

## A BRIEF SURVEY OF THE RARE TERRESTRIAL NATURAL COMMUNITIES AND ASSOCIATED VASCULAR FLORA OF THE WABASH RIVER CORRIDOR IN INDIANA

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**ABSTRACT.** Along the Wabash River corridor in Indiana there exists an array of rare terrestrial natural communities that includes such diverse examples as cliffs, seepage wetlands, prairies, flatwoods, and bald cypress swamps. Many examples are quite small, existing either naturally in small patches, or as remnants of a formerly more extensive occurrence. Many possess rare species, including several that in Indiana are mostly confined to the corridor. Examples include Tennessee milk-vetch (*Astragalus tennesseensis*), water locust (*Gleditsia aquatica*), Amazon sprangletop (*Leptochloa panicoides*), Lesquereux's mustard (*Lesquerella globosa*), cylindric-fruited seedbox (*Ludwigia glandulosa*), plains muhlenbergia (*Muhlenbergia cuspidata*), glade mallow (*Napaea dioica*), Canada burnet (*Sanguisorba canadensis*), Forbes' saxifrage (*Saxifraga Forbesii*), and woodland pinkroot (*Spigelia marilandica*).

**Keywords:** Wabash River, Indiana rare vascular plants, Indiana rare natural communities

Along its course through Indiana the Wabash River flows through a diversity of natural communities that is considerable for such a relatively short run. The context for these communities is the natural regions through which the river flows, *viz.*, the Central Till Plain, Southwestern Lowlands, and Southern Bottomlands (Homoya et al. 1985). Other than the dissected topography created by the entrenchment of the river and its tributaries, the general area within these natural regions is relatively level. The landforms are a consequence of glacial activity, with ice having occupied almost all of the terrain except that within the last few miles of the current river's course (Gray 2000). The glacial landforms, along with bedrock exposure, climate, and environmental perturbations such as fire, have helped to mold the vegetation found in the Wabash River corridor.

This paper addresses those rare natural communities along the Wabash River corridor that were formerly common, e.g., tallgrass prairie, or always rare and localized, e.g., limestone cliff. [The corridor, as defined here, includes that area generally within 3 km horizontally perpendicular to the edge of the river's floodplain]. The order of discussion starts with the natural regions and rare communities in the upper portion of the Wabash River cor-

ridor, and ends at the river's confluence with the Ohio River. A partial list of associated rare flora is also provided, including (but not restricted to) species confined in Indiana mostly to the corridor. Emphasis is also placed on species occurring as disjuncts and those at the edge of their range.

### METHODS

Most of the communities and species reported herein have been directly observed by members of the Division of Nature Preserves and subsequently documented and stored in the database and files of the Indiana Natural Heritage Program (2006). The number of extant occurrences statewide determines the state rarity categories of plants. These are state endangered (SE), with 1–5 known occurrences in the state; state threatened (ST), with 6–10 known occurrences in the state; and state rare (SR), with 11–20 known occurrences in the state. Additional information on many of these is discussed in Aldrich et al. (1986), Homoya (1983, 1988); Homoya & Abrell (1986); Homoya et al. (1995). Most sites indicated in the text as nature preserves are owned and managed (and/or dedicated) by the Indiana Department of Natural Resources, Division of Nature Preserves.

Nomenclature for most species follows

Gleason & Cronquist (1991). Authority names are given for exceptions.

## RESULTS AND DISCUSSION

**Central Till Plain Natural Region.**—Of all of the natural regions through which the Wabash River flows, its course runs the longest through the Central Till Plain Natural Region and its sections. Here it flows through, in sequential order, the Bluffton Till Plain Section, the Tipton Till Plain Section, and the Entrenched Valley Section. In Indiana it starts at the state line with Ohio and continues within the region to just north of Terre Haute. The following are rare natural communities and vascular plants of the Wabash River corridor in the Central Till Plain Natural Region.

