

Appendix D. Habitat Classification Schemes and Definitions

Description of Procedures

The NatureServe Explorer (<http://explorer.natureserve.org/index.htm>) online database was used to update habitat information for SGCN. For consistency with the 2005 CWS, the NatureServe habitat values were categorized under the eight major habitat types as subhabitats. The eight major habitats are described using the definitions given in the 2005 CWS. The subhabitats are described using the definitions given in the NatureServe database.

For some habitat features or special cases of habitats that were designated as their own subhabitat types in the 2005 CWS (e.g., reclaimed mine lands, which may be considered a special case of herbaceous grasslands), use by SGCN is noted in the comments on the habitat tables in the regional chapters.

Two unique habitats of interest in Indiana (mudflats and Lake Michigan) were added to NatureServe's subhabitat list. These unique subhabitats are not already covered in a NatureServe habitat type. Data on use of these habitats by SGCN was collected from Whitaker and Amlaner's *Habitats and Ecological Communities of Indiana* (2012) and from the 2005 CWS.

Habitat and Subhabitat Definitions

1. **Agricultural Lands:** Lands devoted to commodity production, including intensively managed nonnative grasses, row crops, and fruit and nut-bearing trees.

- A. Cropland/Hedgerow: Cultivated fields and field borders.

2. **Aquatic Systems:** All water habitats, both flowing and stationary, but not including wetlands.

- A. Lacustrine Habitats

- I. Lakes: All naturally occurring stationary water body contained in a basin. Can vary widely in habitat and eutrophication. Less fertile lakes may be deep well-oxygenated, with marl or sandy substrate. More fertile lakes may be shallow, with muck bottoms and dense stands of aquatic vegetation.

1. Deep Water: Open, non-vegetated aquatic habitats, extending beyond the littoral zone (shore or shallow water).

2. Shallow Water: The littoral zone: characterized by the frequent presence of rooted aquatic plants, disturbance by wave action, and periodic exposure during drawdown (during drought, for example). Some lakes and ponds are all shallow water; in some others, shallow water is restricted to shores and bays.

- II. Additional Unique Subhabitats in Indiana:

1. Lake Michigan: Indiana's largest natural lake, the southern tip of which forms the State's extreme northwest border.

- B. Riverine Habitats: A broad, deep inland body of water with a steady, directional current.

- I. Big Rivers: The largest streams, generally characterized by large perennial flows, large quantities of nutrients and organic matter, high turbidity, and fine sediments.

- II. *Medium Rivers*: Perennial tributaries of big rivers (or flowing directly into other water bodies) with coarse-to-fine sediments. Riparian vegetation does not heavily dominate the community through shading and organic inputs.
- III. *Creeks*: Smaller streams, sometimes characterized by heavy influence (e.g., shading, organic detritus) from adjacent terrestrial habitats; variable flow, sometimes intermittent.
- IV. *Springs/Spring Brooks*: Points of concentrated groundwater discharge, either concentrated (at a distinct orifice) or diffuse (at a seep). The outflow channel is classified as a spring brook as far downstream as the spring waters' characteristics (i.e., relatively constant temperature, nutrient-poor) are maintained.

V. *Features of Riverine Habitats*

- 1. Riffles: Shallow area where water passing over the bottom causes visible disturbances (ripples) at the water surface.
- 2. Pools: Discrete areas where the water is relatively still and usually deeper than adjacent waters.
- 3. High Gradient: Streams with a fall of more than two meters per kilometer, characterized by riffles, pools, rock outcrops, and coarse sediments.
- 4. Moderate Gradient: Streams with a fall between 0.2 and two meters per kilometers; bottom sediments are a mosaic of sand, gravel, and silt.
- 5. Low Gradient: Streams with a fall fewer than 0.2 meters per kilometer; there may be sand bars, but the sediments are mostly silt.

3. **Barren Lands**: Lands dominated by exposed rock or minerals with sparse vegetation.

- A. Sand/Dunes: Open sandy beaches above high tide, barren active dunes, and similar areas of barren, largely unvegetated sand. Does not include stabilized thickly vegetated dunes.
- B. Cliffs/Rock Outcrops: Vertical or nearly vertical rock outcrops.
- C. Bare Rock/Talus: Unvegetated expanses of bedrock or broken rock.

