



4.9 Natural Resources

4.9.1 Physiographic Regions

Physiographic regions are areas that have similar elevation, relief and related types of topographic features present. These regions provide a general view of the terrain of an area, and what resources are present. The entire US 31 Plymouth to South Bend Project study area is within the Northern Moraine and Lake Region. This region covers about the northern quarter of Indiana. The majority of the state's natural lakes are within this region. Most of these lakes are small, occurring at terminal moraines. A moraine is an accumulation of earth and stones carried forward and deposited by a glacier. There are numerous outwash and lacustrine (associated with lakes or ponds) plains, which are often characterized by wide marshes (many now drained), intersected by low sand ridges or knolls. Large, rugged moraines are common in this region (Mumford and Whitaker, 1982). Bogs and fens also occur in this portion of the state.

4.9.2 Natural Regions

A natural region is “a major, generalized unit of the landscape where a distinctive assemblage of natural features is present. It is part of a classification system that integrates several natural features, including climate, soils, glacial history, topography, exposed bedrock, pre-settlement vegetation, species composition, physiography, and plant and animal distribution to identify a natural region” (Homoya, et al, 1985). Natural regions are similar to physiographic regions, but whereas physiographic regions may give information on predominant topography and land use, natural regions give more information about the native plant and animal species of an area.

The majority of the study area is within the Northern Lakes Natural Region. A small portion of the northwest corner of the study area is within the Grand Prairie Natural Region. There are no alternatives that go through the Grand Prairie Natural Region, and for this reason, it will not be discussed in detail in this Section. Figure 4.9.33 shows the study area and the natural regions in this portion of the state.

The following natural region descriptions are from “The Natural Regions of Indiana,” by Homoya et al. (1985).

“There are numerous natural community types within the Northern Lakes Natural Region. They include: bogs, fens, marshes, prairie, sedge meadows, swamps, seep springs, lakes and various deciduous forest types. Oak and hickory species, especially red oak, white oak, black oak, shagbark hickory, and pignuthickory, dominate the dry and dry-mesic upland forests. Mesic sites characteristically have beech, sugar maple, black maple, and tulip tree as dominants. Floodplain forests typically include sycamore, American elm, red elm, green ash, silver maple, red maple, cottonwood, hackberry and honey locust. Swamp communities commonly border lake and bog sites where red maple, silver maple, green ash, American elm, black ash, and locally, yellow birch, are typical. Swamps dominated by black ash typically are associated with seep springs.”

The Northern Lakes Natural Region is characterized by numerous freshwater lakes of glacial origin. Marsh communities are often associated with these lakes. Typical marsh species include swamp loosestrife, cattails, bulrush, marsh fern, marsh cinquefoil and sedges, notably *Carex stricta* and *C. lasiocarpa*. In deeper water, distinctive species such as spatterdock, watershield, fragrant water-lily, pickerelweed, hornwort, wild celery, pondweeds, Virginia arrow-arum and sedge occur. Figure 4.9.34 shows a wetland associated with Catfish Lake.

Bogs are more numerous in this natural region than any other. Bogs commonly consist of a floating mat of *Sphagnum* moss occupying a glacial depression. Characteristic bog plants include leatherleaf, cranberry, bog



Figure 4.9.33: US 31 Study Area Natural Regions



rosemary, pitcher plant, sundews, mountain holly, tamarack, Virginia chain fern, grass-pink orchid, rose pogonia orchid, sedges, poison sumac and Sphagnum.

Wet sand flats and muck flats border some of the lakes and shallow basins. In some places, unique plant species of the Atlantic Coastal Plain disjuncts are associated with these communities. A disjunct species is one found growing in a natural setting separated by a relatively large distance from other populations of the same species.

Distinctive animal species of this natural region include the: spotted turtle, eastern massasauga rattlesnake, Blanding's turtle, star-nosed mole, cisco, marsh wren, swamp sparrow and sandhill crane.



Figure 4.9.34: Wetlands by Catfish Lake in Northern Lakes Natural Region

4.9.3 Soils and Geology

The topography in the study area is generally flat to gently rolling. Elevation ranges from 215 meters (705 feet) to 273 meters (895 feet) above sea level. This region was once covered by the Wisconsin glacier and is now covered by a thick and complex deposit of glacial material. Glacial topography is also prominent, including knobs, kettles, kames, valley trains and outwash plains (Homoya, et al, 1985).

There is a collection of fans and small ridges deposited during the last part of Wisconsin glaciation, formerly called the Maxinkukee Moraine, located in the northwestern portion of the study area. A fan is a feature created by deposition of sediment by streams. Fan formation is similar to delta formation; however, fans can form on land, such as outwash fans that form in front of glaciers. This area of complex glacial till is described in the Indiana Geological Survey (IGS) publication Miscellaneous Map 49 "Quaternary Geologic Map of Indiana," as "mixed drift; till and stratified drift in chaotic form." This area is a unique area both in terms of geology and ecology. It is described by the Indiana Department of Natural Resources as "one of the best examples of glacially formed landscapes in northern Indiana. Prominent features include knolls which rise 50 to 60 feet above their bases, numerous sloughs, enclosed basins, small lakes and ponds" (IDNR, November 25, 1996).

The study area is underlain by Middle Devonian to Early Mississippian age bedrock, primarily Sunbury shale, Ellsworth shale and Antrim shale. The Antrim shale is a dark brownish to black shale and is between 60 to 220 feet thick. The Ellsworth shale is 40 to 200 feet thick, and lies on top of the Antrim shale. The Ellsworth shale is dominated by alternating brownish and greenish layers in its lower portion and greenish layers with some thin beds of dolomite in the upper portion. The Sunbury shale overlies the Ellsworth shale and is dark brownish in color. It is slightly more than 10 feet thick in northeastern Indiana, and thins to the west and to the south (Camp and Richardson, 1999).

