

### 3.1 Mammal Species of Greatest Conservation Need

This is an overview of Wisconsin's mammal Species of Greatest Conservation Need (SGCN) and their associations with Natural Communities and Ecological Landscapes. This section also identifies mammal species that are not classified as SGCN, but are classified as BasicSINS (species with information needs), RankingSINS, or species that had sufficient information to assess them with confidence and did not meet the SGCN criteria (e.g., ranked S4 or S5, ranked S3G5 or S3S4G5, or did not meet the additional criteria considered after assessing S/G-Ranks). See Section 2.6 for more explanation on ranking and SINS.

The issues, challenges and conservation actions that will be important for most or all mammal SGCN over the next ten years are presented in the second half of this section along with those applicable to one or a few mammal species. The discussion of the issues and challenges facing mammal SGCN and their habitat, and the conservation actions that address them, follow nomenclature developed by the Open Standards for the Practice of Conservation.<sup>1</sup> The Open Standards classification for Conservation Actions, with some modification for circumstances particular to Wisconsin, is presented in Appendix 2.1 at the end of Section 2.

#### 3.1.1 Mammal SGCN

Mammals play an important role in ecosystem function as top of the food-chain predators, and likewise, serving as prey for numerous other predators. Mammals provide a necessary means of disturbance for plant communities and by this indirect influence, the size and composition of many insect communities, as well. There are 70 native mammal species in Wisconsin. Of these 70 species, 13 (19%) have been identified as Species of Greatest Conservation Need in Wisconsin (Table 3.1.1). Five of these species are listed as Threatened or Endangered at the state or federal level. Species of Greatest Conservation Need are those with low or declining populations that are in need of conservation action. They have been defined in our state based in part on state and global ranks developed through Wisconsin's Natural Heritage Inventory program and other criteria that address species or taxonomic characteristics not captured by the ranking method alone.

Although all taxonomic groups used the same process to identify Wisconsin's SGCN, within the mammal group, bat species in particular face an uncertain future because of the threat of White-nose Syndrome (WNS) discovered in Wisconsin in 2014. White-nose syndrome is a disease causing unprecedented mortality in cave hibernating bats. It is identified by the white fungus and causative pathogen (*Pseudogymnoascus destructans*, formerly *Geomyces destructans*), that grows on the nose, ears, muzzle and/or wing membranes of affected bats, and was first discovered in the United States in 2007. Several hibernacula surveyed before and after WNS's appearance have documented bat declines greater than 75%, and in some cases 90%-100% (Blehert et al. 2009).

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<sup>1</sup> <http://cmp-openstandards.org/tools/threats-and-actions-taxonomies/> (Search Terms: open standards conservation threats actions)

The recent publication by Stephens and Anderson (2014) sheds much light on the habitat associations and assemblages of small mammals throughout the state in numerous plant communities. These data were tremendously helpful in assessing the status of many small mammals and reinforced the rarity of many of those found on the initial SGCN list (WDNR 2005) that remain on the list in 2015. There is still a paucity of information for several of our small mammal species due to their cryptic nature, lack of effective and reliable detection methods, and/or simply low population numbers.

### 3.1.2 SGCN-NC and SGCN-EL Association Scores

The association between each mammal SGCN and each natural community type is provided in Tables 3.1.3 to 3.1.10 by natural community group. The definition at each level of association is provided below. For mammals in particular, the SGCN-NC scores tend to illustrate that some species are very mobile and use many different natural communities (e.g., bats), while others use fewer community types (e.g., woodland vole or American marten). All mammal SGCNs are highly associated with at least two natural communities in our state. Figure 3.1.1 takes all mammal SGCN with an association of moderate (score = 2) and high (score = 3) for a given community type and then sums all the “2’s” and “3’s”. Each bar in the graph represents that sum for the stated natural community. If mammal SGCN have only a low or no association with a community type, the community is not listed. Higher scores indicate higher overall association of mammal SGCN with that community type.

#### Key to SGCN-NC Association Score

Level of Association	Description
High	This natural community (currently and/or historically) contains essential biological, physical and ecological habitat elements for the species, which must be present in quality and quantity to sustain the species; conservation actions implemented in this natural community may result in significant improvement in the factors used to identify SGCN (e.g., rarity, trend and threat factors used in S/G Ranks).
Moderate	This natural community (currently and/or historically) contains some, but not all biological, physical and ecological habitat elements that support or help to support this species; species may sustain itself with reduced quantity or quality of this natural community; conservation actions implemented in this natural community may result in moderate improvement in the factors used to identify SGCN (e.g., rarity, trend and threat factors used in S/G Ranks).
Low	Species is (and/or historically was) minimally associated with the biological, physical and ecological characteristics of this natural community; conservation actions implemented in this natural community may result in minimal improvement in the factors used to identify SGCN (e.g., rarity, trend and threat factors used in S/G Ranks).
None	Species does not (and did not historically) or is highly unlikely to use this Ecological Landscape.

The association between each mammal SGCN and the sixteen ecological landscapes is provided in Section Table 3.1.11. The definition of each level of association is provided below. Many mammal SGCN are distributed in many of the ecological landscapes, while the American marten, Eastern pipistrelle and prairie vole are associated with fewer than half of the ecological landscapes in our state. Figure 3.1.2 takes all mammal SGCN with an association of moderate and high for a given ecological landscape and then sums all the 2's and "3's". Each bar in the graph represents that sum for the stated landscape. If mammal SGCN have only a low or no association with a landscape, it is not listed. Higher scores indicate higher overall association of mammal SGCN with that ecological landscape.

**Key to SGCN-EL Association Scores**

Level of Association	Description
High	Estimated as "majority", "critical", or likely to be ">50%" for current and historical characteristics that measure use or presence at a large scale: area of occupancy, state population size, and/or range extent of the species or its habitat; as a result, conservation actions implemented in this Ecological Landscape may result in significant improvement in the factors used to identify SGCN (e.g., rarity, trend and threat factors used in S/G Ranks).
Moderate	Estimated as "many", "important", or likely to be "≤50%" association with the EL for current and historical characteristics that measure use or presence at a large scale: area of occupancy, state population size, and/or range extent of the species or its habitat; as a result, conservation actions implemented in this Ecological Landscape may result in moderate improvement in the factors used to identify SGCN (e.g., rarity, trend and threat factors used in S/G Ranks).
Low	Estimated as "minimal", "infrequent" or "occasional" association with the Ecological Landscape for current and historical characteristics that can be estimated at a large scale: area of occupancy and/or range extent of the species or its habitat; species is present; as a result, conservation actions implemented in this Ecological Landscape may result in some improvement in the factors used to identify SGCN (e.g., rarity, trend and threat factors used in S/G Ranks).
None	Species does not (and did not historically) or is highly unlikely to use or be present in this Ecological Landscape.