*Limestone outcrop:* Within the Bluffton Till Plain is a stretch of the river, primarily from Wabash County to Cass County, that possesses a series of outcrops of Silurian limestone (and dolomite). Although small, these outcrops, occurring as cliffs and rocky slopes, provide a naturally exposed bedrock substrate that is exceptionally uncommon for northeastern Indiana. They are host to several plant species that are both uncommon for the region, as well as the state. One outcrop near Logansport is of particular interest by providing an unusual rock habitat for death camas (*Zigadenus elegans*—SR) and tufted hair grass (*Deschampsia cespitosa*—SR), species that elsewhere in Indiana are confined to fens. Other species of note include forked aster (*Eurybia furcata* (Burgess) Nesom—SR), smooth cliff brake fern (*Pellaea glabella*), harebell (*Campanula rotundifolia*), black-fruit mountain ricegrass (*Oryzopsis racemosa*—SR) and a small population of round-leaved serviceberry (*Amelanchier sanguinea*), a species under review for state listing. Other rare species associated with outcrops on or near the river are calamint (*Satureja glabella*—SE) and purple oat grass (*Schizachne purpurascens*—SE). With the exception of one population of the latter in LaGrange County, all known populations of this northern grass are in proximity to the Wabash River. Hanging Rock Natural Area in Wabash County contains examples of interesting limestone outcrop communities bordering the Wabash River.

*Sandstone outcrop:* Most sandstone outcrops near the Wabash River occur within the

Entrenched Valley Section in Warren and Fountain counties. A most spectacular example of this type occurs in Portland Arch Nature Preserve. Here a deep canyon lined with sandstone cliffs provides a refugium for a number of species uncommon to the state and/or natural region. Such examples include white pine (*Pinus strobus*—SR), Canada blueberry (*Vaccinium myrtilloides*—SE), wintergreen (*Gaultheria procumbens*), rock spike-moss (*Selaginella rupestris*—ST), pinnatifid spleenwort (*Asplenium pinnatifidum*), hay-scented fern (*Dennstaedtia punctilobula*), northern bush-honeysuckle (*Diervilla lonicera*—SR), and Forbes' saxifrage (*Saxifraga forbesii* Vasey—SE). Within Indiana, Forbes' saxifrage is confined to sandstone outcrops along the Wabash River and its immediate tributaries. Most of Indiana's populations of the forked aster (*Eurybia furcata* (Burgess) Nesom—SR) are found on sandstone outcrops along and near the Wabash River, although it also occurs on limestone (see above) and mesic gravel slopes. Burgette and Knudson (1976) provide a list of additional species for Portland Arch.

*Gravel barrens (Gravel hill prairie):* Localized deposits of glacial outwash gravel and sand form a substrate that, where found on steep-sided, south or west-facing slopes, creates a rather xeric environment known as gravel barrens (Homoya 1994) or gravel hill prairies (Post et al. 1985; White & Madany 1978). In Indiana, the most diverse examples of these small communities—each less than 0.5 ha—occur on steep hillsides bordering the Wabash River in the vicinity of Lafayette in Tippecanoe County. The community is conducive to the growth of drought-adapted grasses and forbs, and it harbors species more commonly found in climatically dry communities considerably farther west, e.g., western wallflower (*Erysimum capitatum* (Doug.) Greene—ST), plains muhlenbergia (*Muhlenbergia cuspidata*—SE), and narrow-leaved puccoon (*Lithospermum incisum*—SE). In Indiana these species are mostly confined to the Wabash River corridor. Other rarities of the community include Pitcher's stichwort (*Arrenaria patula*—SE), kitten tails (*Besseya bullii*—SE), and disjunct occurrences of post oak (*Quercus stellata*), aromatic aster (*Symphiotrichum oblongifolium* (Nutt.) Nesom—SR) and narrowleaf summer bluets (*Hedyotis ni-*

*gricans*—SR). Tennessee milkvetch (*Astragalus tennesseensis*—extirpated), a species of the glades and barrens in Tennessee and Alabama with disjoint occurrences in Illinois and Indiana, was collected at only one site in the state, near Lafayette (Stuart 1902). Stuart indicated collecting it from sandy bottomland (along Wea Creek), an unusual habitat for the species. A more expected habitat, and perhaps the seed source for the bottomland plants, would have been the gravel barrens occurring on adjacent slopes. The species has not been collected nor reported in Indiana since 1901. Wea Creek Nature Preserve, located in Tippecanoe County, harbors some of the above listed species.