Soils in this area are diverse and may include: loamy soils in the moraine areas and till plains, neutral, clayey soils in moraine areas of the southeastern portion of this region and sandy loam soils on the outwash deposits. A moraine is an accumulation of earth and stones carried forward and deposited by a glacier. Muck soils are those with a high organic component, formed partly or almost completely by the decomposed remains of woody or herbaceous vegetation. Muck soils are important components of some wetland communities and are present in this region (Homoya, et al, 1985).



Soil characteristics such as drainage, permeability, depth to water table, depth to bedrock, compaction, shear strength, and shrink swell potential, can affect roadway design and construction. In particular, muck and peat soils require special engineering considerations. These soils must be excavated and filled in with an appropriate, more stable fill material. If they cover a large area, bridging may be necessary.

General soil associations within the study area were identified using United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) State Soil Geographic Database (STATSGO), and are listed below.

- **Coloma-Spinks-Oshtemo:** Deep, nearly level to strongly sloping, well-drained, coarse textured and moderately coarse textured soils on outwash plains and terraces
- **Coupee-Elston-Tracy:** Deep, nearly level to moderately sloping, well drained, medium textured and moderately coarse textured soils on outwash plains and terraces
- **Crosier-Brookston-Barry:** Deep, depressional and nearly level to gently sloping, somewhat poorly drained to very poorly drained, medium textured to moderately fine textured soils on till plains and lake plains
- **Gilford-Maumee-Sparta:** Deep, nearly level to strongly sloping, well-drained and excessively drained, moderately coarse textured and coarse textured soils on till plains, moraines, outwash plains and terraces
- **Houghton-Adrian-Carlisle:** Deep, depressional and nearly level, very poorly drained, organic soils on lake plains, outwash plains and till plains
- **Oshtemo-Kalamazoo-Houghton:** Nearly level to strongly sloping, well-drained, moderately coarse textured and coarse textured soils, some are deep and some are moderately deep over sand and gravel, on outwash plains and moraines
- **Riddles-Crosier-Oshtemo:** Deep, nearly level to strongly sloping, well-drained and somewhat poorly drained, medium textured and moderately fine textured soils on till plains
- **Wolcott-Odell-Corwin:** Deep, nearly level, very poorly drained and somewhat poorly drained, medium textured soils, on outwash plains, lake plains and terraces

Figure 4.9.35 shows the general soil associations within the Study Area.

The Riddles-Crosier-Oshtemo association is the largest crossed by the alternatives, at roughly 40-45% of each alternative. Crosier-Brookston-Barry and Gilford-Maumee-Sparta were the second most common with roughly 20% each. Oshtemo-Kalamazoo-Houghton was third with roughly 10% of each alternative. Houghton-Adrian-Carlisle was the final association crossed by the alternatives, ranging from 3-8 %.

Many peat and marl pits exist in Marshall and St. Joseph counties, with additional mineral resources including sand and gravel, cement, gypsum, high silica sand, whetstone plants and expanded shale. Some oil and gas exists in north central Marshall County (Wier and Patton, 1966).