These associations are estimates based on expert and professional knowledge, and like the SGCN list itself, new information and changes in our environment are good reasons to reassess these scores periodically. Subtle shifts in natural community characteristics may render the natural community or habitat it represents less (or more) favorable for these species. While these scores can be used individually to some extent, they are best considered together with the NC-EL opportunity scores. For example, a site assessment that identifies open grasslands, prairies or sparsely wooded barrens on a property may be a suitable conservation site for prairie vole. A barrens community with more open understory and less dense grass may be more suitable for prairie deer mouse, but primarily in the central sands and southwest grasslands ecological landscapes. If the barrens communities are found as patches within primarily forested

landscapes in the north then they are less likely to work as restoration targets for the prairie deer mouse. The scores help make decisions about matching conservation actions linked to SGCN mammals to the most appropriate species and natural community targets in an area.

### **3.1.3 Mammal SINS and Other Mammal Species that are not SGCN**

Species with information needs (SINS) are classified as such because: 1) inventory, trend data, and/or life history data were insufficient to estimate the factors and other criteria used to identify SGCN (Ranking SINS); or 2) the most basic taxonomic and/or status data are lacking to identify the species or its distribution. Other species had sufficient information to assess their SGCN status, and did not meet the SGCN criteria (i.e., “NotSGCN”); however, information may still be gathered to monitor their populations and habitat in the event their status changes

These three groups of species are identified in Table 3.2 to distinguish survey, monitoring, or research objectives over the next five to ten years. There are no BasicSINS mammal species, indicating that basic information about the taxonomy and occurrence of species in the mammal group is generally adequate. What remains is to focus information gathering on continued monitoring or surveys targeted at the ranking factors of rarity, trends and threats (see Section 2.2.5).

Of our states remaining native mammal species, some are very common or stable and relatively speaking are not in need of conservation (e.g., raccoon, striped skunk) or they may be managed as game species (e.g., deer). These mammals were not assessed for SGCN status. For some mammal species an assessment was deemed “not applicable” (NatureServe Rank = SNA) because the species is not a suitable target for conservation activities. A species can be “not applicable” for several reasons: their presence here is unpredictable or infrequent, there are no permanent breeding pairs, there isn't a sustainable population, or we can't identify a habitat or territory that it uses. These species include cougar, Canada lynx and Indiana bat. In our state, these species bring important issues to the forefront about what defines a native species and the circumstances that qualify a species for conservation need, especially with species and habitat shifts occurring as a result of environmental changes.

### **3.1.4 Issues and Conservation Actions Common to All or Most Mammal SGCN**

This section summarizes issues and challenges affecting the conservation of mammal SGCN and actions that can be implemented at the source or to address the effects of the source on the species or its habitat. Distinguishing the source of the impact from the effects or the changes that occur to the species and its habitat is important because the two typically need a different approach and set of conservation actions. For example, land development in grassland habitat may be an issue that has the effect of habitat loss. Conservation actions may be focused at the source of the activity, which is related to the location, type and extent of the development, or the action can be focused on restoring or replacing habitat elsewhere or at the edge of the development. Multiple sources of impact may have the same or similar effects on

species or habitat. Similar effects may be addressed collectively by a single action or suite of actions.

The first part of this subsection identifies issues and conservation actions identified most frequently for mammal SGCN and their habitats. The nomenclature is based on the higher level categories in the Open Standards threats and actions classification<sup>2</sup>. The second half is devoted to very important conservation actions for specific mammal SGCN and their habitat.<sup>3</sup> Key words or titles that correspond to the categories in the threats and action classifications are in the text to orient the reader. Unlike in WWAP1, an effort has been made to pair issues affecting conservation of mammal SGCN with their relevant conservation actions.

**Issue.** Residential and commercial development and agriculture. In the Open Standards classification, "development" includes the footprint of the activity on the landscape—all phases of construction and operation. Similarly, agriculture impacts consider the conversion of land for placement of agricultural activities and operation of the farm for animals, crops or grazing. All subcategories of residential, commercial and agricultural use and the transportation and utility corridors that link them can affect small mammal SGCN, but not always in negative ways. The footprint of transportation and utility corridors can expose mammals to predators and also provide movement corridors. The relative significance of each of these sources of impact depends, in part, on where it occurs in the state and how closely the development is associated with natural community types that these species are found in (i.e., the siting and intensity of the development are important). For example, agriculture is a more important issue for small mammal SGCN in southwestern ecological landscapes; whereas commercial and residential development is more important in south central and south eastern ecological landscapes.

Many native mammals have declined both in range and abundance in the past 100 years due largely to converting native landscapes into other uses, which has the cumulative effect of habitat loss, fragmentation, and reduction in habitat quality. Habitat conversion and continued loss is a widespread threat facing mammal Species of Greatest Conservation Need in Wisconsin. Habitat alteration has three major components: loss of the original habitat, reduction in habitat patch size, and increasing isolation of habitat patches, all of which contribute to a decline in biological diversity within the original habitat (Wilcox 1980, Wilcox & Murphy 1985). Specific examples of these issues affecting habitat vary widely, from conversion of native prairie habitat to row crops, roads, and housing (WDNR 2006) to changes in forest habitats through management activities that decrease the extent of older forest, coarse woody debris, or dramatically open the forest canopy (WDNR 2010a, WDNR 2010b). Given their

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<sup>2</sup> See the following website for the classifications. <http://cmp-openstandards.org/tools/threats-and-actions-taxonomies/> (Search Terms: open standards conservation threats actions). The conservation actions classification is provided in Appendix 2.1.

