data from restoration and mitigation projects and make it available on the Internet.

- ✔ Chicago Wilderness members and local agencies should standardize the methods for collection of hydrological data, including the use of remote data-sensing equipment.

- ✔ Chicago Wilderness members and local agencies should provide training to land owners and land managers in techniques for identifying hydrological disturbances, locating and removing agricultural field tiles, and installing groundwater monitoring wells.

- ✔ Local agencies should identify large, artificially drained wetlands and prioritize them for restoration.

- ✔ Chicago Wilderness members and local agencies should further develop education and outreach programs on wetland ecosystems, making use of demonstration and restoration projects.

- ✔ Chicago Wilderness members and local agencies should address key research questions, such as:
  - How do offsite factors affect hydrology at a site, and what are the implications for restoring the site's hydrology?
  - What are the best methods for restoring hydrology, and when should they be implemented?

Reestablishment of native species

- ✔ Land management agencies that have not already done so should develop in-house nurseries to produce seeds and plants. A nursery can produce large quantities of seed at low cost and can also produce propagules irrespective of natural environmental conditions.

- ✔ Expand seed and plant exchanges. Member organizations can trade for seed or plants of the local or regional eco-type that are not available within their own land. This creates a market for the seed and plants that are surplus for one organization but useful to another that year.

- ✔ Donate or exchange the use of facilities. Local conservation organizations and landowners can make use of each other's facilities or landholdings to build up the number of available propagules. The collaborative efforts create a regional economy of scale and assist individual organizations whose resources are stretched thin.

- ✔ Conduct propagation research. The task of recovering over 1500 native plant species is a daunting one. Only about 350 of these species have been propagated commercially or for restoration. The personnel and facilities of significant botanical research organizations within Chicago Wilderness provide great potential for research into propagating native plants for restoration and could act as a clearing-house for such work. Such botanical facilities include the Chicago Botanical Garden and the Morton Arboretum. Staff from these facilities can and also do help in preparing recovery plans for rare species.

- ✔ Work with home gardeners. Volunteers have provided their backyards as nurseries for several plant species identified for inclusion in restoration seeding. Gardeners receive seed or plants to grow in their backyards. The seed from these plants is collected and used in restoration projects.

Control of invasive plant species

- ✔ Continue to develop and share cost-effective protocols for controlling targeted invasive species.

- ✔ Monitor species locally and regionally to identify and anticipate problems before they reach epidemic proportions.

- ✔ Develop region-wide collaborative efforts to control invasive species on all public land not already managed for biodiversity, including utility and transportation rights-of-way

- ✔ Develop and promote native landscaping recommendations for residential and commercial properties that strongly discourage the use of potentially invasive species in landscaping, working through nurseries and other outlets.

Management of problem wildlife

- ✔ Until effective alternative methods become available, deer should be harvested regularly to limit numbers to levels that support a balance that sustains a full range of native plants and provides diverse habitat for birds and other animals.

- ✔ Disseminate any new information on alternative control methods to land managers.

- ✔ Disseminate models that predict responses of deer populations to management to managers and encourage their widespread use. Continue to improve existing models based on additional field research and the incorporation of stochastic functions and spatial components.

- ✔ As deer populations are managed and reduced in size, there will be an increased need for more accurate census techniques. Additional research should be carried out to develop more effective census techniques in general.

- ✔ State and federal agencies should provide support for collecting information from deer harvests that can provide a basis for future decisions about deer management. This information would include collection locations; gender; the number, gender, and age of fetuses; and reproductive information.

- ✔ Public agencies (and private landowners where relevant) should cooperate more closely to manage deer across borders of managed lands.

- ✔ Support continued research on limiting the spread of zebra mussels. Promising research pursued by Chicago Wilderness members shows that control of zebra mussels in river systems would be most efficiently focused on particular upriver source sites rather than on the entire river. Illinois Natural History Survey (INHS) found that removing zebra mussels or constructing barriers to prevent down-river
dispersal of larvae would have a strong negative effect on down-river populations. Plans are underway to construct a dispersal barrier to the round goby, another invasive species, in the Chicago Ship and Sanitary Canal.