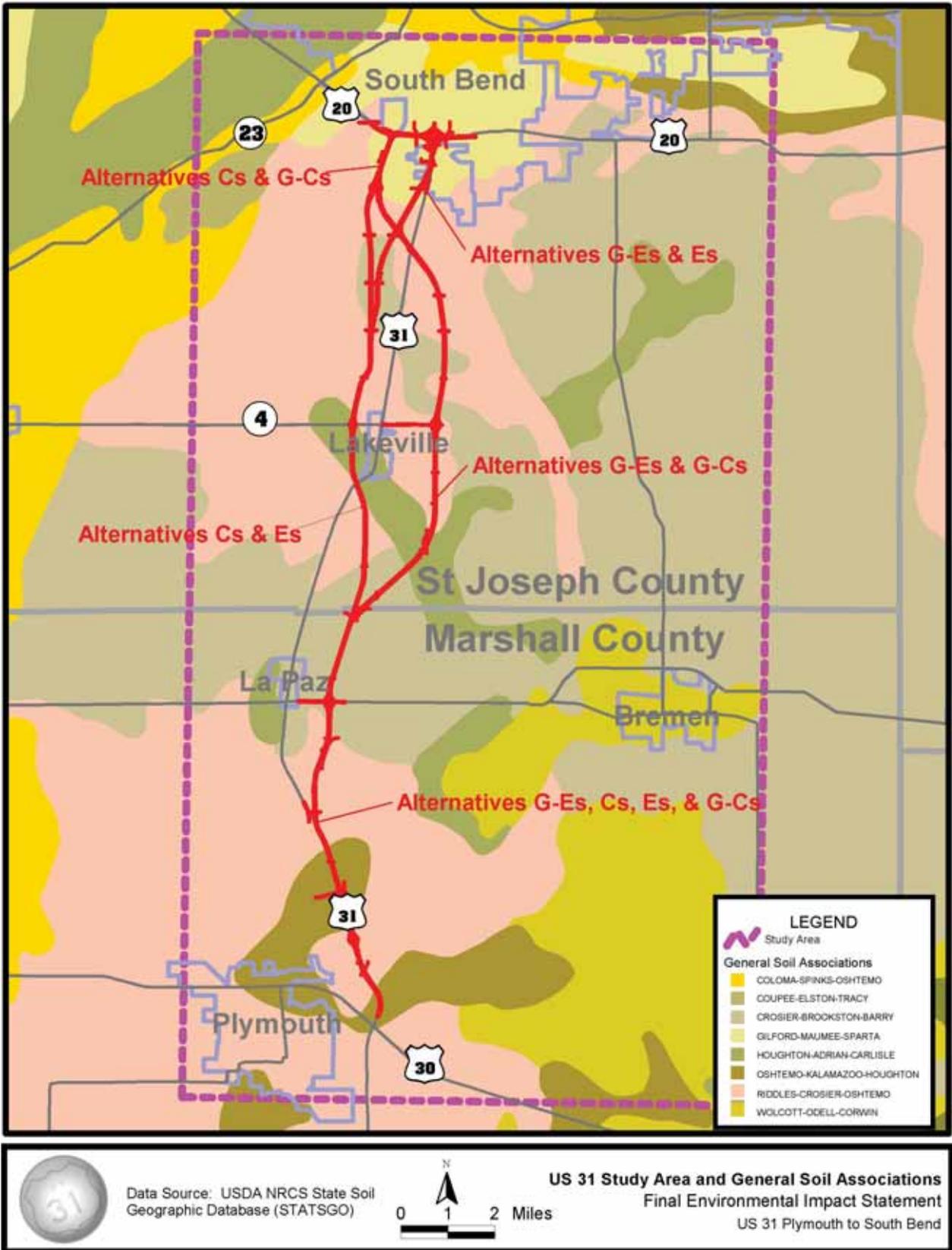


Figure 4.9.35: General Soil Associations



4.9.4 Terrestrial Wildlife and Habitat

Terrestrial wildlife and habitat in the study area will be discussed in two categories: General Habitat and Designated/Managed Habitat Areas. General habitat will refer to the general terrestrial habitat types found within the study area, while the Designated/Managed habitat areas are those that are designated or managed such that they provide habitat for wildlife. Habitat to be impacted within Designated/Managed Habitat Areas is discussed in the General Habitat section. For example, forest impact calculations also include forest within the Designated/Managed Habitat Areas. Wetlands and other aquatic habitats are discussed in separate sections in this document.

General Habitat

Terrestrial habitats occurring within the project area include: forestland, shrub/herbaceous land and pasture/crop/fallow land.

Forestland. As part of the Forest Inventory Analysis by the USDA in 1950, Indiana was divided into four forest survey units. These units have remained consistent throughout the years in order to more accurately track changes in forests from survey to survey. The study area is within the Northern Unit. The Northern Unit is the largest unit, comprising about 60% of the state; however, because much of the land use in this unit is agricultural, it has the lowest percentage of forestland (less than 10%). Due to its large size, the Northern Unit includes many types of growing conditions. The forests in this unit are predominately maple-beech (45%), oak-hickory (27%) and elm-ash-cottonwood (23%) (Tormoehlen et al., 2000).



Figure 4.9.36: Forested land in study area

Wooded areas are scattered throughout the study area. Generally, the larger, more contiguous forested areas were associated with the area of complex glacial drift in the northwestern portion of the study area. Typical canopy species in upland areas were sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), white oak (*Quercus bicolor*), northern red oak (*Quercus rubra*), bitternut hickory (*Carya cordiformis*), shagbark hickory (*Carya ovata*), sassafras (*Sassafras albidum*), eastern cottonwood (*Populus deltoides*), American basswood (*Tilia americana*) and common hackberry (*Celtis occidentalis*). Typical species in the upland shrub understory were American hornbeam (*Carpinus caroliniana*), staghorn sumac (*Rhus hirta*), pawpaw (*Asimina triloba*), red mulberry (*Morus rubra*), Japanese honeysuckle (*Lonicera japonica*), black raspberry (*Rubus occidentalis*), multiflora rose (*Rosa multiflora*) and greenbriar (*Smilax* sp.).

Typical herbaceous species in these areas were poison ivy (*Toxicodendron radicans*), clustered black snakeroot (*Sanicula odorata* = *Sanicula gregaria*), annual ragweed (*Ambrosia artemisiifolia*), white snakeroot (*Ageratina altissima* = *Eutorium rugosum*), stinging nettle (*Urtica dioica*), Virginia creeper (*Parthenocissus quinquefolia*) and white heath aster (*Symphyotrichium ericoides* = *Aster ericoides*).

Typical canopy species in bottomland wooded areas were boxelder (*Acer negundo*), red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), swamp white oak (*Quercus bicolor*), pin oak (*Quercus palustris*), green ash (*Fraxinus pennsylvanica*) and American elm (*Ulmus americana*). Typical bottomland shrub understory species were common elderberry (*Sambucus canadensis*), northern spicebush (*Lindera benzoin*), grapevines (*Vitis* sp.) and greenbriar (*Smilax* sp.). Typical herbaceous species were New England aster (*Aster-novea-angliae*), common boneset



(*Eupatorium perfoliatum*), jewelweed (*Impatiens capensis*), poison ivy (*Toxicodendron radicans*), American pokeweed (*Phytolacca americana*), whitegrass (*Leersia virginica*), great ragweed (*Ambrosia trifida*), stinging nettle (*Urtica dioica*), Canadian clearweed (*Pilea pumila*), smallspike false nettle (*Boehmeria cylindrica*), sweet woodreed (*Cinna arundinacea*) and Canadian woodnettle (*Laportea anadensis*).



Figure 4.9.37: Yellow River Riparian Corridor

The only major riparian corridor observed was associated with the Yellow River in Marshall County. The existing US 31 crosses the Yellow River in this area. Typical canopy species in this area were green ash (*Fraxinus pennsylvanica*), silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), American elm (*Ulmus americana*), red maple (*Acer rubrum*), honey locust (*Gleditsia triacanthos*), box elder (*Acer negundo*), river birch (*Betula nigra*), Eastern cottonwood (*Populus deltoides*), and common hackberry (*Celtis occidentalis*). The shrub understory is represented by sandbar willow (*Salix exigua*), staghorn sumac (*Rhus hirta = Rhus typhina*) and red mulberry (*Morus rubra*). Herbaceous species included crown vetch (*Coronilla varia*), eastern daisy fleabane (*Erigeron annuus*), annual ragweed (*Ambrosia artemisiifolia*), smallspike false nettle (*Boehmeria cylindrica*), poison ivy (*Toxicodendron radicans*), stinging nettle (*Urtica dioica*), great ragweed (*Ambrosia trifida*), jewelweed (*Impatiens capensis*), Canadian clearweed (*Pilea pumila*), wild yam (*Dioscorea villosa*), cocklebur (*Xanthium strumarium*), creeping jenny (*Lysimachia nummularia*), broadleaf arrowhead (*Sagittaria latifolia*), swamp smartweed (*Polygonum hydropiperoides*), Pennsylvania smartweed (*Polygonum pennsylvanicum*), giant ironweed (*Veronia gigantea*), purplestem beggartick (*Bidens connata*), cutleaf coneflower (*Rudbeckia laciniata*), white snakeroot (*Ageratina altissima = Eupatorium rugosum*), grapevine (*Vitis* sp.), goldenrod (*Solidago* sp.), Canada germander (*Teucrium canadense*) and reed canary grass (*Phalaris arundinacea*).