*Fen*: Fens—wetland communities formed by upwelling of groundwater flowing in a diffuse manner through a surface layer of peat or muck—occur along most of the course of the Wabash River, but primarily in the portion located in the Central Till Plain. The fens are typically positioned at the bases of slopes and in ravine valleys bordering the river, but can also occur on relatively level terraces between the river and adjacent hills. Community structure can range from forested to graminoid, the latter generally the type with the greatest species diversity. Occurrences of rare or uncommon species include small white lady's-slipper (*Cypripedium candidum*), small yellow lady's-slipper (*C. parviflorum* Salisbury var. *makasin* (Farwell) Sheviak—SR), queen-of-the-prairie (*Filipendula rubra*), and shining ladies'-tresses (*Spiranthes lucida*—SR). Canada burnet (*Sanguisorba canadensis*—SE) is one of the rarest and most localized. Only three extant populations are known, and all occur in fens bordering the Wabash River. The absence of the species in other seemingly prime habitat in the far northern counties is an enigma. Most Indiana occurrences of glade mallow (*Napaea dioica*—SR) are confined to the lowland terraces bordering the upper Wabash River. While there is no apparent natural community where this species occurs today, it might have been a fen (and prairie) edge plant in presettlement times. As almost all of the terrace fens have been converted to agricultural uses, the mallow has persisted only in strips of edge habitat along roadsides and fence rows. Species representative of fens along the Wabash River are listed in Ebinger & Bacone (1981). Small examples of fens bordering the Wabash

River occur in Prophetstown State Park in Tippecanoe County.

*Tallgrass prairie*: Tallgrass prairie vegetation on loam soils occurred on slopes and valleys bordering the Wabash River, especially nearby in those counties that are included within the Grand Prairie Natural Region, viz., Tippecanoe, Warren, and Vermillion. Essentially all of the community has been converted to agriculture or shaded out of existence by trees (due to fire suppression). Remnants are confined to a few pioneer cemeteries and fence rows. In the few remaining square meters of prairie vegetation extant along the Wabash a few rare species persist, including royal catchfly (*Silene regia*—ST), prairie wild hyacinth (*Camassia angusta* (Engel. & Gray)—SE), and prairie violet (*Viola pedatifida* Don.). Additional species for the community in Indiana can be found in Betz (1978). Smith Cemetery Nature Preserve, located in Vermillion County, is one of the few remnants of tallgrass prairie in the region.

**Southwestern Lowlands Natural Region.**—The Southwestern Lowlands Natural Region is the area of relatively low relief in southwestern Indiana south of the Wisconsin glacial border and west of the rugged Shawnee Hills. The Wabash River courses through this area from just north of Terre Haute in Vigo County southward to Merom in Sullivan County, at which point the river then begins its course through the floodplain communities found in the Southern Bottomlands Natural Region. The Southwestern Lowlands Natural Region is never far from the Wabash River however, as it borders the Southern Bottomlands from Merom to the river's confluence with the Ohio River in Posey County. The following are rare natural communities and vascular plants of the Wabash River corridor in the Southwestern Lowlands Natural Region.

*Sand barrens (sand prairie)*: Examples of sand barrens occur along the Wabash River from near Lafayette and extending southward; but the most extensive ones, at least historically, were near and south of Terre Haute. Sand barrens are located on eolian sand deposits and are mostly positioned on the leeward side of the river. The sandy substrate is commonly quite dry due to excessive drainage through the coarse-grained material. Historically much of it was dominated by graminoid

vegetation interspersed with small growths of oak and hickory trees. Like the fen and loam prairie communities, most sand barrens have been converted to agricultural uses, and thus only very small remnants remain. Rare species associated with sand barrens include heavy sedge (*Carex gravida*—SE), hairy golden-aster (*Heterotheca camporum* (Greene) Shinners var. *camporum*—ST), slender-stalked gaura (*Gaura filipes*—ST), tube penstemon (*Penstemon tubaeflorus*—extirpated), Carolina anemone (*Anemone caroliniana*—extirpated), clustered poppy-mallow (*Callirhoe triangulata*—extirpated), and black hickory (*Carya texana*—SE). The latter three are known in Indiana only from barrens bordering the Wabash River. Additional species of the community can be found in Homoya (1994). Although not in the natural region, a representative example of the type occurs in Tippecanoe County at Granville Sand Barrens Nature Preserve.

*Tallgrass prairie:* Although deep soil prairie is no longer known to exist along the Wabash River in this natural region, it was documented as occurring there. Place names, such as Prairie Creek and Prairie Creek Township in Vigo County, attest to its former occurrence. Historical accounts by early visitors and pioneers (Thomas 1916), as well as notes taken by the surveyors of the General Land Office (General Land Office 1799–1834), indicate the presence of several prairies in the region. Today along the Wabash River only scattered individual prairie plants have survived, and of the listed rare species, only very old records of royal catchfly (*Silene regia*) are known from the prairie in this area.

