



SOUTHEAST GAP ANALYSIS PROJECT



Species Modeling Report

Indiana Bat

Myotis sodalis

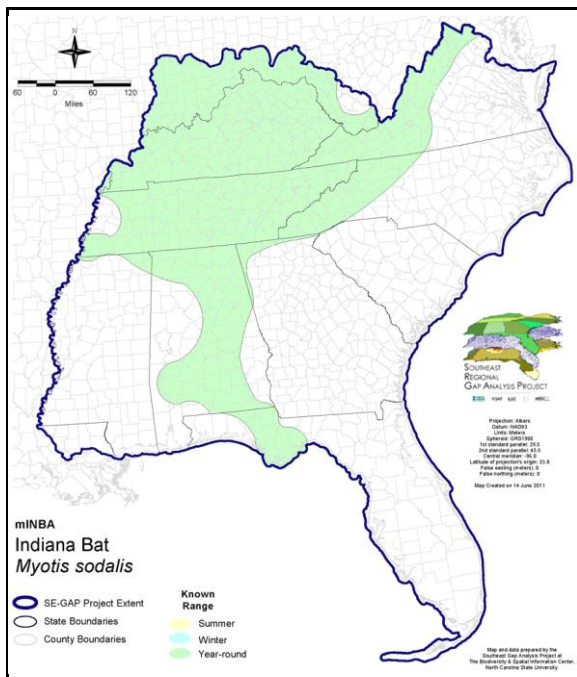
Taxa: Mammalian
 Order: Chiroptera
 Family: Vespertilionidae

SE-GAP Spp Code: **mINBA**

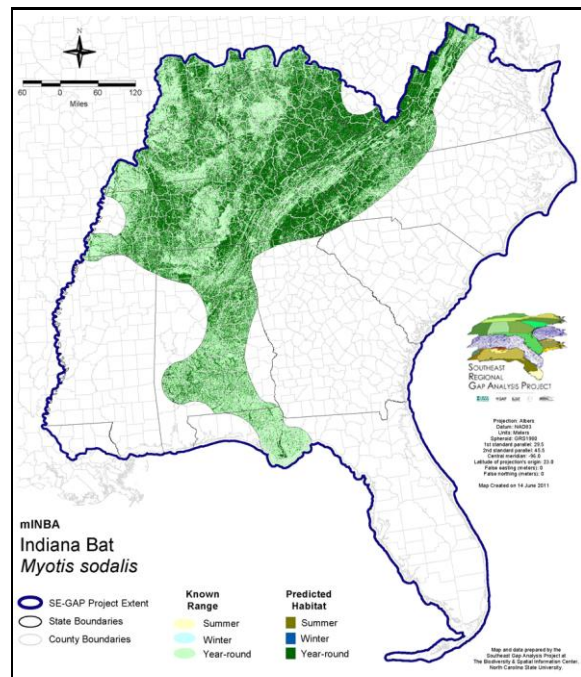
ITIS Species Code: 180001

NatureServe Element Code: AMACC01100

KNOWN RANGE:



PREDICTED HABITAT:



Range Map Link: http://www.basic.ncsu.edu/segap/datazip/maps/SE_Range_mINBA.pdf

Predicted Habitat Map Link: http://www.basic.ncsu.edu/segap/datazip/maps/SE_Dist_mINBA.pdf

GAP Online Tool Link: <http://www.gapservice.ncsu.edu/segap/segap/index2.php?species=mINBA>

Data Download: http://www.basic.ncsu.edu/segap/datazip/region/vert/mINBA_se00.zip

PROTECTION STATUS:

Reported on March 14, 2011

Federal Status: LE

State Status: AL (SP), CT (E), FL (FE), GA (E), IA (E), IL (LE), IN (SE), KY (E), MA (E), MD (E), MI (E), MO (E), MS (LE), NC (E), NC (E), NJ (E), NY (E), OH (E), PA (PE), SC (SE-Endangered), TN (E), VA (LE), VT (E), WI (SC/FL)