- ✔ Provide more public outreach and education calling for boat owners to take responsibility for cleaning boats and boating equipment prior to transporting them from one water body to another.

- ✔ Promote research on methods to control zebra mussels and round goby.

- ✔ Chicago Wilderness members should lead a public education effort explaining the problems caused by feral cats and advocating that people not feed stray cats, support cat licensing laws, support humane removal of stray cats from neighborhoods and wildlife areas, and keep domestic cats indoors.

Management plans

- ✔ Chicago Wilderness members should support regional ecological performance standards, monitoring techniques to measure attainment of the performance standards, and evaluation techniques (such as a regional report card) to evaluate land restoration and management.

Promoting management-related r esearch

- ✔ Compile a prioritized list of research needs and support targeted research projects with internal and external grants.

- ✔ Set up a central source of information for students and professors about priority research needs.

- ✔ Promote the Chicago Wilderness region as a research station. This would help students to identify appropriate sites and experts, as well as to receive permits.

- ✔ Compile a thorough literature review of previous studies regarding management of natural communities and conservation of biodiversity relevant to efforts in the Chicago Wilderness region.

Chapter 10
Education and Communication

- ✔ Ensure that every student graduating from a school system in the Chicago Wilderness region is "biodiversity-literate."
  - Develop a commonly held definition of "biodiversity literacy"—what knowledge, skills, attitudes, and experience are essential to help people make informed decisions and participate in biodiversity protection.
  - Increase the visibility of biodiversity concepts and issues in state education standards to encourage teachers to integrate biodiversity content into other programs.
  - Give school staff the incentive to devote precious instructional time to biodiversity topics by demonstrating to teachers how using biodiversity as a unifying theme could improve test scores.
  - Support state plans that integrate environmental education into schools. In particular, work to support the passage of the Environmental Education Literacy of Illinois Master Plan.
  - Develop "best practices" for teacher training, such as the package being produced for the Mighty Acorns youth stewardship education program.

- ✔ Expand the scope of existing and future programs in biodiversity education to include components for attitudes, skills, and participation in curricular design
  - Determine the effectiveness of existing biodiversity education programs for achieving "biodiversity literacy," and use successful programs as models.
  - Foster professional development for organizations inaugurating biodiversity education, and increase the number of pre-service and in-service opportunities for teachers to strengthen their qualifications to teach biodiversity.

✔ Make biodiversity in Chicago Wilderness a component of the degree programs of local colleges and universities

- Survey existing course selections at local universities. Identify courses that effectively and thoroughly communicate key information about local biodiversity and work to increase their visibility.
- Develop a degree program in restoration ecology at a local university with an accompanying field station.

✔ Expand and improve the use of existing tools for biodiversity education, and create new tools as needed.

- Promote practicum opportunities by linking universities with professional land managers in the region.
- Work toward the better distribution of existing tools by forming a distribution center and investing in publicity about the center.
- Assess the effectiveness of tools for reaching their target audiences.
- Create new tools for groups starting community-based, non-school projects in biodiversity education. For example, create a biodiversity program primer with a list of potential partners.
- Produce tools and materials in multiple languages.

✔ Increase the number of communities being reached with non-school-based programs in biodiversity education

- Foster neighborhood- and community-based programs aimed at improving the environment and biodiversity locally to unify different cultural groups for concerted community action.
- Identify specific leaders in cultural and ethnic communities who can inform educators and communicators and serve as partners for collaborative programs.
- Create a diverse base of spokespeople, including professionals and volunteers, who can serve as "ambassadors" for biodiversity to a wider variety of communities.
- Develop collaborations between Chicago Wilderness member organizations and cultural, ethnic, and arts and humanities organizations to foster the exploration of nature through cultural avenues.
- Improve the infrastructure within conservation agencies and organizations to better support community-based biodiversity projects.
- Develop links between school-based biodiversity programs and community projects.
- Find new ways of providing urban populations with opportunities to become aware of and explore the region's natural communities (for example, a "biodiversity bus" to bring urban residents to outlying natural areas).
- Devote more effort to recruiting citizen scientists from more diverse communities. Build effective tools to track the success of recruiting techniques, and use the effective techniques to expand the reach of volunteer-recruitment programs.
- Encourage the providers of non-formal education programs to recruit and employ professional educators who reflect the diversity of the communities they serve.