*Southwestern lowland flatwoods:* In the level uplands bordering the Wabash River, especially in the far southern portion of Posey County, are flatwoods that harbor some of the most interesting vegetation in the state. Dominated mostly by post oak (*Quercus stellata*), cherrybark oak (*Q. pagoda*), and shagbark hickory (*Carya ovata*), these flatwoods possess a mix of floodplain forest species and those from prairie and dry forest communities. The wetland species occur in the shallow depressions, e.g., spider lily (*Hymenocallis occidentalis* (Le Conte) Kunth var. *occidentalis*), deciduous holly (*Ilex decidua*), purple fringeless orchid (*Platanthera peramoena* (Gray) Gray), narrow-leaved cattail sedge (*Carex*

*squarrosa*), swamp oval sedge (*C. muskingumensis*), and common wood reed (*Cinna arundinacea*). On the slightly higher and drier areas the prairie and dry forest species can be found, e.g., stiff goldenrod (*Solidago rigida*), blazing star (*Liatris spicata*), rattlesnake master (*Eryngium yuccifolium*), and big bluestem (*Andropogon gerardii*). A more detailed description and species list are found in Aldrich & Homoya (1984). Rare species noted from the community are many, including buffalo clover (*Trifolium reflexum*—SE), eastern eulophus (*Perideridia americana*—SE), broom panic grass (*Dichanthelium scoparium* (Lam.) Gould—SE), clustered fescue (*Festuca paradoxa*—ST), blackfoot quillwort (*Isoetes melanopoda*—ST), Wolf bluegrass (*Poa wolfii*—SR), rough rattlesnake root (*Prenanthes aspera*—SR), and Wolf spikerush (*Eleocharis wolfii*—SR). Rare species restricted in Indiana to the community type near the Wabash include woodland pinkroot (*Spigelia marilandica*—SE), Buckley's goldenrod (*Solidago buckleyi*—SE), and Lesquereux's mustard (*Lesquerella globosa*—SE). The occurrence of the *Lesquerella* here is remarkable, as it is the only station for the species outside of its known range in the Central Basin of Tennessee and the Inner Bluegrass in Kentucky. Section Six Nature Preserve in Posey County is home to several of the species referenced above.

**Southern Bottomlands Natural Region.**—The Wabash River flows through the Southern Bottomlands Natural Region from the general area of Merom in Sullivan County to its confluence with the Ohio River in southern Posey County. The lowland region is, as the name implies, “southern,” not only because of its location in the state, but also by the geographic affinity of many of its organisms to the southern U.S. The principal communities are wetland and aquatic ones, mainly floodplain forest, swamp, pond, and lake. The following are rare natural communities and vascular plants of the Wabash River corridor in the Southern Bottomlands Natural Region.

*Swamp and wet floodplain forest:* Of special interest in the natural region are the swamps dominated by bald cypress (*Taxodium distichum*—ST). The most northern natural occurrence for *Taxodium* in the midwestern U.S. is near Vincennes in Knox County (and is within a few kilometers of being the

northernmost in the world). Other rare species include creeping bur-head (*Echinodorus cordifolius*—SE), Amazon sprangletop (*Leptochloa panicoides*—SE), featherfoil (*Hottonia inflata*—ST), cylindric-fruited seedbox (*Ludwigia glandulosa*—ST), bloodleaf (*Iresine rhizomatosa*—SR), Pursh buttercup (*Ranunculus pusillus*—SE), Mississippi buttercup (*Ranunculus laxicaulis* Darby—SE), social sedge (*Carex socialis*—SR), short-bristle horned-rush (*Rhynchospora corniculata*—ST), southern rein orchid (*Platanthera flava* (L.) Lindley var. *flava*—SE), climbing dogbane (*Trachelospermum diffforme*—SR), water locust (*Gleditsia aquatica*—SE), water purslane (*Didiplis diandra*—SE), and catbird grape (*Vitis palmata*—SR). Of these, the *Echinodorus*, *Gleditsia*, *Leptochloa*, and *Ludwigia* are confined primarily to the Wabash River corridor. A prime location to see many of these species is in Posey County at Twin Swamps Nature Preserve.

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