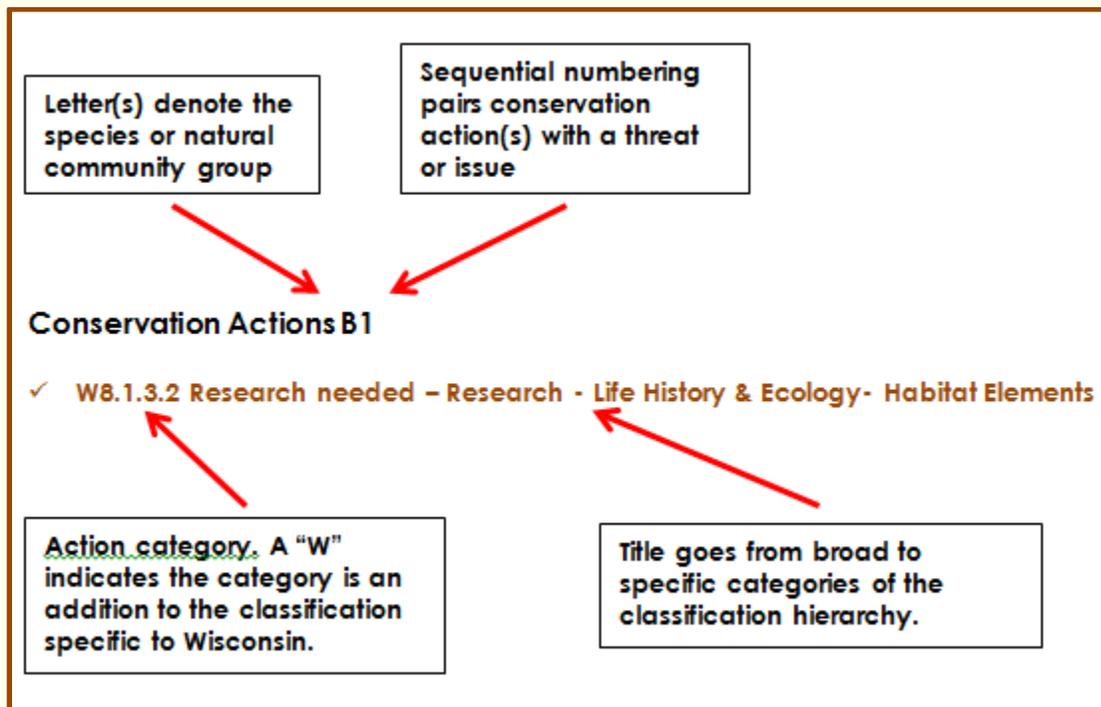


## Threats/Issues and Conservation Actions for Mammal Species of Greatest Conservation Need

This is a summary of threats or issues 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 may 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.

Conservation actions applicable to all or most mammal SGCN are organized according to categories in the [Conservation Actions Classification](#) based on the Open Standards threats and actions classification<sup>1</sup>. If the threat/issue and its associated conservation action(s) apply to one or a few species they are identified as such. Conservation actions overlapping in content or scope may be grouped under a single code. Coding and identification for each action category are explained further below.



<sup>1</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.



More about how threats and issues or conservation actions were developed, opportunities to provide input on this topic, and how this information can be used to make conservation decisions can be found on the [Conservation Actions and Effectiveness Monitoring](#) page or in [Sections 2 and 3.1](#) of the Wisconsin Wildlife Action Plan.

---

## Threat/Issue M1

Residential and commercial development and agriculture. In the Open Standards for the Practice of Conservation classification, “development” includes the footprint of the activity on the landscape—all phases of construction and operation. Similarly, agricultural 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 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 M1

- ✓1.1 Land/water protection - Site/area protection
- ✓W1.2 Land/water protection – Resource and habitat protection
- ✓W2.4 Land/water management – Comprehensive management

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.