Appendix E contains a list of plant species observed while studying the alternatives. Appendix F contains a list of plant species reported in St. Joseph and Marshall counties by Deam (1974).

In addition to impacts from the direct taking of land, ecosystems such as forests, prairies (remnants), wetlands and others may be adversely affected by habitat fragmentation. Habitat fragmentation is perhaps the most pervasive type of habitat alteration taking place in the world today. It can be defined as the steady transformation of once large and continuous tracts of natural landscape into smaller and more isolated patches or fragments surrounded by disturbed areas (Temple and Wilcox, 1986). Figure 4.9.38 shows a forest before fragmentation and one after fragmentation

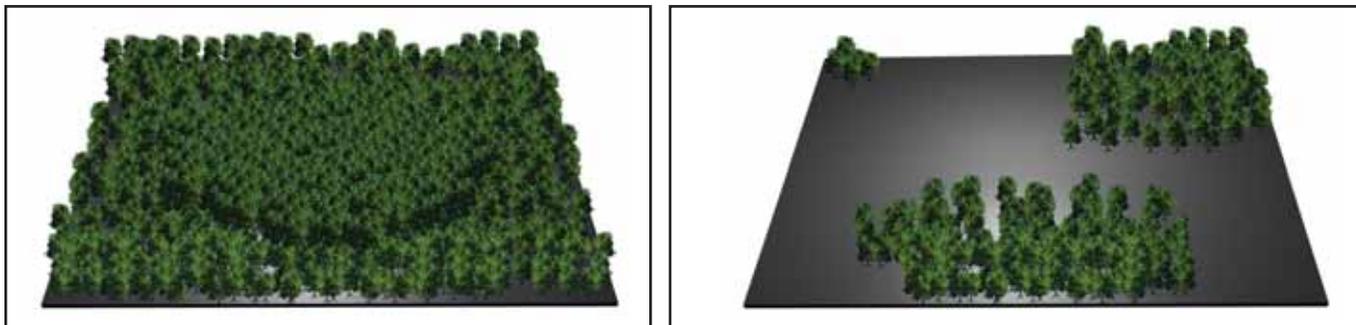


Figure 4.9.38: Left: Forest Prior to Fragmentation. Right: Forest After Fragmentation



occurs. Fragmentation can increase the likelihood of invasive species entering an area of remaining habitat. Invasive plant species can cause ecological damage by displacing native plant species, eliminating food and cover for wildlife, and threatening rare plant and animal species. The Invasive Plant Species Assessment Working Group (IPSAWG) was formed in order to combat invasive species in Indiana. A number of agencies and organizations, including INDOT, participate in this group.

Core habitat is the interior portion of any particular habitat. Habitat fragmentation and core habitat can be associated with different ecosystem types, such as forest and prairies. However, in Indiana most core habitat is generally associated with forests because no large tracts of prairie remain, usually only remnants. Core forest is generally accepted to be the portion of the forest that is 100 meters from the edge (Temple, 1986). The outer portion of forest is considered the edge habitat. Figure 4.9.39 diagrams core forest habitat.

Shrub/Scrub Land. Shrub/scrub areas are those that do not have a canopy, but are in the early stages of succession towards a forest community. This habitat type provides some cover, foraging, and breeding opportunities for wildlife. Woody and herbaceous species typically found in shrub/scrub areas include Queen Anne's lace (*Daucus carota*), Indian hemp (*Apocynum cannabinum*), common milkweed (*Asclepias syriaca*), staghorn sumac (*Rhus hirta* = *Rhus typhina*), giant ironweed (*Veronia gigantean*), red maple (*Acer rubrum*), red mulberry (*Morus rubra*), American pokeweed (*Phytolacca americana*), reed canary grass (*Phalaris arundinacea*) and Canada goldenrod (*Solidago canadensis*).

Pasture/Crop/Fallow Land. Vegetation on tilled or active cropland is primarily soybeans, corn and winter wheat for much of the growing season in the study area. Due to the disturbance of the land by agricultural practices and grazing, there is limited cover, foraging and breeding habitat for wildlife species. Typical plant species observed in these areas were common dandelion

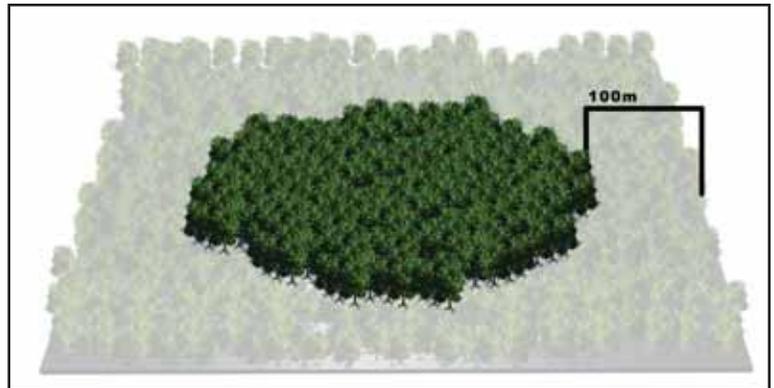


Figure 4.9.39: Diagram of Core Forest Habitat



Figure 4.9.40: Field of Goldenrod in the Study Area



Figure 4.9.41: Soybean Field in Study Area



(*Taraxacum officinale*), chufa flatsedge (*Cyperus esculentus*), black medick (*Medicago sativa*), red clover (*Trifolium pretense*), white clover (*Trifolium repens*), common moonseed (*Menispermum canadense*), orchard grass (*Dactylis glomerata*), barnyard grass (*Echinochloa crus-galli*), annual ragweed (*Ambrosia artemisiifolia*), great ragweed (*Ambrosia trifida*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), chicory (*Cichorium intybus*), curly dock (*Rumex crispus*), rough cocklebur (*Xanthium strumarium*), ivy-leaf morning glory (*Ipomoea hederacea*), tall morning glory (*Ipomoea purpurea*) and perennial pea (*Lathyrus latifolius*).