4. **Developed Lands**: Highly impacted lands intensively modified to support human habitation, transportation, commerce, and recreation.

- A. Urban Areas: Human-maintained habitats dominated by buildings, with little vegetation.
- B. Suburban Areas: Human-maintained habitats generally characterized by open-grown trees, lawns, and small buildings; does not include rural residential areas where human dwellings are scattered within or widely adjacent to more or less natural ecosystems or cropland.

5. **Forest Lands**: A plant community extending over a large area and dominated by trees—the crowns of which form an unbroken covering layer or canopy.

- A. Forests

- I. *Hardwood Forest*: Angiosperms comprise over two-thirds of the canopy—woody vegetation at least six meters tall (usually much taller) with a fairly continuous and complete (two-thirds or greater) canopy closure.
- II. *Conifer Forest*: Gymnosperms comprise over two-thirds of the canopy—complete (two-thirds or greater) canopy closure.
- III. *Mixed Forest*: Forest composed of both hardwood and conifer trees, neither dominating as much as two-thirds of the canopy.

B. Woodlands

- I. *Hardwood Woodland*: Angiosperms comprise over two-thirds of the canopy; open stands of trees at least six meters tall, with crowns often not interlocking; tree canopy discontinuous (often clumped), averaging between two-thirds and 40% overall cover (at 40%, the average diameter of a tree crown equals the average distance between crowns); shrub layer often poorly developed or present only in gaps in the canopy.
- II. *Conifer Woodland*: Gymnosperms comprise over two-thirds of the canopy; forest edge species (i.e., those dependent on a break in the canopy rather than on forest per se) are included in this category; pine barrens are either conifer or mixed woodlands.
- III. *Mixed Woodland*: Woodland composed of both hardwood and conifer trees, neither dominating as much as two-thirds of the canopy.
- IV. *Early Successional Forest*: See old fields (Grasslands).

6. **Grasslands**: Open areas dominated by grass species.

- A. Herbaceous Grasslands: Habitat dominated by grasses or forbs; trees and shrubs very widely scattered, if present; includes pastures and hayfields.
- B. Old Fields (early successional): A successional habitat composed of a mosaic of shrubs, scattered trees, and herbaceous vegetation.
- C. Shrubland: Vegetation composed of shrubs (many-stemmed woody plants, generally fewer than six meters tall).
- D. Savannas: Mosaic of trees or shrubs and grassland; between 40% and 10% cover by trees and shrubs.

7. **Subterranean Systems**: Connected underground rooms and passages beyond natural light penetration.

- A. Subaquatic: Subterranean aquatic. Underground waters, above, and below the water table.
- B. Subterrestrial: Subterranean terrestrial (air-filled) habitats, ranging from large caves to interstitial crevices below soil horizons.

8. **Wetlands**: Temporarily or permanently flooded habitats, often supporting aquatic vegetation.

- A. Bogs/Fens: Wetlands with peat or muck substrate resulting from unusual water chemistry, including areas of highly mineralized groundwater discharge (e.g., many fens) as well as sterile rainwater catch basins (e.g., many bogs) and other peatlands.
- B. Herbaceous Wetland: Vegetated areas characterized by emergent herbaceous aquatic plants, excluding mosses and lichens (e.g., freshwater marsh).

- C. Forested Wetland: Wetland dominated by woody vegetation six meters tall or taller.
- D. Shrub Wetland: Wetland dominated by woody vegetation fewer than six meters tall.
- E. Ephemeral/Temporary Wetlands: Small depressions in which surface water is present for extended periods (especially early in the growing season) but is absent by the end of the season in most years; seasonally flooded.
- F. Riparian Zones: A narrow zone of habitat, which may or may not be vegetated, directly associated with streamsides, lakeshores, or a similar immediately adjacent habitat. Note: this refers to any riparian zone such as forested, shrubby, grassy, etc.
- G. Additional Unique Subhabitat in Indiana:
 - I. Mudflats: Moist unvegetated soil often produced in shallow wetlands by advance and retreat of water levels (2005 CWS).