<sup>3</sup> An Actions Database is being developed by WWAP partners to add more detail and characteristics about the conservation actions described here, including locations, cross-benefits to other species or natural communities, issues categories addressed by the action and the rationale behind the action). More about the approach to the Actions Database is described in Section 2.5.

relatively short dispersal capabilities small mammals are particularly susceptible to development that fragments habitat. Loss of these animals from an area makes it very difficult for them to recolonize unless a local source population exists nearby.

**Conservation Actions.** Mammal SGCN use a wide variety of habitats from sand prairies to old growth forests to streams to caves. Managing and protecting these diverse habitats from fragmentation, degradation, and destruction are primary actions proposed for conserving mammal Species of Greatest Conservation Need in Wisconsin. Other actions to mitigate the threat of habitat fragmentation and isolation in dry or sandy landscapes are to integrate management of dry forests and barrens in northern and central Wisconsin landscapes by aggregating harvest units to create larger open areas and to connect otherwise isolated forest patches. In addition, when managing land surrounding a high-quality forest site in the northern forest, manage in a way that does not “island” the site and that minimizes the negative effects of fragmentation<sup>4</sup>. Managing northern forests to benefit SGCN mammals would include maintaining a diverse tree composition, especially to favor conifer species, allowing for smaller openings that fill in relatively quickly, leaving downed woody debris to provide cover, and providing structurally diverse forests with well-developed ground layer, shrub and sub-canopy levels.

In southern Wisconsin, financial and nonfinancial incentives that protect or preserve land, regardless of ownership, in a natural state, as either native prairie, pasture, surrogate grassland, or hay and grains to maximize grassland acreage benefit our grassland small mammals. Many SGCN small mammals do not require remnant native prairie but do need larger tract of grass cover to avoid isolation since they can only move short distances.

**Issue.** Transportation and service corridors, and timber and wood harvesting. As with different types of development and agriculture, transportation and service corridors and timber or wood harvesting, can also result in loss of habitat, habitat fragmentation or reduced habitat quality. The nature and extent of transportation and service corridors' effects on small mammals, not only depends on the footprint (i.e., its dimensions and location) as it often does with development, but how vegetation control, access and maintenance of the line or road are managed. Timber harvest does not necessarily fragment forests on a landscape scale, but can reduce habitat availability or quality for small mammals over multiple generations, depending on how timber harvests are planned and conducted.

**Conservation Actions.** Among the conservation actions linked to these categories, industry sector management practices for the transportation, utility and forestry sectors are very important for sustaining ecological and habitat value for mammal SGCNs. The specificity of industry sector management practices and the degree to which they are optional, voluntary or required varies, depending on their policy or regulatory context. However, they generally include measures that give users the opportunity to integrate

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<sup>4</sup> Ecological Landscapes Report, Chapter 2. Northern Forest Communities.  
<http://dnr.wi.gov/topic/landscapes/documents/1805Ch2.pdf> (Search Terms: Ecological Landscapes of Wisconsin Handbook)

and maximize conservation benefits to SGCNs. Managing northern forests to benefit SGCN mammals would include maintaining a diverse tree composition, especially to favor conifer species, leaving downed woody debris to provide cover, allowing for smaller openings that fill in relatively quickly, and providing structurally diverse forests with well-developed ground layer, shrub and sub-canopy levels.

In the WWAP we tried to recognize the diversity of differently aged forests on our landscape by including seral stages in some of the northern forest community types. An important conservation action that follows from this is to design and estimate acreage goals for seral/developmental stages ranging from young to old for each ecological landscape to reach a balanced mosaic of forest age-classes that provide habitat for mammal SGCN. Interdisciplinary working groups could identify focal areas with the greatest opportunities to begin this effort based in part on the association and opportunity scores identified in the WWAP.

Not only for forested communities, but on a more diverse scale one can consider a landscape-scale approach to reserve design and management, where complementary natural communities and habitat types are interwoven in a mosaic, and occupy different positions along soil, topography, and moisture gradients. For example, in the Western Coulees and Ridges Ecological Landscape, restore and manage sandstone-influenced sites with a mosaic of dry oak savanna, oak woodland and sand prairie communities, along with smaller patches containing oak forest, pine relicts, dry prairie, open shrubby barrens, and rock outcrops.

**Issue.** Fire suppression. On many of our terrestrial landscapes, lack of fire has changed ecological processes in ways that affect most small mammal SGCN. Succession of grassland habitats to shrubland and woodland and changes in species composition due to lack of fire have altered habitat quality, including food sources, soil temperature and increase in predators, all of which adversely affect small mammal survival.

**Conservation Actions.** Maintain and restore open oak barrens and sand, dry or dry-mesic prairie habitats in suitable landscapes (Southwest Savanna, Western Coulees and Ridges, Central Sands Ecological Landscapes) by rotating management throughout the property and across years or seasons and using a variety of management techniques, including timber harvest, prescribed fire, mowing, grazing, and herbicide applications to minimize negative impacts from any specific or individual management techniques. Expanding grassland acreage by reducing tree cover or conversion of prairies to brush by burning, grazing, or mowing enables larger patches of suitable grassland habitat for SGCN small mammals and where species like the abundant white-footed mouse (*Peromyscus leucopus*) are less prone to inhabit or out-compete grassland SGCN.

**Issue.** Pollution in the form of waterborne and airborne pesticides, herbicides and other effluents. Pollution originating from pesticide and herbicide application from different types of development, resource use and land use may affect mammal Species of Greatest Conservation Need in different habitat scenarios: mammals that use trees in forested habitat, small mammals that use grassland or surrogate grassland habitats, or mammals that use waterways passing through these areas. Chemicals in the natural

system can negatively impact mammal species themselves as well as water quality and possibly invertebrate prey species. Some pesticides have known effects on reproduction and other aspects of small mammal biology (Sheffield & Lochmiller 2001).