Designated/Managed Habitat Areas

In addition to general types of wildlife habitat, some areas have been identified by state agencies or managed such that they provide wildlife habitat. There are federal and state interests in many of these lands in the form of cost-sharing agreements, purchased easements, or property tax reductions. Federal and state funds have been or are being expended on many of these properties. Such areas include Potato Creek State Park, IDNR Notable Wildlife Habitat Areas, Classified Wildlife Areas, Classified Forests, Partners for Fish and Wildlife, Conservation Reserve Program Lands, and Wetland Reserve Program Lands.

Potato Creek State Park and Swamp Rose Nature Preserve. Potato Creek State Park is owned and managed by the IDNR and includes approximately 3,840 acres of forest, wetlands, prairie, and the 327-acre Worster Lake. This park is located in the far western portion of the study area on SR 4, and offers a number of recreational opportunities, as well as a variety of natural areas. There is an active resource management program in place to restore and maintain natural areas to conditions found prior to European settlement. Wetland types such as sedge meadows, shallow marshes, swamps and beaver ponds are being restored and maintained. Native prairie plantings are being conducted, and prairie areas are being maintained by periodic, controlled burnings. Other areas in the park are being allowed to grow into hardwood forests. The Swamp Rose Nature Preserve is located in the northeast section of the park. The preserve contains an area that provides an example of eutrophication, where a lake has slowly filled in, over hundreds of years, to become a wetland. A number of rare plant species are found in the nature preserve. The state park and nature preserve provide habitat to a number of wildlife species such as songbirds, raccoon, fox, coyote, turkey and beaver.

Notable Wildlife Habitat (Identified by the IDNR). Notable wildlife habitat areas are privately owned, high quality wildlife habitat and were identified by the IDNR and provided on a map during an interagency meeting and bus tour on May 15, 2003. These areas were identified as providing very good habitat for a variety of wildlife species, or having unique plant species. The majority of these areas are forest or wetland communities, and are located in the northwestern portion of the study area. Many are west of US 31 and north of Lakeville, and correspond with the area of complex glacial drift, formerly the Maxinkukee Moraine.

Classified Wildlife Habitats. The Classified Wildlife Habitat Program is administered by the IDNR, and was created to encourage landowners to develop, save and maintain quality wildlife habitat. These areas are privately owned and landowners that are enrolled in the program receive property tax reductions, a wildlife management plan specifically tailored to meet the habitat and management needs of the wildlife species of interest and free technical advice and assistance. As part of the program, the landowner must carry out minimum standards of wildlife management as specified in their management plan. Prescribed habitat management practices may include: the periodic use of strip disking, strip mowing, prescribed burning, food plot rotation, legume inter-seeding, timber harvesting, woodland regeneration cuts, water level manipulation, and other practices designed to control natural succession and maintain quality habitat.

Classified Forests. The Classified Forest Program is designed to keep Indiana's private forests intact. This program is administered by the IDNR Division of Forestry. This program allows private landowners with at least ten acres of forest to set it aside and to remain as forest. Landowners enrolled in the program receive property tax reductions,



forestry literature and periodic free inspections by a professional forester. Classified forests must be protected from livestock. Landowners must follow minimum standards of good timber management as prescribed by the IDNR district forester.

Conservation Reserve Program (CRP) and Wetlands Reserve Program (WRP). The Conservation Reserve Program (CRP) provides technical and financial assistance to eligible farmers and ranchers to address soil, water and other natural resource concerns on their lands. This program helps to reduce soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter strips or riparian buffers. The Wetlands Reserve Program (WRP) provides technical and financial assistance to eligible landowners who would like to restore and enhance wetlands on their property. It is discussed in this section, rather than the Section 4.12, Wetlands due to its similarity with the CRP. The goal of the WRP wetland restoration efforts is to achieve the greatest wetland functions and values, along with the optimum wildlife habitat. Both the CRP and WRP are administered by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Both CRP and WRP areas are privately owned.

Partners for Fish and Wildlife Program. The Partners for Fish and Wildlife Program is administered by the United States Fish and Wildlife Service (USFWS) and is a voluntary program providing financial and technical assistance to private landowners who wish to restore fish and wildlife habitats on their property. The restoration of degraded wetlands, native grasslands, streams, riparian corridors and other habitats to their natural condition is emphasized. Lands enrolled in this program are privately owned.