✔ Measure local citizens' understanding of biodiversity by developing appropriate gauges for long-term effectiveness of education programs

- Create appropriate gauges and gather baseline data on targeted communities.
- Gather data at set intervals to measure long-term change.
- Disseminate findings to agencies and organizations involved in biodiversity education.

✔ Gain a better understanding of the views of a broader segment of the Chicago-area population on biodiversity issues such as ecological restoration

- Compile existing local market research, including that gathered through land-acquisition bond campaigns, to determine gaps in the understanding of public values and perceptions.
- Commission professional market research locally to better inform communications strategies and messages.
- Disseminate research findings to decision-makers and conservation agencies and organizations.

✔ Increase the public's understanding of the role of management in natural areas.

- Craft a common lexicon that describes restoration efforts, and create methods to evaluate and adapt the messages to grow in effectiveness.
- Foster the delivery of essential message points not only through conservation agencies and organizations, but also through a broader range of institutions and channels.
- Engage and educate those who interpret conservation issues for the public, including community leaders, media, and elected officials.

✔ Improve communication with those immediately affected by management decisions.

- Ensure that restoration efforts, particularly in new areas, include plans for communications to local residents, and that resources are available for efficient and appropriate communication efforts.

- Create a communication guide that restoration agencies can use to help develop these plans, including resources that already exist and successful examples from other agencies.
- Conduct direct outreach to organizations in the local communities, such as block clubs and religious groups, that are interested in environmental work.
- Engage advocacy organizations that work on environmental issues (such as air and water quality or sprawl) and educate them about biodiversity loss.
- Seek opportunities to inform journalists and increase media coverage of restoration and land management.
- Review current mechanisms for public involvement in land-management decisions and make improvements, using models that are successful in other arenas.
- Create a structure for collaborating partners not only to react quickly but also to anticipate issues that arise in public forums.

✔ Communicate documented benefits of local restoration efforts, especially those of most value to humans.

- Gather data on the results of restoration efforts, translating the data into easily understood benefits.
- Create communications tools that connect restoration results to core values: the beauty and wonder of nature, our responsibility to future generations, and the desire for a healthy environment.
- Include illustrations of restoration results in programs, nature walks, signs, and other communication vehicles.
- Develop innovative campaigns and programs that position habitat restoration in mainstream culture (such as museum exhibits, ad campaigns, and retail promotions).

✔ Improve the credibility and public perception of the people involved in restoration efforts.

- Seek trusted local spokespeople who represent the sound, scientific thinking behind restoration and/or exemplify the role of the local volunteer.
- Provide support for volunteers who interact with the public, and offer training in public speaking, ecological concepts, interpretation, etc.
- Emphasize the public service provided by volunteers and the leverage of public funds through donated time.
- Ensure that decision-makers are aware of the value of conservation volunteers.

✔ Improve communication about biodiversity with key decision-makers such as elected officials and their staff, land managers, and planners

- Assess current tools and programs to inform key decision-makers for content, availability, and effectiveness in increasing understanding of the importance of local biodiversity.
- Survey, as necessary, to assess key decision-makers' knowledge, attitudes, and information needs.
- Develop vehicles to keep decision-makers regularly informed, such as tours, literature, up-to-date scientific information, and contacts for further information.

Chapter 11
Role of Key Players

Forest preserve and conservation districts

✔ In keeping with their central role as land managers, the forest preserve and conservation districts should continue to play lead roles in identifying, evaluating, and acquiring unprotected natural communities within their jurisdictions.

✔ Federal and state agencies should support these efforts with funding and technical resources. The most recent example of such a partnership was the Chicago Wilderness collaboration that produced the natural-areas inventory for McHenry County.

✔ Forest preserves should use all tools available to add land to their holdings. It is also recommended that existing natural areas be protected from purchase requests by commercial and other interests or conversion to intensive recreational uses.

Sanitary districts

✔ Since the concern for maintaining biodiversity is not one of the purposes for which sanitary districts were created, enabling legislation should be amended to specify the authority and obligation of districts to protect biodiversity.