**Conservation Actions.** Actions to address this issue fall into a combination of awareness and education, and developing natural methods of invasive and problematic species control and prevention. Avoid pesticide use that may impact SGCN mammal populations (diazinon). Limit use of chemicals and pesticides in grassland habitats because of known effects on reproduction and other aspects of mammal biology. Continuing to apply best practices for pesticide application ensures healthy habitats for mammal SGCN. Integrated pest management practices that consider natural biological processes and biopesticides, preventative cultural practices and emphasis on control are important components of these actions. Toxic effects of chemicals on bats species are well cited in the literature; studies on other small mammals like voles, mice and shrews are less common. A precautionary approach regarding application and use of chemicals in or near habitat occupied by mammal SGCN is prudent from a conservation perspective.

**Issue.** Lack of information. The lack of information on status, distribution, population trends, habitat use and requirements, species interaction, and other factors is needed to adequately and more effectively work to conserve many species and their habitats. This is particularly true for our small mammals SGCN, defined here as those mammals weighing less than 5 grams, which make up 92% of our SGCN list. The lack of basic knowledge for this group makes many aspects of conservation very difficult. Many mammal SGCN are faced with interspecific competition from other sympatric species due to shifting ranges causing interactions that tend to favor the more aggressive, and most commonly, the more ubiquitous species. Examples include the advancement of the southern flying squirrel and white-footed mouse into northern Wisconsin forests or meadow vole moving into southern Wisconsin grasslands.

**Conservation Actions.** Research is an area in need of critical action for mammal Species of Greatest Conservation Need. Continue monitoring measures for carnivores through winter tracking and other surveys, research initiatives, and telemetry studies. Additionally, work should be done to develop partnerships with academic staff and biologists to research small mammal distribution, population size, habitat use, and mortality factors as a basis for developing an effective management and conservation strategy. Research is needed to address migratory tree bat species migration and dispersal patterns as well as life history information, including population dynamics and trends. One outcome of this life history and habitat research should be clearer options for restoring and maintaining important habitat elements for bat species in northern forest communities.

Research should be done to better determine habitat relationships and SGCN interactions with other species (e.g., range overlap) to ensure successful management and conservation. Interdisciplinary planning (i.e., a form of research) is needed among forestry sector and forest community stakeholders as well as agricultural sector and grassland/savanna/barrens community stakeholders to develop design objectives for

diverse landscapes that consider a range of development and conservation opportunities and objectives.

### 3.1.5 Issues and Conservation Actions Specific to One or a Few Mammal SGCN

Although most actions identified in the WWAP updates can benefit multiple species and/or habitats, some remain specific to a one or a few species, natural community or habitat. This section briefly identifies those that currently reside at the forefront of our conservation efforts—primarily bats.

**Issue.** Energy production – wind turbines. Wind turbines may cause mortality to bat SGCNs.

**Conservation Actions:** Research is needed to develop methods as conservation actions to reduce collision-related mortality to migratory tree bats and commuting hibernating bats.

**Issue.** Recreation and timber harvest. Inappropriate timing, and the type or magnitude of disturbance at ecologically sensitive sites like mammal dens, bat hibernacula or roost sites can threaten the long-term viability of these areas to sustain bat populations. This comes from several sources that include recreation, biological resource use (timber or wood harvest) and mining.

**Conservation Actions:** Encourage and monitor compliance with NR40 (state legislation) to limit disturbance to bat hibernacula.

**Issue.** Invasive and problematic species. Disease poses a catastrophic threat to our hibernating bat populations. Disturbing hibernacula sites presents additional stress to bat species threatened by White-nose Syndrome (*Pseudogymnoascus destructans*) and may spread the disease to additional sites.

**Conservation Actions.** Promote efforts that include protecting bat hibernacula (caves and abandoned mines), monitor and enforce compliance with ch. NR 40 (state legislation) to limit disturbance to bat hibernacula, develop and implement a formal written statewide Bat Conservation Plan, monitor for presence, distribution, and prevalence of fungal diseases, parasites, bacteria, or other diseases and their impacts to SGCN populations, and continue to conduct vulnerability assessments for SGCN bat species.

**Issue.** Direct and indirect competition from other meso-carnivores, low habitat quality and quantity due to competing forest resource uses, and suitable habitat range shifts due to climate related changes can affect American marten populations.

**Conservation Actions.** Update Wisconsin's American Marten Conservation Plan based on new research findings on these issues and develop forest management BMPs (Best Management Practices) for American martens.

### 3.1.6 References for Mammal Species of Greatest Conservation Need

The following references were used in the evaluation and assessment of mammal species for Species of Greatest Conservation Need status as well as the specific issues, challenges and conservation actions presented in this section. It is impossible however, to document all the references used by the many people providing technical input to the WWAP revision. Conversely, there are many gaps in the published literature—funding or people to cover all important areas of research, inventory or monitoring is always limited. Some information about rare species locations is confidential<sup>5</sup> or comes to us through informal technical reports or memos. For these various reasons, we also relied significantly on expert and professional observations and unpublished data.

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<sup>5</sup> Information related to the Natural Heritage Inventory database, which shows the name and/or specific location of rare species is confidential, but may be shared through agreements or permissions with the WDNR-NHI program. Information at a county level or higher is publicly available. <http://dnr.wi.gov/topic/nhi/> (Search Terms: Wisconsin Natural Heritage Inventory)