Wildlife Species Observed in the Study Area

The following wildlife species were observed within the study area while doing field work: wild turkey (*Meleagris gallopavo*), whitetail deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), great blue heron (*Ardea herodias*), ring-necked pheasant (*Phasianus colchicus*), red-tailed hawk (*Buteo jamaicensis*), spotted salamander (*Ambystoma maculatum*), wood frog (*Rana sylvatica*), southern leopard frog (*Rana sphenocephala*), green frog (*Rana clamitans melanota*), common garter snake (*Thamnophis sirtalis*), redback salamander (*Plethodon cinereus*), red bat (*Lasiurus borealis*) and big brown bat (*Eptesicus fuscus*). Property owners in the study area also report the dickcissel (*Spiza americana*), bobolink (*Dolichonyx oryzivorus*), meadowlark (*Sturnella* sp.), American kestrel (*Falco sparverius*), green heron (*Butorides virescens*), tufted titmouse (*Parus bicolor*), American goldfinch (*Carduelis tristis*), northern cardinal (*Cardinalis cardinalis*), black-capped chickadee (*Poecile atricapilla*), white-breasted nuthatch (*Sitta carolinensis*), red-winged blackbird (*Agelaius phoeniceus*), mourning dove (*Zenaidura macroura*), northern flicker (*Colaptes auratus*), rose-breasted grosbeak (*Pheucticus ludovicianus*), dark-eyed junco (*Junco hyemalis*), song sparrow (*Melospiza melodia*), white-crowned sparrow (*Zonotrichia leucophrys*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), red-bellied woodpecker (*Melanerpes carolinus*), red-headed woodpecker (*Melanerpes erythrocephalus*), house wren (*Troglodytes aedon*), American robin (*Turdus migratorius*), blue jay (*Cyanocitta cristata*), eastern bluebird (*Sialia sialis*), Baltimore oriole (*Icterus galbula*), purple martin (*Progne subis*), American crow (*Corvus brachyrhynchos*), Canada goose (*Branta canadensis*) and eastern cottontail (*Sylvilagus floridanus*) in the study area. Appendix F contains lists of fishes, mammals, birds, reptiles and amphibians reported from St. Joseph and Marshall counties. Those federal or state listed threatened and endangered species are discussed separately in Section 5.9.5, Threatened and Endangered Species.



4.9.5 Threatened and Endangered Species

Endangered and threatened species are recognized by federal and state agencies as being in danger of extinction or being sufficiently compromised that they are at risk of becoming endangered, either nationally or within a state. The assessment of endangered and threatened species is concerned with the preservation and conservation of such species and their sustainability. The following federal and state definitions for threatened, endangered, special concern, and extirpated species are provided:

Federal Classifications:

Endangered (E) Any species that is in danger of extinction throughout all or a significant portion of its range.

Threatened (T) Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Candidate (C) Any species that the United States Fish and Wildlife Service (USFWS) has sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened.

Indiana State Classifications:

Endangered (E) Any animal or plant species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.

Threatened (T) Any animal or plant species likely to become endangered within the foreseeable future. Plants known to occur currently on 6 to 10 sites are considered threatened.

Special Concern (SSC) Any animal or plant species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.

Extirpated (X) Any animal or plant species that has been absent from Indiana as a naturally occurring population for more than 15 years.

Federally listed species are protected under Section 7 of the Endangered Species Act (ESA). This section directs all Federal agencies to use their existing authorities to conserve threatened and endangered species, and in consultation with the United States Fish and Wildlife Service (USFWS), to ensure that their actions do not jeopardize the continued existence of listed species or significantly impact or adversely modify critical habitat.

Critical habitat is defined as a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. There is no designated critical habitat within the study area.

Table 4.9.12 summarizes the identified federal and state listed threatened, endangered, or special concern species that may be present in the study area. These species were identified through coordination with the United States Fish and Wildlife Service (USFWS), the Indiana Department of Natural Resources (INDR) Indiana Natural Heritage Data Center, expert opinion, and property owners within the study area. Only recent (1980+) records from the Indiana Natural Heritage Data Center were used. Habitat requirements and the probability of occurrence in the study area are also listed. All federally listed species are also state listed. Potential impacts to these species are discussed in more detail in Section 5.9.5, Threatened and Endangered Species.



Table 4.9.12: Summary Of Threatened And Endangered Species Possibly Present In US 31 Study Area

SPECIES	COMMON NAME	STATE ¹ STATUS	FEDERAL ² STATUS	STATE ³ RANK	GLOBAL ⁴ RANK	PREFERRED HABITAT	PROBABILITY OF OCCURRENCE WITHIN THE PREFERRED ALTERNATIVE
Gastropods							
<i>Campeloma decisum</i>	Pointed Campeloma	SSC	-	S2	G5	Streams, lakes, and ponds, burrows in mud	Low - Little to no preferred habitat loss
<i>Lymnaea stagnalis</i>	Swamp Lymnaea	SSC	-	S2	G5	Permanent & semipermanent aquatic habitats	Low - Little to no preferred habitat loss
Amphibians							
<i>Acris crepitans blanchardi</i>	Blanchard's Cricket Frog	**	-	S?	G5	Water with an open canopy with low emergent vegetation, such as ponds, ditches, wet prairies, marshes and fens near permanent or flowing water	Moderate - Suitable habitat observed on-site
<i>Ambystoma laterale</i>	Blue-spotted Salamander	SSC	-	S2	G5	Deciduous and coniferous forest; beneath logs, rocks, leaf litter, or in burrows of other small animals; require ponds in midsummer for breeding	Moderate - Suitable habitat observed on-site
Reptiles							
<i>Clemmys guttata</i>	Spotted Turtle	E	-	S2	G5	Shallow, well vegetated wetlands with soft substrates such as marshes, wet pastures, bogs, fens, swamps, woodland streams, and drainage ditches	Low - Limited preferred habitat impacted by project
<i>Clonophis kirtlandii</i>	Kirtland's Snake	E	-	S2	G2	Moist to wet grassy areas such as wet meadows, wet prairies, fens, and grasslands that are near waterbodies such as open and woodland ponds, streams and marshes; may be found in residential or urban areas under boards and trash	Low - Limited preferred habitat impacted by project
<i>Emydoidea blandingii</i>	Blanding's Turtle	E	-	S2	G4	Marshes, creeks, wet prairies, sloughs, fens, and edges of lakes and ponds; prefer shallow systems, clean water, soft organic substrates, and reasonably dense aquatic vegetation	Moderate - Suitable habitat observed on-site



Table 4.9.12: Summary Of Threatened And Endangered Species Possibly Present In US 31 Study Area (Continued)