NS Global Rank: G2

NS State Rank: AL (S2), AR (S1), CT (SHN), FL (SNA), GA (S1), IA (S1), IL (S1), IN (S1), KY (S1S2), MA (SH), MD (S1), MI (S1), MO (S1), MS (SH), NC (S1), NC (S1), NJ (S1), NY (S1), OH (S1), OK (SNR), PA (SUB,S1N), SC (S1), TN (S1), VA (S1), VT (S1), WI (SNA), WV (S1)

SUMMARY OF PREDICTED HABITAT BY MANAGMENT AND GAP PROTECTION STATUS:

| | US FWS | | US Forest Service | | Tenn. Valley Author. | | US DOD/ACOE | |
|----------|------------------------|-----|-----------------------|-----|----------------------|-----|-----------------------|-----|
| | ha | % | ha | % | ha | % | ha | % |
| Status 1 | 8,851.1 | < 1 | 31,388.8 | < 1 | 0.0 | 0 | 0.0 | 0 |
| Status 2 | 12,060.1 | < 1 | 318,990.9 | 2 | 0.0 | 0 | 0.0 | 0 |
| Status 3 | 2,545.3 | < 1 | 1,527,459.5 | 7 | 50,287.3 | < 1 | 109,963.9 | < 1 |
| Status 4 | 27.6 | < 1 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 |
| Total | 23,484.1 | < 1 | 1,877,839.1 | 9 | 50,287.3 | < 1 | 109,963.9 | < 1 |
| | US Dept. of Energy | | US Nat. Park Service | | NOAA | | Other Federal Lands | |
| | ha | % | ha | % | ha | % | ha | % |
| Status 1 | 0.0 | 0 | 286,147.4 | 1 | 0.0 | 0 | 0.0 | 0 |
| Status 2 | 0.0 | 0 | 11,500.8 | < 1 | 785.3 | < 1 | 0.5 | < 1 |
| Status 3 | 9,902.2 | < 1 | 79,697.1 | < 1 | 0.0 | 0 | 140.9 | < 1 |
| Status 4 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 |
| Total | 9,902.2 | < 1 | 377,345.3 | 2 | 785.3 | < 1 | 141.3 | < 1 |
| | Native Am. Reserv. | | State Park/Hist. Park | | State WMA/Gameland | | State Forest | |
| | ha | % | ha | % | ha | % | ha | % |
| Status 1 | 0.0 | 0 | 1,178.6 | < 1 | 72.0 | < 1 | 0.0 | 0 |
| Status 2 | 0.0 | 0 | 8,513.8 | < 1 | 299,368.1 | 1 | 1,314.2 | < 1 |
| Status 3 | 17,083.4 | < 1 | 96,925.2 | < 1 | 93,083.3 | < 1 | 32,012.6 | < 1 |
| Status 4 | 0.0 | 0 | 0.0 | 0 | 21,547.3 | < 1 | 0.0 | 0 |
| Total | 17,083.4 | < 1 | 106,617.7 | < 1 | 414,070.7 | 2 | 33,326.8 | < 1 |
| | State Coastal Reserve | | ST Nat.Area/Preserve | | Other State Lands | | Private Cons. Easemt. | |
| | ha | % | ha | % | ha | % | ha | % |
| Status 1 | 0.0 | 0 | 11,629.2 | < 1 | 0.0 | 0 | 0.0 | 0 |
| Status 2 | 24.1 | < 1 | 42,849.4 | < 1 | 5.0 | < 1 | 1,106.0 | < 1 |
| Status 3 | 0.0 | 0 | 2,648.3 | < 1 | 2,296.7 | < 1 | 1,205.2 | < 1 |
| Status 4 | 0.0 | 0 | 2.1 | < 1 | 249.6 | < 1 | 0.0 | 0 |
| Total | 24.1 | < 1 | 57,128.9 | < 1 | 2,551.2 | < 1 | 2,311.2 | < 1 |
| | Private Land - No Res. | | Water | | Overall Total | | | |
| | ha | % | ha | % | ha | % | ha | % |
| Status 1 | 0.0 | 0 | 0.0 | 0 | 339,267.0 2 | | | |
| Status 2 | 0.0 | 0 | 0.0 | 0 | 696,518.1 3 | | | |
| Status 3 | 0.0 | 0 | 0.0 | 0 | 2,025,250.9 17 | | | |
| Status 4 | 16,506,374.4 | 78 | 16,371.7 | < 1 | 16,566,092.3 78 | | | |
| Total | 16,506,374.4 | 78 | 16,371.7 | < 1 | 19,627,128.3 100 | | | |

GAP Status 1: An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, and intensity) are allowed to proceed without interference or are mimicked through management.