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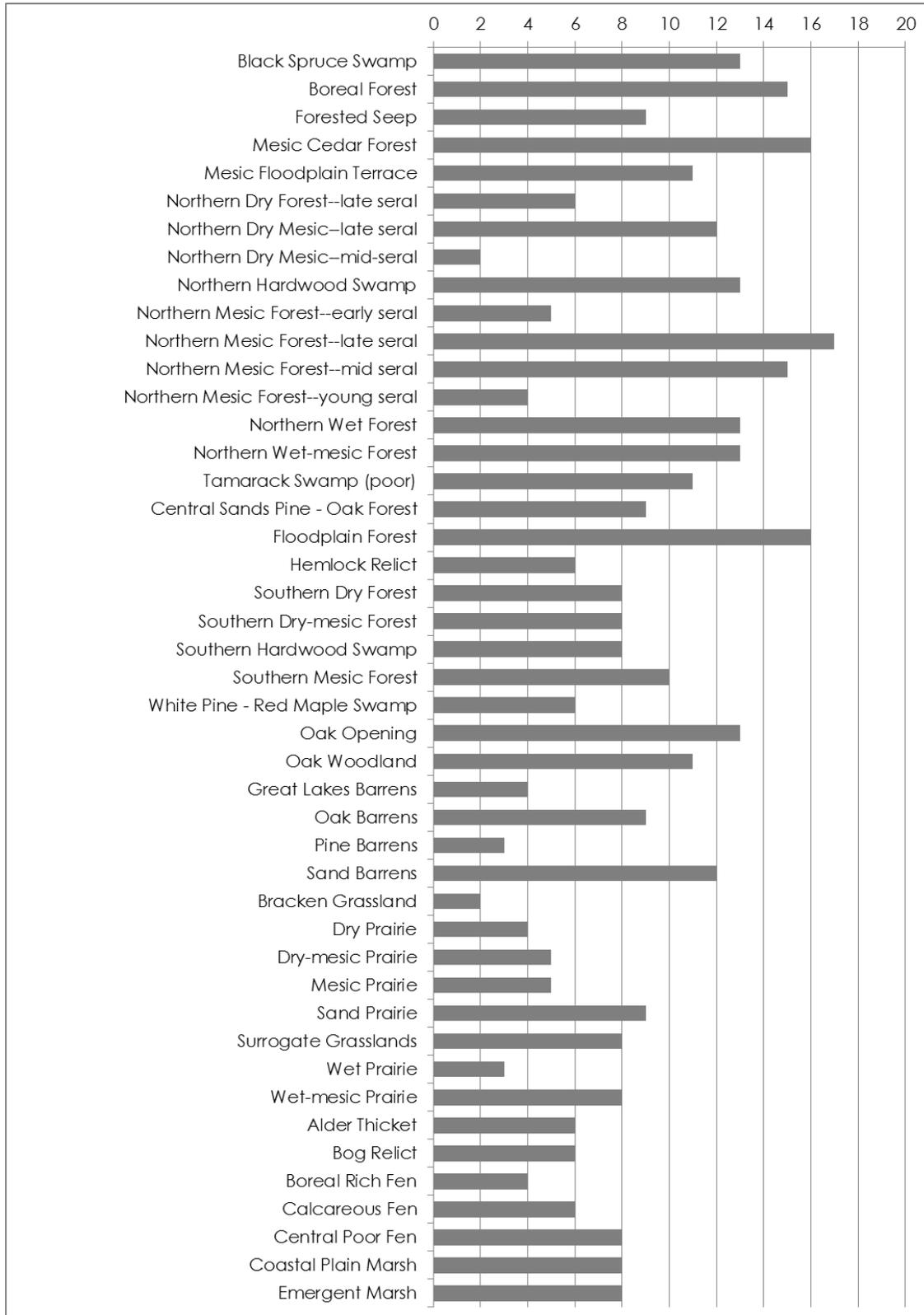
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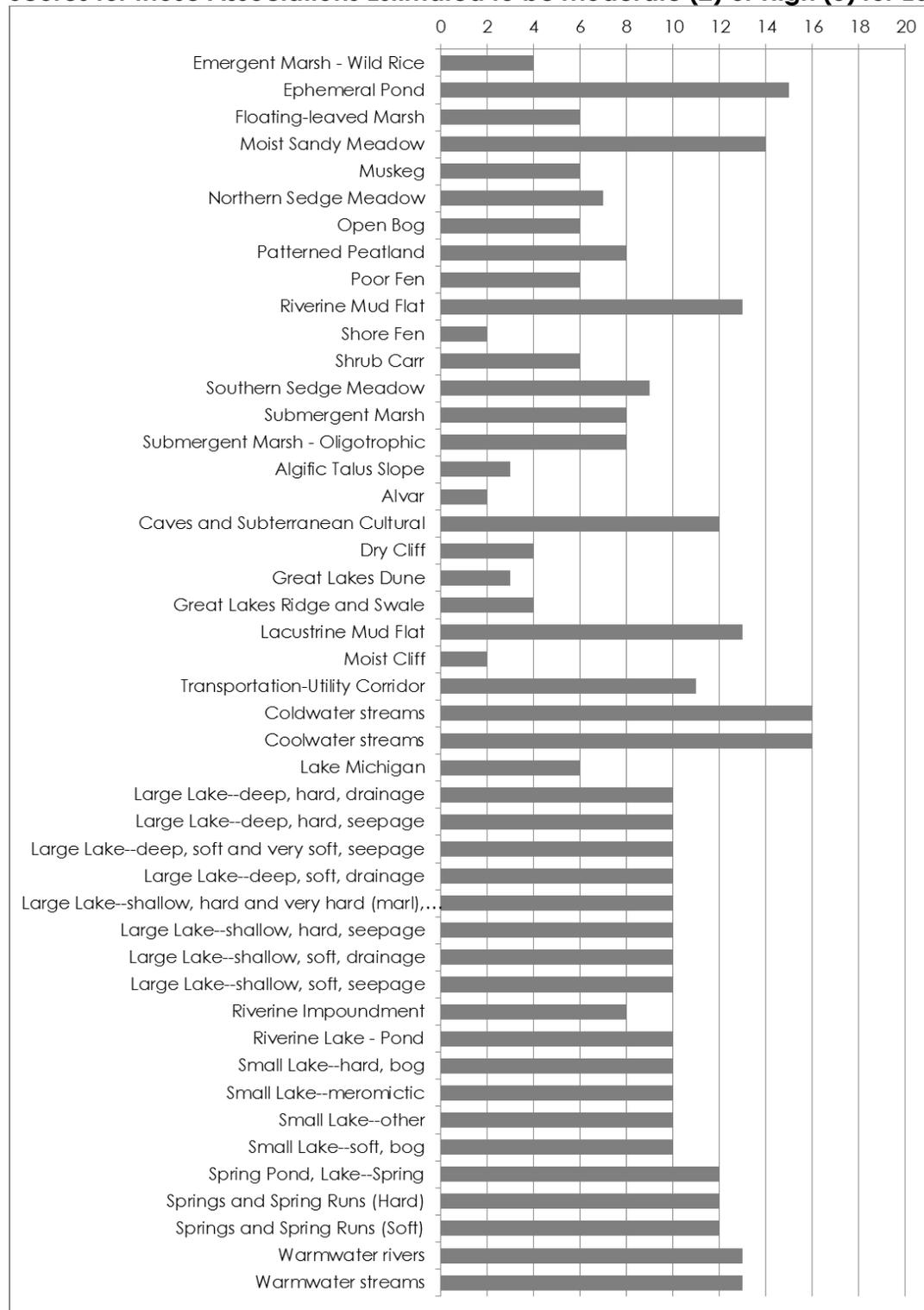
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**Figure 3.1.1. Sum of All Mammal SGCN-Natural Community Association Scores for those Associations Estimated to be Moderate (2) or High (3) for Each Community Type**