### ✓W2.3.3 Land/water Management – Habitat and natural process restoration - Terrestrial

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>2</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.

### ✓W4.2.1 Education and awareness – Training – Management and conservation training

### ✓W4.3.1 Education and awareness - Awareness and communications – General ecology biology, habitat related to conservation needs

### ✓W6.1 Linked enterprises and livelihood alternatives

### ✓6.4 Conservation payments

### ✓6.5 Non-monetary incentives

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.

## Threat/Issue M2

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.

<sup>2</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)



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 M2

### ✓W5.2.1 Law and policy - Policies and regulations – National (Federal)

### ✓W5.2.2 Law and policy – Policies and regulations – State and Tribal

### ✓W5.2.3.1 Law and policy – Policies and regulations – Local - County

### ✓5.3 Law and policy – Private sector standards and codes

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 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.

### ✓W7.2.1 External capacity building – Alliance and partnership development – Research

### ✓W7.2.3 External capacity building – Alliance and partnership development – Management and protection

### ✓W8.1.7 Research needed – Research – Natural community inventory and ecology

### ✓8.2.2 Research needed – Conservation planning – Area-based management plan

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.

### ✓W7.2.1 External capacity building – Alliance and partnership development – Research

### ✓W8.1.7 Research needed – Research – Natural community inventory and ecology

### ✓8.2.2 Research needed – Conservation planning – Area-based management plan

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.

## Threat/Issue M3

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 M3

### ✓W2.3.3 Land/water Management - Habitat and Natural Resource Restoration - Terrestrial

### ✓W2.4 Land/water Management – Comprehensive management

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 technique. 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.

---

## Threat/Issue M4

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 M4

### ✓W2.2.1.3 Land/water management – Invasive/problematic species control – Prevention - Terrestrial

### ✓W2.2.2.3 Land/water management – Invasive/problematic species control – Control - Terrestrial



✓W4.2.1 Education and awareness – Training – Management and conservation training

✓8.1.5 Research needed – Research - Threats

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.

## Threat/Issue M5

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 mammal 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 M5

✓W8.1.2.1 Research needed – Research – Population size, distribution and past trends – Distribution and mapping

✓W8.1.3.1 Research needed – Research – Life history

✓W8.1.3.3 Research needed – Research – Species interactions and associations

✓8.2.1 Research needed – Conservation planning – Species action/recovery plan

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.

---

## **Threat/Issue M6, BATS**

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

## **Conservation Actions M6, BATS**

### **✓8.1.6 Research needed – Research - Actions**

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

---

## **Threat/Issue M7, BATS and DENNING MAMMALS**

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 Action M7, BATS and DENNING MAMMALS**

### **✓W4.3.2 Education and awareness – Awareness and communications – Harvest, roadkill or other sources of illegal, incidental mortality, nonlethal threats**

### **✓5.4.3 Law and policy – Compliance and enforcement – Sub-national level (state)**

### **✓5.3 Law and policy – Private sector standards and codes**

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

---

## **Threat/Issue M8, CAVE BATS**

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 Action M8, CAVE BATS

- ✓W2.2.1.3 Land/water management – Invasive/problematic species control – Prevention - Terrestrial
  - ✓W2.2.2.3 Land/water management – Invasive/problematic species control – Control - Terrestrial
  - ✓W4.3.2 Education and awareness – Awareness and communications – Harvest, roadkill or other sources of illegal, incidental mortality, nonlethal threats
  - ✓5.4.3 Law and policy – Compliance and enforcement – Sub-national level (state)
  - ✓8.2.1 Research needed – Conservation planning – Species action/recovery plan
- 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.
- 

## Threat/Issue M9, AMERICAN MARTEN

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 Action

- ✓W8.2.1 Research needed – Research – Species action/recovery plan
  - ✓5.3 Law and policy – Private sector standards and codes
  - ✓W7.2.3 External capacity building – Alliance and partnership development – Management and protection
- 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.