GAP Status 2: An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive use or management practices that degrade the quality of existing natural communities.

GAP Status 3: An area having permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low-intensity type or localized intense type. It also confers protection to federally listed endangered and threatened species throughout the area.

GAP Status 4: Lack of irrevocable easement or mandate to prevent conversion of natural habitat types to anthropogenic habitat types. Allows for intensive use throughout the tract. Also includes those tracts for which the existence of such restrictions or sufficient information to establish a higher status is unknown.

PREDICTED HABITAT MODEL(S):

Year-round Model:

Habitat Description: In summer, habitat consists of wooded or semiwooded areas, mainly along streams. Solitary females or small maternity colonies bear their offspring in hollow trees or under loose bark of living or dead trees (Humphrey et al. 1977, Garner and Gardner 1992). Humphrey et al. (1977) determined that dead trees are preferred roost sites and that trees standing in sunny openings are attractive because the air spaces and crevices under the bark are warmer. In Illinois, Garner and Gardner (1992) found that typical roosts were beneath the exfoliating bark of dead trees; other roost sites were beneath the bark of living trees and in cavities of dead trees. Kurta et al. (1993) found a large maternity colony in a dead, hollow, barkless, unshaded sycamore tree in a pasture in Illinois. In Michigan, a reproductively active colony occupied eight different roost trees (all green ash), all of which were exposed to direct sunlight throughout the day; bats roosted beneath loose bark of dead trees (Kurta et al. 1993). In western Virginia, a male used a mature, live, shagbark hickory tree as a diurnal roost; the bat foraged primarily among tree canopies of an 80-year-old oak-hickory forest (Hobson and Holland 1995). In Missouri, primary maternity roosts were in standing dead trees exposed to direct sunlight; there were 1-3 primary roosts per colony; alternate roosts were in living and dead trees that typically were within the shaded forest interior (Callahan et al. 1997). See Garner and Gardner (1992) for detailed information on summer habitat in Illinois. Though maternity sites have been reported as occurring mainly in riparian and floodplain forests (Humphrey et al. 1977, Garner and Gardner 1992), recent studies indicate that upland habitats are used by maternity colonies much more extensively than previously reported. Garner and Gardner (1992) reported that 38 of 51 roost trees in Illinois occurred in uplands and 13 trees were in floodplains. Of the 47 trees in forested habitat, 27 were in areas having a closed (80-100%) canopy, and 15 were in areas having an intermediate (30-80%) canopy. A single roost tree was found in the following types of habitat: a heavily grazed ridgetop pasture with a few scattered dead trees, a partially wooded swine feedlot, a palustrine wetland with emergent vegetation, a forested island in the Mississippi river, and a clearcut around a segment of an intermittent stream where dead trees were retained for wildlife. Roosts were not found in forests with open canopies (10-30%) or in old fields with less than or equal to 10% canopy cover.

Roost trees include slippery elm (*ULMUS RUBRA*), American elm (*ULMUS AMERICANA*), northern red oak (*QUERCUS RUBRA*), post oak (*QUERCUS STELLATA*), white oak (*QUERCUS ALBA*), shingle oak (*QUERCUS IMBRICARIA*), shagbark hickory (*CARYA OVATA*), bitternut hickory (*CARYA CORDIFORMIS*), sweet pignut hickory (*CARYA OVALIS*), silver maple (*ACER SACCHARINUM*), sugar maple (*ACER SACCHARUM*), cottonwood (*POPULUS DELTOIDES*), green ash (*FRAXINUS PENNSYLVANICA*), and sassafras (*SASSAFRAS ALBIDUM*) (Cope et al. 1974, Humphrey et al. 1977, Garner and Gardner 1992). See Garner and Gardner (1992) for a detailed description of tree characteristics.