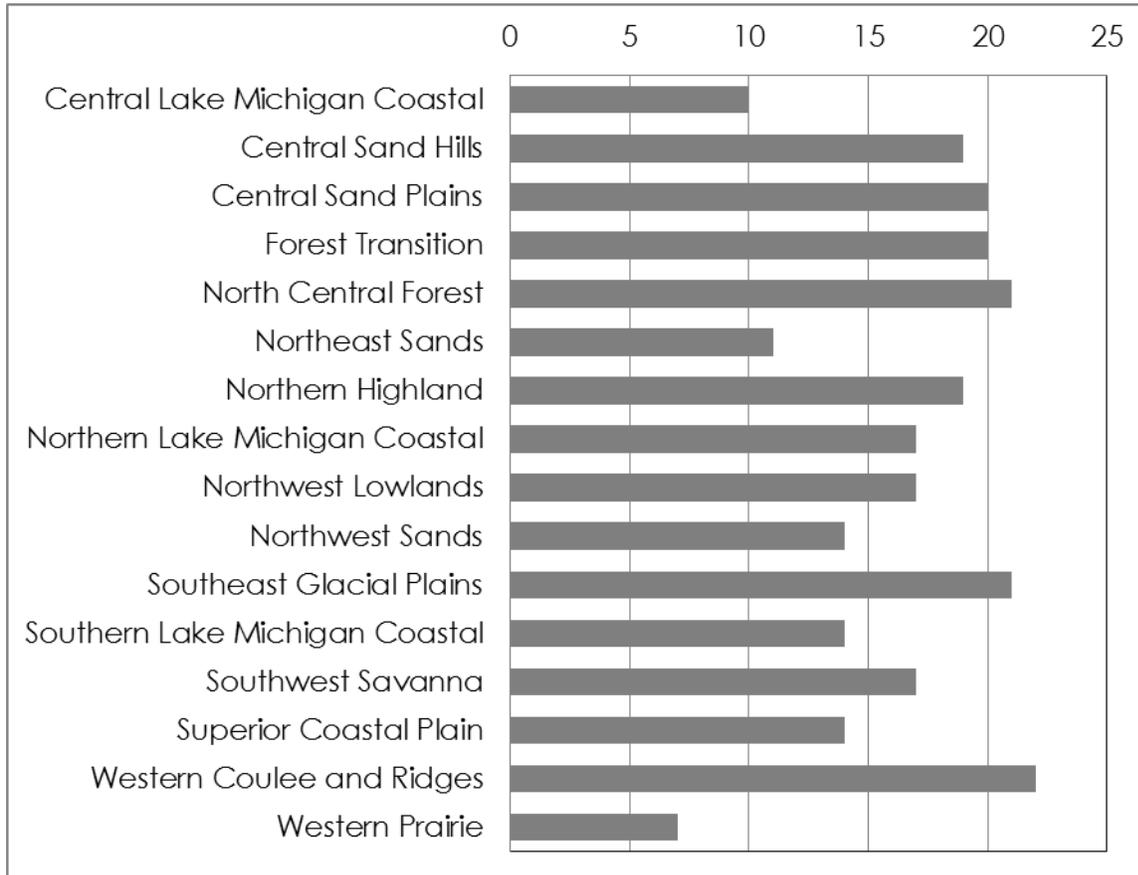


**Figure 3.1.1. (continued) Sum of All Mammal SGCN-Natural Community Association Scores for those Associations Estimated to be Moderate (2) or High (3) for Each Type**



\*Figure 3.1.1 takes all mammal SGCN with an association of moderate (score = 2) and high (score = 3) for a given community type and then sums all the "2's" and "3's". Each bar in the graph represents that sum for the stated natural community. If mammal SGCN have only a low or no association with a community type, the community is not listed. Higher scores indicate higher overall association of mammal SGCN with that community type.

**Figure 3.1.2 Sum of All Mammal SGCN-Ecological Landscape Association Scores for those Associations Estimated to be Moderate (2) or High (3) for Each Landscape**



\*Figure 3.1.2 takes all mammal SGCN with an association of moderate and high for a given ecological landscape and then sums all the 2's" and "3's". Each bar in the graph represents that sum for the stated landscape. If mammal SGCN have only a low or no association with a landscape, it is not listed. Higher scores indicate higher overall association of mammal SGCN with that ecological landscape.

**Table 3.1.1 Mammal Species of Greatest Conservation Need**

Common Name	WI Status THR/END	Federal Status LT/LE	Natural Heritage Inventory Global Rank*	Natural Heritage Inventory State Rank*	New SGCN for WWAP2
Big Brown Bat	THR		G5	S2S4	Y
Northern Flying Squirrel			G5	S3	
Silver-haired Bat			G5	S3	
American Marten	END		G5	S2	
Prairie Vole			G5	S2	
Woodland Vole			G5	S2	
Little Brown Bat	THR		G3	S2S4	Y
Northern Long-eared Bat	THR		G2G3	S1S3	
Woodland Jumping Mouse			G5	S2	
Eastern Pipistrelle	THR		G3	S1S3	Y
Prairie Deer Mouse			G5T5	S2S3	Y
Water Shrew			G5	S3	
Franklin's Ground Squirrel			G5	S2	

\*For rank definitions see Tables 2.9 and 2.10 in Section 2. NHI ranks as of June 2015.