SPECIES	COMMON NAME	STATE ¹ STATUS	FEDERAL ² STATUS	STATE ³ RANK	GLOBAL ⁴ RANK	PREFERRED HABITAT	PROBABILITY OF OCCURRENCE WITHIN THE PREFERRED ALTERNATIVE
<i>Nerodia erythrogaster neglecta</i>	Northern Copperbelly Water Snake	E	T	S2	G5, T2, T3	Use multiple wetlands, frequently moving between them; prefer shallow edges of open water wetlands, ponds, or lakes, shrubby swamps, shallow woodland ponds, and slow moving streams associated with floodplain woods; also use uplands, particularly in summer	Low - Limited preferred habitat impacted by project
<i>Thamnophis butleri</i>	Butler's Garter Snake	E	-	S1	G4	Moist, grassy, open canopy areas, such as meadows, wet prairies, marshes, savanna, and grasslands; may also be found in grassy vacant lots in suburban areas; often under rocks, logs, trash and boards	Low - Limited preferred habitat impacted by project
<i>Sistrurus catenatus catenatus</i>	Eastern Massasauga	E	C	S2	G3, G4, T3, T4	Sphagnum bogs, fens, swamps, marshes, shrub-dominated peatlands, wet meadows, floodplains, dry woodland, seasonal wetlands with mixture of open grass-sedge areas and short closed canopy	Low - Limited preferred habitat impacted by project
Birds							
<i>Ardea alba</i>	Great Egret	SSC	-	S1B, SZN	G5	Shores of lakes, ponds, and rivers; freshwater or saltwater marshes, mudflats, shallow lagoons, estuaries; requires trees or shrubs near water for nesting	Low - Limited preferred habitat impacted by project
<i>Botaurus lentiginosus</i>	American Bittern	E	-	S2B	G4	Shallow or deep water emergent wetlands, with tall, dense vegetation; wet meadows; tall dense vegetation in uplands adjacent to wetlands	Moderate - Suitable habitat observed on-site
<i>Certhia americana</i>	Brown Creeper	**	-	S2B, SZN	G5	Deciduous and mixed forest, often forested floodplains; prefer to nest in dead or dying trees with peeling bark	Low - Limited preferred habitat impacted by project
<i>Chlidonias niger</i>	Black Tern	E	-	S1B, SZN	G4	Freshwater marshes and sloughs with tall, dense marsh vegetation and areas of open water	Very Low - migratory species and little to no preferred habitat loss



Table 4.9.12: Summary Of Threatened And Endangered Species Possibly Present In US 31 Study Area (Continued)

SPECIES	COMMON NAME	STATE ¹ STATUS	FEDERAL ² STATUS	STATE ³ RANK	GLOBAL ⁴ RANK	PREFERRED HABITAT	PROBABILITY OF OCCURRENCE WITHIN THE PREFERRED ALTERNATIVE
<i>Circus cyaneus</i>	Northern Harrier	E	-	S2	G5	Tall, dense vegetation in wet or dry grasslands, wetlands, lightly grazed pastures, croplands, fallow fields and brushy areas, coastal or inland areas	Moderate - Suitable habitat observed on-site
<i>Grus canadensis</i>	Sandhill Crane	SSC	-	S2B, SZN	G5	Open freshwater, marshes, bogs, sedge meadows, fens	Very Low - migratory species and little to no preferred habitat loss
<i>Haliaeetus leucocephalus</i>	Bald Eagle	E	T	S2	G4	Mature forests near large bodies of water.	Very Low - suitable habitat not observed on-site
<i>Mniotilta varia</i>	Black-and-White Warbler	SSC	-	S1, S2B	G5	Primary and secondary deciduous or mixed forest	Low - Limited preferred habitat impacted by project
<i>Rallus limicola</i>	Virginia Rail	E	-	S3B, SZN	G5	Freshwater marshes with cattails or other dense vegetation	Moderate - Suitable habitat observed on-site
<i>Xanthocephalus xanthocephalus</i>	Yellow-Headed Blackbird	E	-	S1B	G5	Freshwater marshes in summer, forages in open, cultivated fields and pastures during migration	Very Low - suitable habitat not observed on-site
Mammals							
<i>Condylura cristata</i>	Star-nosed Mole	SSC	-	S2	G5	Marshes, bogs, ditch and stream banks, swamps	Moderate - Suitable habitat observed on-site
<i>Myotis sodalis</i>	Indiana Bat	E	E	-	-	Hibernaria are in caves and mines; maturity and foraging habitat is located near small stream corridors with well-developed riparian woods; and upland forests.	Moderate - Suitable summer habitat observed on-site
<i>Lynx rufus</i>	Bobcat	SSC	-	S1	G5	Forest, scrub, or grassy areas in Indiana; has adapted to swamp and desert in other parts of the country	Very Low - Suitable habitat not observed on-site
<i>Taxidea taxus</i>	American Badger	SSC	-	S2	G5	Open areas such as prairie, fallow fields, old gravel pits, stream corridors, railroad right-of-way, and edge of woods	Moderate - Suitable habitat observed on-site



Table 4.9.12: Summary Of Threatened And Endangered Species Possibly Present In US 31 Study Area (Continued)

SPECIES	COMMON NAME	STATE STATUS	FEDERAL ² STATUS	STATE ³ RANK	GLOBAL ⁴ RANK	PREFERRED HABITAT	PROBABILITY OF OCCURRENCE WITHIN THE PREFERRED ALTERNATIVE
Plants							
<i>Geranium robertianum</i>	Herb-Robert	T	-	S2	G5	Ravines and rocky woods	Very Low - suitable habitat not observed on-site.

State Status - X = extirpated, E = endangered, T = threatened, R = rare, SSC - special concern, WL = watch list, SG = significant, ** = no status but rarity warrants concern. Indiana Department of Natural Resources, Division of Nature Preserves Web Site - <http://www.dnr.org/dnr/naturepr/species/index.htm> (November, 2002).