Additional Special Cases or Habitat Features

The following special cases or habitat features used in 2005 that were already covered in the NatureServe habitat classifications are noted in the comments section of the habitat tables in the regional chapters. These classifications include: recovering mine lands (special case of herbaceous grassland), quarries (special case of bare rock), roads (feature), rights-of-way (feature), hay lands (herbaceous grassland), vegetated dunes (herbaceous grassland), Farm Bill program lands (herbaceous grassland), prairies (herbaceous grassland), impoundments (lacustrine), borrow pits (lacustrine), and oxbows/backwaters/sloughs/embayments (riverine).

1. Aquatic Systems

- A. Oxbows/Backwaters/Sloughs/Embayments: A series of riverine habitats varying in structure and permanency that are associated with large rivers in the southwest portion of Indiana along the Ohio River. They often have muck bottoms and function as important nursery areas for large river fish species. These areas may be natural or manmade: for example, embayments along the Ohio River are the result of a series of locks and dams, and many oxbows are the result of stream channelization.
- B. Impoundments: Artificially constructed or maintained standing or flowing water bodies.
- C. Borrow Pits: Areas where soil has been removed for transport and used elsewhere, which can then fill with water.

2. Barren Lands

- A. Quarries: Areas where vegetative cover has been removed to extract mineral, stone, gravel, or sand.

3. Developed Lands

- 1. Roads: Corridors, paved strips and connecting structures for the moving of goods, services and people by cars, trucks, and trains.
- 2. Rights-of-Way: Grassy areas of land along railroad tracks, highways, and utility lines.

4. Grasslands

- A. Reclaimed Mine Lands: Open areas created by total soil disturbance related to surface mining activities and re-vegetated with warm or cool season grasses.

- B. Haylands: Open areas maintained in mixed grass and forb covers or predominated by legumes and periodically harvested during the growing season to produce forage for livestock.
- C. Vegetated Dunes: Ridge and valley topography developed by wind-blown sand deposits near Lake Michigan. Vegetative cover progresses the further the dunes are from the lakeshore.
- D. Farm Bill Program Lands: Grasslands developed in a predominately agricultural landscape to promote soil and water conservation and wildlife habitat values.
- E. Prairies: An open, usually treeless area, with its vegetation composed primarily of native grasses, forbs, and wildflowers.

Definitions of Habitats Used to Analyze Changes in Land Cover

Changes in land cover were analyzed using the National Land Cover Database (NLCD) in 2001 and 2011. The NLCD classifies land cover in the following categories:

1. Planted/Cultivated

- A. Cultivated Crops: Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops, such as orchards and vineyards. Crop vegetation accounts for more than 20% of total vegetation. This class also includes all land being actively tilled.

2. Water

- A. Open Water: Areas of open water, generally with less than 25% cover of vegetation or soil.

3. Barren

- A. Barren Land: Areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.

4. Developed

- A. Developed, Open Space: Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot, single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
- B. Developed, Low Intensity: Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% of total cover. These areas most commonly include single-family housing units.
- C. Developed, Medium Intensity: Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
- D. Developed, High Intensity: Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80% to 100% of the total

cover.

5. Forest

- A. Deciduous Forest: Areas dominated by trees generally more than five meters tall and with more than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
- B. Evergreen Forest: Areas dominated by trees generally more than five meters tall and with more than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
- C. Mixed Forest: Areas dominated by trees generally more than five meters tall and with more than 20% of total vegetation cover. Neither deciduous nor evergreen species are more than 75% of total tree cover.

6. Herbaceous

- A. Grassland/Herbaceous: Areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management, such as tilling, but can be utilized for grazing.
- B. Hay/Pasture: Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/Hay vegetation accounts for more than 20% of total vegetation.

7. Shrubland

- A. Shrub/Scrub: Areas dominated by shrubs fewer than five meters tall with shrub canopy typically more than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.

8. Wetlands

- A. Woody Wetlands: Areas where forest or Shrubland vegetation accounts for more than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
- B. Emergent Herbaceous Wetlands: Areas where perennial herbaceous vegetation accounts for more than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.