**Table 3.1.2 Mammal SINS and Other Mammal Species that were Assessed, but are not SGCN**

Common Name	Natural Heritage Inventory Global Rank*	Natural Heritage Inventory State Rank*	Result	SGCN in WWAP 1 but not in WWAP2
Eastern red bat	G5	S3	NotSGCN	Y
Hoary bat	G5	S3	NotSGCN	
Western harvest mouse	G5	S3	NotSGCN	
Woodland deer mouse	G5TNR	S3S4	NotSGCN	
Least chipmunk	G5	S3S4	NotSGCN	
Snowshoe hare	G5	S4	NotSGCN	
Gray Wolf	G4G5	S4	NotSGCN	Y
Moose	G5	SNA	NotSGCN	Y
White-tailed Jackrabbit	G5	SNA	NotSGCN	Y
Least weasel	G5	SU	RankingSINS	

\*For rank definitions see Tables 2.9 and 2.10 in Section 2. NHI ranks as of June 2015.

**Table 3.1.3 Mammal SGCN – Natural Community Association Scores for the Northern Forest Community Group**  
**H = High Association; M = Moderate Association; L = Low Association; Blank = No Association**

Common Name	Aspen-Birch	Black Spruce Swamp	Boreal Forest	Conifer Plantation	Forested Seep	Mesic Cedar Forest	Mesic Floodplain Terrace	Northern Dry Forest--late seral	Northern Dry Forest--mid-seral	Northern Dry Forest--young seral	Northern Dry Mesic--late seral	Northern Dry Mesic--mid-seral	Northern Dry Mesic--young seral	Northern Hardwood Swamp	Northern Mesic Forest--early seral	Northern Mesic Forest--late seral	Northern Mesic Forest--mid seral	Northern Mesic Forest--young seral	Northern Wet Forest	Northern Wet-mesic Forest	Tamarack Swamp (poor)
American Marten	L	L	M	L	L	H	L	L			H	M		L	L	H	M		L	L	L
Big Brown Bat	L		L	L	L		L														
Eastern Pipistrelle					M																
Franklin's Ground Squirrel																					
Little Brown Bat		H	M		H	M	H	L	L		M	L		M	L	M	M		H	H	H
Northern Flying Squirrel	L	H	H	L		H	M	M	L		H	L		M	L	H	M		H	H	H
Northern Long-eared Bat	L	L	L	L	L	M	M	M	L		M	L		M	L	M	M		L	L	L
Prairie Deer Mouse																					
Prairie Vole																					
Silver-haired Bat		M	M		M	M	M	M	L		M	L		M	L	M	M		M	M	M
Water Shrew		H	H		L	M	M							H	M	M	M	M	H	H	H
Woodland Jumping Mouse	L	M	H		M	M	L	L	L	L	L	L	L	M	H	H	H	M	M	M	L
Woodland Vole																					

**Table 3.1.4 Mammal SGCN – Natural Community Association Scores for the Southern Forest Community Group H = High Association; M = Moderate Association; L = Low Association; Blank = No Association**

Common Name	Central Sands Pine - Oak Forest	Floodplain Forest	Hemlock Relict	Pine Relict	Southern Dry Forest	Southern Dry-mesic Forest	Southern Hardwood Swamp	Southern Mesic Forest	Southern Tamarack Swamp (rich)	White Pine - Red Maple Swamp
American Marten		L								
Big Brown Bat	M	H	L		M	M	L	L	L	
Eastern Pipistrelle		M	M		M	M	L	M		
Franklin's Ground Squirrel										
Little Brown Bat	L	H	L	L	L	L	M	M	L	M
Northern Flying Squirrel	L	M				L	L	L	L	
Northern Long-eared Bat	H	M	M	L	M	M	M	M		M
Prairie Deer Mouse										
Prairie Vole										
Silver-haired Bat	M	M	M		L	L	L	L	L	M
Water Shrew		M					M	M	L	L
Woodland Jumping Mouse		L					M	M		
Woodland Vole	M	L			M	M		L		

**Table 3.1.5 Mammal SGCN – Natural Community Association Scores for the Savanna Community Group H = High Association; M = Moderate Association; L = Low Association; Blank = No Association**

Common Name	Cedar Glade	Oak Opening	Oak Woodland
American Marten			
Big Brown Bat		H	M
Eastern Pipistrelle		H	H
Franklin's Ground Squirrel		H	M
Little Brown Bat		M	L
Northern Flying Squirrel			
Northern Long-eared Bat	L	L	M
Prairie Deer Mouse		L	
Prairie Vole		L	
Silver-haired Bat	L	L	L
Water Shrew			
Woodland Jumping Mouse			
Woodland Vole		M	M

**Table 3.1.6 Mammal SGCN – Natural Community Association Scores for the Barrens**  
**Community Group H = High Association; M = Moderate Association; L = Low Association;**  
**Blank = No Association**

Common Name	Great Lakes Barrens	Oak Barrens	Pine Barrens	Sand Barrens
American Marten				
Big Brown Bat		L		L
Eastern Pipistrelle		L		
Franklin's Ground Squirrel		H	H	M
Little Brown Bat		L		M
Northern Flying Squirrel	M		L	
Northern Long-eared Bat		M		M
Prairie Deer Mouse	M	M	L	H
Prairie Vole		M	L	H
Silver-haired Bat				
Water Shrew				
Woodland Jumping Mouse	L		L	
Woodland Vole		L		

**Table 3.1.7 Mammal SGCN – Natural Community Association Scores for the Grassland Community Group H = High Association; M = Moderate Association; L = Low Association; Blank = No Association**

Common Name	Bracken Grassland	Dry Prairie	Dry-mesic Prairie	Mesic Prairie	Sand Prairie	Surrogate Grasslands	Wet Prairie	Wet-mesic Prairie
American Marten								
Big Brown Bat		L	L	L		M	H	H
Eastern Pipistrelle				L		M	L	L
Franklin's Ground Squirrel	M	L	H	M	H	M	L	H
Little Brown Bat				H			L	M
Northern Flying Squirrel								
Northern Long-eared Bat								
Prairie Deer Mouse		M	M	L	H	M		
Prairie Vole	L	M	L	L	H	L		
Silver-haired Bat								
Water Shrew								
Woodland Jumping Mouse								
Woodland Vole								

**Table 3.1.8 Mammal SGCN – Natural Community Association Scores for the Wetland Community Group H = High Association; M = Moderate Association; L = Low Association; Blank = No Association**