Amy Silvano 10jun05

Although this species is generally associated with hardwood forested habitats, Britzke et al. (2003) found that within Nantahala National Forest, NC & Great Smokey Mountains National Park, TN, primary and alternate roost trees in NC were ' in a stand that was classified as hemlock-hardwood; dominant trees were eastern hemlock (*Tsuga canadensis*), Fraser magnolia (*Magnolia fraseri*), and sweet birch (*Betula lenta*) and in TN 'roosts were classified as a pine stand; dominant trees were shortleaf pine (*P. echinata*), eastern hemlock, and sourwood (*Oxydendrum arboreum*). The primary roost for GSMNP2 was in a stand classified as pine; dominant species were pitch pine (*P. rigida*), chestnut oak (*Q. prinus*), Virginia pine (*P. virginiana*), and black tupelo (*Nyssa sylvatica*). Amy Silvano 10jun05

Foraging habitat is in/around crowns of riparian and floodplain trees (FL-GAP 2001) and sometimes over water (GA-GAP 2003). Amy Silvano 10jun05

Ecosystem Classifiers: Evergreen, Mixed Hardwood, Mesic, Cove, Montane (excluding spruce-fir), D. Plantation, successional, open water Treed depressional, & Floodplain/Riparian (No herb mods). *****If we have sufficient canopy layer can add restrictor also of >80% canopy closure (Garner & Gardner 1992, In Evans et al. 1998). Amy Silvano 10jun05

Avoidance Mask: Medium - moderately intolerant of human disturbance.

Hydrography Mask:

Utilizes flowing water features with buffers of 2000m from and 60m into selected water features.

Utilizes open water features with buffers of 2000m from and 60m into selected water features.

Utilizes wet vegetation features with buffer of unlimited into selected vegetation features.

Selected Map Units:

| Functional Group | Map Unit Name |
|-------------------------|--|
| Anthropogenic | Deciduous Plantations |
| Anthropogenic | Quarry/Strip Mine/Gravel Pit |
| Forest/Woodland | Allegheny-Cumberland Dry Oak Forest and Woodland |
| Forest/Woodland | Allegheny-Cumberland Dry Oak Forest and Woodland - Hardwood Modifier |
| Forest/Woodland | Allegheny-Cumberland Dry Oak Forest and Woodland - Pine Modifier |
| Forest/Woodland | Appalachian Hemlock-Hardwood Forest |
| Forest/Woodland | Appalachian Serpentine Woodland |
| Forest/Woodland | Central and Southern Appalachian Montane Oak Forest |
| Forest/Woodland | Central and Southern Appalachian Northern Hardwood Forest |
| Forest/Woodland | Central Appalachian Oak and Pine Forest |
| Forest/Woodland | Central Appalachian Pine-Oak Rocky Woodland |
| Forest/Woodland | East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest - Hardwood Modifier |
| Forest/Woodland | East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest - Mixed Modifier |
| Forest/Woodland | East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland - Offsite Hardwood Modifier |
| Forest/Woodland | East Gulf Coastal Plain Limestone Forest |
| Forest/Woodland | East Gulf Coastal Plain Northern Dry Upland Hardwood Forest |
| Forest/Woodland | East Gulf Coastal Plain Northern Loess Bluff Forest |
| Forest/Woodland | East Gulf Coastal Plain Northern Loess Plain Oak-Hickory Upland - Hardwood Modifier |
| Forest/Woodland | East Gulf Coastal Plain Northern Mesic Hardwood Forest |
| Forest/Woodland | East Gulf Coastal Plain Southern Loess Bluff Forest |
| Forest/Woodland | East Gulf Coastal Plain Southern Mesic Slope Forest |
| Forest/Woodland | Northeastern Interior Dry Oak Forest - Mixed Modifier |
| Forest/Woodland | Northeastern Interior Dry Oak Forest - Virginia/Pitch Pine Modifier |
| Forest/Woodland | Northeastern Interior Dry Oak Forest-Hardwood Modifier |
| Forest/Woodland | Northern Atlantic Coastal Plain Dry Hardwood Forest |
| Forest/Woodland | South-Central Interior Mesophytic Forest |
| Forest/Woodland | Southern and Central Appalachian Cove Forest |
| Forest/Woodland | Southern and Central Appalachian Oak Forest |
| Forest/Woodland | Southern and Central Appalachian Oak Forest - Xeric |
| Forest/Woodland | Southern Appalachian Low Mountain Pine Forest |
| Forest/Woodland | Southern Appalachian Montane Pine Forest and Woodland |
| Forest/Woodland | Southern Coastal Plain Dry Upland Hardwood Forest |
| Forest/Woodland | Southern Interior Low Plateau Dry-Mesic Oak Forest |
| Forest/Woodland | Southern Interior Low Plateau Dry-Mesic Oak Forest - Evergreen Modifier |
| Forest/Woodland | Southern Piedmont Dry Oak-(Pine) Forest - Hardwood Modifier |
| Forest/Woodland | Southern Piedmont Dry Oak-(Pine) Forest - Mixed Modifier |
| Forest/Woodland | Southern Piedmont Dry Oak-Heath Forest - Hardwood Modifier |
| Forest/Woodland | Southern Piedmont Dry Oak-Heath Forest - Mixed Modifier |
| Forest/Woodland | Southern Piedmont Dry Oak-Heath Forest - Virginia/Pitch Pine Modifier |
| Forest/Woodland | Southern Piedmont Mesic Forest |
| Forest/Woodland | Southern Ridge and Valley Dry Calcareous Forest |
| Forest/Woodland | Southern Ridge and Valley Dry Calcareous Forest - Hardwood Modifier |
| Forest/Woodland | Southern Ridge and Valley Dry Calcareous Forest - Pine Modifier |
| Rock Outcrop | Allegheny-Cumberland Sandstone Box Canyon and Rockhouse |
| Rock Outcrop | Central Interior Acidic Cliff and Talus |
| Rock Outcrop | Central Interior Calcareous Cliff and Talus |
| Rock Outcrop | North-Central Appalachian Acidic Cliff and Talus |
| Rock Outcrop | North-Central Appalachian Circumneutral Cliff and Talus |
| Rock Outcrop | Southern Appalachian Granitic Dome |
| Rock Outcrop | Southern Appalachian Montane Cliff |
| Rock Outcrop | Southern Appalachian Spray Cliff |
| Rock Outcrop | Southern Interior Acid Cliff |
| Rock Outcrop | Southern Interior Calcareous Cliff |
| Rock Outcrop | Southern Interior Sinkhole Wall |

| | |
|--------------|---|
| Rock Outcrop | Southern Piedmont Cliff |
| Water | Open Water (Fresh) |
| Wetlands | Central Appalachian Floodplain - Forest Modifier |
| Wetlands | Central Appalachian Riparian - Forest Modifier |
| Wetlands | East Gulf Coastal Plain Large River Floodplain Forest - Forest Modifier |
| Wetlands | East Gulf Coastal Plain Northern Seepage Swamp |
| Wetlands | East Gulf Coastal Plain Small Stream and River Floodplain Forest |
| Wetlands | North-Central Appalachian Acidic Swamp |
| Wetlands | North-Central Interior and Appalachian Rich Swamp |
| Wetlands | South-Central Interior Large Floodplain - Forest Modifier |
| Wetlands | South-Central Interior Small Stream and Riparian |
| Wetlands | Southern Coastal Plain Blackwater River Floodplain Forest |
| Wetlands | Southern Coastal Plain Nonriverine Basin Swamp |
| Wetlands | Southern Coastal Plain Seepage Swamp and Baygall |
| Wetlands | Southern Piedmont Large Floodplain Forest - Forest Modifier |
| Wetlands | Southern Piedmont Small Floodplain and Riparian Forest |
| Wetlands | Southern Piedmont/Ridge and Valley Upland Depression Swamp |

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