Federal Status - E = endangered, T = threatened, LELT = different listings for specific ranges of species, C = Candidate for listing, e/sa = appearance similar to a listed endangered species, - = not listed

State Rank - SX = presumed extirpated, SH = possibly extirpated, S1 = critically imperiled, S2 = imperiled, vulnerable, S4 = apparently secure, S5 = secure, SR = reported, SZ = migratory transient, SE = exotic, S? = unranked, SU = unrankable

Global Rank - GX = presumed extirpated, GH = possibly extirpated, G1 = critically imperiled, G2 = imperiled, vulnerable, G4 = apparently secure, G5 = secure, GR = reported, GZ = migratory transient, GE = exotic, G? = unranked, GU = unrankable

Wetland, Habitat and Trophic Response Guilds

As part of a separate project, wetland, habitat and trophic response guilds were developed for all reasonable resident and migrant species occurring in Indiana based on a literature review and field experience. Rankings were coded so as to emphasize wildlife species and their sensitivity or tolerance to anthropogenic (man-made) disturbances in aquatic and terrestrial habitats. This database provides valuable information about the habitat, feeding, movement, status and sensitivity for adaptability of each species.

The categories used are shown in Table 4.9.13. They are 1) wetland or aquatic dependency, 2) habitat specificity, 3) trophic level, 4) seasonality (birds only), and 5) species status. In addition, birds that are sensitive to forest and grassland (prairie) fragmentation, and tolerance levels for fishes are included for reference. Ranking of species in standardized guilds provides a way to compare structural and functional changes in wildlife communities affected by various types of environmental impacts.



Table 4.9.13: Ranking scores for response guilds of wildlife communities	
	Code
1. WETLAND DEPENDENCY	
obligate species (found >99% in wetlands)	5
facultative wet (57-99%, generally found in or near wetlands)	3
facultative (34-66%, occurs frequently, but not essential)	1
facultative dry (1-33%, occasional or no use)	0
upland (>99% in uplands)	0
2. HABITAT SPECIFICITY	
alpha species -- stenotypic, specialist (e.g., large tree cavity nester, clear water)	5
gamma species -- landscape dependent (e.g., undisturbed forest in Indiana, affected by changes in land use, wide-ranging)	3
beta species -- generalist, edge, disturbance	1
3. TROPHIC LEVEL	
carnivore, specialist (restricted diet)	5
carnivore, generalist	4
herbivore, specialist (e.g., nuts, nectar)	3
herbivore, generalist	2
omnivore (exists on either plants or animals)	1
4. SEASONALITY (birds only)	
breeding season resident/neotropical migrant	5
short-distance migrant	4
year round resident	3
non-breeding season resident only	2
migratory transient	1
Occasional	0
5. SPECIES STATUS	
endangered, threatened, special concern, watch list, and endemic	5
commercial, recreational value	3



		Code
5. SPECIES STATUS		
other native species		1
Exotics		0

This database of mammals, birds, reptiles, amphibians, and fishes occurring in Indiana includes a sample size of 606 species based on guild rankings. Results show about 47% of 57 mammals, 62% of 282 birds, 43% of 53 reptiles, 100% of 38 amphibians, and 100% of 176 fishes could be categorized as being partially or fully dependent upon wetlands and/or associated aquatic habitats.

Of these 606 vertebrates, approximately 73% are fully or partially wetland dependent. In addition, 93 of 120 (78%) of the TES (including watch list species) are wetland dependent. Wetlands make up only 4-5% of the surface area of Indiana and such high occurrences of TES species for wetlands shows the value and importance of wetland habitats to Indiana’s biota. The remaining 27 TES species may be categorized as grassland species (14), forest species (10), cave species (2), or reintroduced (1).

Table 4.9.14 lists those vertebrate threatened, endangered, and special concern species that may be within the US 31 study area and their ranking scores for response guilds. These species are similar to those for the entire state, with 73% being fully or partially wetland dependent. Species not dependent on wetlands are often sensitive to forest fragmentation.

Appendix G contains response guild ranking scores for the vertebrates of Indiana.

Species	Wetland Dependence	Habitat Specificity	Trophic Level	Seasonality (Birds Only)	Status
<i>Acris crepitans blanchardi</i> (Blanchard's cricket frog)	3	1	4	-	5
<i>Ambystoma laterale</i> (Blue-spotted salamander)	3	3	4	-	5
<i>Clemmys guttata</i> (Spotted turtle)	5	3	1	-	5
<i>Clonophis kirtlandii</i> (Kirtland's snake)	3	3	4	-	5
<i>Emydoidea blandingii</i> (Blanding's turtle)	5	5	4	-	5
<i>Nerodia erythrogaster neglecta</i> (Northern copperbelly water snake)	5	3	4	-	5
<i>Thamnophis butleri</i> (Butler's garter snake)	0	3	4	-	5



Table 4.9.14: Response Guilds for Threatened, Endangered, and Special Concern Species (Continued)

Species	Wetland Dependence	Habitat Specificity	Trophic Level	Seasonality (Birds Only)	Status
<i>Sistrurus catenatus catenatus</i> (Eastern massasauga rattlesnake)	5	5	4	-	5
<i>Ardea alba</i> (Great egret)	5	5	4	4	5
<i>Botaurus lentiginosus</i> (American bittern)	5	3	4	5	5
<i>Certhia americana*</i> (Brown creeper)	1	5	4	3	5
<i>Chlidonias niger</i> (Black tern)	5	3	4	5	5
<i>Circus cyaneus**</i> (Northern harrier)	3	3	4	3	5
<i>Grus canadensis</i> (Sandhill crane)	5	3	1	1	5
<i>Haliaeetus leucocephalus</i> (Bald eagle)	5	5	4	3	5
<i>Mniotilta varia*</i> (Black-and-white warbler)	0	3	4	5	5
<i>Rallus limicola</i> (Virginia rail)	5	3	1	5	5
<i>Xanthocephalus xanthocephalus</i> Yellow-headed blackbird	3	3	1	0	5
<i>Condylura cristata</i> (Star-nosed mole)	5	5	4	-	5
<i>Myotis sodalis</i> (Indiana bat)	1	5	5	-	5
<i>Lynx rufus</i> (Bobcat)	0	3	4	-	5
<i>Taxidea taxus</i> (American badger)	0	3	4	-	5

* Denotes sensitive to forest fragmentation

**Denotes sensitive to prairie and grassland fragmentation