✔ In the case of private utility companies that provide wastewater collection and treatment services, and whose franchises are regulated by the Illinois Commerce Commission, a similar broadening of authorizing legislation would be appropriate.

Illinois counties and municipalities

✔ Counties and municipalities should amend their comprehensive plans, zoning ordinances, and other regulations to incorporate relevant recommendations contained in this plan.

✔ When a state infrastructure investment such as a toll road or major airport is likely to trigger substantial residential, commercial, or industrial development, affected governments (including state, county, municipal and other local jurisdictions) should enter into intergovernmental agreements designed to prevent adverse environmental impacts

including the loss of biodiversity. Such agreements were developed as part of the process for considering a proposed expressway in central Lake County, Illinois.

✔ Municipalities should play an active role in protection and management of biodiversity by managing their lands to support native ecological communities and consider acquisition of additional land for these purposes.

Northwest Indiana municipalities

✔ In northwest Indiana, city departments should enter into partnerships aimed at protecting biodiversity with federal, state, and county agencies and with private organizations that own and oversee land requiring preservation and long-term maintenance.

✔ Indiana cities and their regional planning and development agencies should develop a process for taking inventory of natural areas and prioritizing areas for preservation and restoration in conjunction with economic-development initiatives.

✔ Indiana cities and their partner agencies should develop plans and allocate funds to preserve land and to manage preserved land consistently.

State agencies

✔ The State of Illinois should continue its grants programs for open space with more funds for acquisition directed to northeastern Illinois. Open Lands Trust Act funds should primarily protect lands with current or potential biodiversity values.

✔ The state should continue to acquire high-quality natural areas through the NAAF.

✔ IDOT should incorporate biodiversity principles into all transportation infrastructure planning and all implementation decisions.

✔ Future toll-road construction projects must assure full compliance with EIS recommendations.

Intergovernmental organizations

✔ The regional transportation planning process should incorporate biodiversity principles into the transportation planning and programming process.

Federal administrative agencies

✔ Transportation designers and planners should carefully follow the TEA-21 process, taking advantage of its programs related to biodiversity in the Chicago Wilderness region.

Strengthening volunteer programs for protection and restoration of biodiversity

✔ Land-managing agencies should invite volunteers to be partners both in planning and in implementing land management.

✔ Develop a strategy for involving volunteers. Identify functions and tasks to be accomplished by volunteers.

✔ Provide opportunity for personal satisfaction in accomplishing tasks that are needed for restoration. People serve as volunteers because they find satisfaction in the work. Successful volunteer programs build on this fact to accomplish the purposes of the organization.

✔ Remove barriers. Make it easy and inviting for volunteers to contribute time and energy. If requirements and/or qualifications are necessary, provide ways for volunteers to earn them through training or certification based on tests of ability or knowledge.

✔ Provide an organized context for volunteer activities. At a minimum, provide a stable set of ground rules to accommodate volunteer efforts and involve volunteer leaders in developing them.

✔ Encourage volunteers to adopt or take "ownership" for specific functions or places.

✔ Identify a specific person within the host organization as the central contact for volunteers.

✔ Provide recognition for volunteers regularly.

✔ Provide support for a volunteer newsletter and related communications that offer education and information on volunteer opportunities.

✔ Provide tools or other necessary resources where possible.

✔ Provide opportunities for face-to-face contact between volunteer leaders and organization staff.

✔ Provide support with heavy equipment operated by staff if needed and possible.

✔ Develop long-term site plans for restoration and protection and annual work plans for activities to complete them. Include volunteers in the planning process and identify their role clearly.

✔ Have experienced volunteer leaders, trained and certified by the landowning agency, provide on-site supervision of most volunteer activities.

✔ Develop criteria for various functions and tasks and facilitate training to ensure expertise in them.

✔ Certification is appropriate for some activities, including applying herbicide on public land and participating in prescribed burns. In such cases it is important to establish clear requirements and the means of meeting them such as training or testing at convenient times and places.

✔ Leadership among volunteers develops as people gain experience and knowledge. Those willing to accept and provide leadership should be encouraged to do so and should be given added responsibility and recognition.

✔ The Volunteer Stewardship Network (see below) should be supported and recognized as a valuable asset in developing leadership, expertise, and overall membership in conservation programs.