Common Name	Alder Thicket	Bog Relict	Boreal Rich Fen	Calcareous Fen	Central Poor Fen	Coastal Plain Marsh	Emergent Marsh	Emergent Marsh - Wild Rice	Ephemeral Pond	Floating-leaved Marsh	Interdunal Wetland	Moist Sandy Meadow	Muskeg	Northern Sedge Meadow	Open Bog	Patterned Peatland	Poor Fen	Riverine Mud Flat	Shore Fen	Shrub Cairr	Southern Sedge Meadow	Submergent Marsh	Submergent Marsh - Oligotrophic	
American Marten																								
Big Brown Bat		M	L	M	M	M	M	M	M	M		H	L		L	M	L	H	L		H	M	M	
Eastern Pipistrelle		L			M	L	L	L	M	L	L	M	L		L	L	L	M		L	L			
Franklin's Ground Squirrel																								
Little Brown Bat	L	M	L		M	M	M	M	H	M	L	H	M	H	M	M	M	H	L	M	M	M	M	M
Northern Flying Squirrel																								
Northern Long-eared Bat	M	L	M	M	M	M	M		H	M		M	M	M	M	M	M	M		M	M	M	M	M
Prairie Deer Mouse												L												
Prairie Vole												L												
Silver-haired Bat	M	M	M	M		M	M		H	L		M	M	M	M	M	M	H	M	M	M	M	M	M
Water Shrew	M	L	L		L						L	M	L	L	L	L	L	L		L	L			
Woodland Jumping Mouse	L								M				L	L	L	L	L			L				
Woodland Vole																								

**Table 3.1.9 Mammal SGCN – Natural Community Association Scores for the Miscellaneous Community Group H = High Association; M = Moderate Association; L = Low Association; Blank = No Association**

Common Name	Algific Talus Slope	Alvar	Bedrock Glade	Bedrock Shore	Caves and Subterranean Cultural	Clay Seepage Bluff	Dry Cliff	Glaciere Talus (Felsenmeer)	Great Lakes Alkaline Rockshore	Great Lakes Beach	Great Lakes Dune	Great Lakes Ridge and Swale	Inland Beach	Lacustrine Mud Flat	Moist Cliff	Transportation - Utility Corridor
American Marten																
Big Brown Bat	H	M	L		H	L	M	L	L			M		H	M	M
Eastern Pipistrelle	L	L			H		M	L	L			L		M	L	M
Franklin's Ground Squirrel											H					H
Little Brown Bat	L	L	L	L	H	L		L	L				L	H		M
Northern Flying Squirrel												M				
Northern Long-eared Bat				L	H			L						M		L
Prairie Deer Mouse											L					L
Prairie Vole																L
Silver-haired Bat				L	L				L					H		M
Water Shrew														L		
Woodland Jumping Mouse												L				
Woodland Vole																

**Table 3.1.10 Mammal SGCN – Natural Community Association Scores for the Aquatic Community Group H = High Association; M = Moderate Association; L = Low Association; Blank = No Association**

Common Name	Coldwater streams	Coolwater streams	Lake Michigan	Lake Superior	Large Lake--deep, hard, drainage	Large Lake--deep, hard, seepage	Large Lake--deep, soft and very soft, seepage	Large Lake--deep, soft, drainage	Large Lake--shallow, hard and very hard (marl), drainage	Large Lake--shallow, hard, seepage	Large Lake--shallow, soft, drainage	Large Lake--shallow, soft, seepage	Riverine Impoundment	Riverine Lake - Pond	Small Lake--hard, bog	Small Lake--meromictic	Small Lake--Other	Small Lake--soft, bog	Spring Pond, Lake--Spring	Springs and Spring Runs (Hard)	Springs and Spring Runs (Soft)	Warmwater rivers	Warmwater streams
American Marten																							
Big Brown Bat	M	M	M	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
Eastern Pipistrelle	M	M			L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H
Franklin's Ground Squirrel																							
Little Brown Bat	H	H	M	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
Northern Flying Squirrel																							
Northern Long-eared Bat	H	H			M	M	M	M	M	M	M	M	L	M	M	M	M	M	M	M	M	M	M
Prairie Deer Mouse																							
Prairie Vole																							
Silver-haired Bat	H	H	M		M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Water Shrew	H	H			L	L	L	L	L	L	L	L	L	L	L	L	L	L	M	M	M	L	L
Woodland Jumping Mouse																							
Woodland Vole																							

**Table 3.1.11 Mammal SGCN – Ecological Landscape Association Scores**  
**H = High Association; M = Moderate Association; L = Low Association; Blank = No Association**

Common Name	Central Lake Michigan Coastal	Central Sand Hills	Central Sand Plains	Forest Transition	North Central Forest	Northeast Sands	Northern Highland	Northern Lake Michigan Coastal	Northwest Lowlands	Northwest Sands	Southeast Glacial Plains	Southern Lake Michigan Coastal	Southwest Savanna	Superior Coastal Plain	Western Coulee and Ridges	Western Prairie	# of Ecological Landscapes present
American Marten				L	H		L		M					M			5
Big Brown Bat	H	H	H	H	M	M	M	H	M	M	H	H	H	M	H	M	16
Eastern Pipistrelle		L		L							M	M	M		H	L	7
Franklin's Ground Squirrel		H	H	M					L	H	H	H	M	M	M	M	11
Little Brown Bat	H	H	H	H	M	M	M	M	M	M	H	H	H	M	H	H	16
Northern Flying Squirrel	L	L	L	M	H	H	H	H	M	H				M			11
Northern Long-eared Bat	M	M	M	M	M	L	H	M	M	L	M	L	M	M	H	L	16
Prairie Deer Mouse	L	M	H	L	L	L		L			M	H	H		M	L	12
Prairie Vole		M	M	L							M	L	L		M		7
Silver-haired Bat	M	M	M	M	H	L	H	M	M	L	M	L	L	M	M	L	16
Water Shrew	L	M	M	M	H	M	H	H	H	M	L	L	L	L	L	L	16
Woodland Jumping Mouse	L	L	L	M	H	M	H	M	M	M				L			11
Woodland Vole	L	L	L	M				L			M	L	M		M		9



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