3.4 Reptile & Amphibian (Herptile) Species of Greatest Conservation Need

This is an overview of Wisconsin's herptile Species of Greatest Conservation Need (SGCN) and their associations with Natural Communities and Ecological Landscapes. This section also identifies herptile 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 herptile SGCN over the next ten years are presented in the second half of this section along with those applicable to one or a few herptile species. The discussion of the issues and challenges facing herptile SGCN and their habitat, and the conservation actions that address them, follows nomenclature developed by the Open Standards for the Practice of Conservation.[1] 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.

3.4.1 Herptile SGCN

There are 55 native herptile[2] species in Wisconsin broken down into 36 reptiles and 19 amphibians. Of these 26 (47%) have been identified as Species of Greatest Conservation Need in Wisconsin. Eight are currently listed as Threatened or Endangered in Wisconsin. Herptile SGCN are listed in Table 3.4.1.

Herptiles use a wide variety of habitats from sand prairies to streams to ephemeral ponds. Many herptile SGCN are distinguished by their use of a combination of terrestrial, wetland and aquatic habitats to meet their life history and ecological needs. As a group, this makes them vulnerable to threats from sources acting in multiple environments.

3.4.2 SGCN-NC and SGCN-EL Association Scores

The association between each herptile SGCN and each natural community type is provided in Tables 3.4.3 to 3.4.10. Figure 3.4.1 takes all herptile 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 herptile SGCN have only a low or no association with a community type, the community is not listed. Higher scores indicate higher overall association of herptile SGCN with that community type. A reminder of the definitions for each level is provided below. The northern forest natural community group has the fewest number of associated SGCNs (i.e., wood turtle, four-toed salamander and mink

[1] http://cmp-openstandards.org/tools/threats-and-actions-taxonomies/ (Search Terms: open standards conservation threats actions)
[2] http://dnr.wi.gov/files/PDF/pubs/er/ER0110.pdf (Search Terms: Wisconsin DNR publication ER0110)

frog). Few species are also associated with the "miscellaneous" natural community group, which is dominated by communities specific to the Great Lakes area and influenced by geologic or bedrock characteristics. Many herptile SGCN are present in dry open communities. In fact, similar reptile assemblages are associated with savanna, barrens and grassland community groups. Several herptile SGCNs are associated with wetland communities that have low or no association with the drier, open communities (e.g., mink frog) and some are not associated with wetlands (e.g., timber rattlesnake). But many reptiles and amphibians are present in multiple aquatic, wetland and terrestrial habitats because of their complex life history needs. It is also important to note that some SGCN have a relatively higher association with transportation and utility corridors because they have a wider range or diurnal or seasonal migrations through multiple habitats, which increases their interaction with corridors.

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 herptile SGCN and the sixteen ecological landscapes is provided in Table 3.4.11. Figure 3.4.2 takes all herptile 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 herptile SGCN have only a low or no association with a landscape, the landscape is not listed. Higher scores indicate higher overall association of herptile SGCN with that ecological landscape. A reminder of the definitions for each level of association is provided below. Three species (i.e., wood turtle, Blanding's turtle and four-toed salamander) have associations with most of the ecological landscapes in our state. Five species have associations only with one or two ecological landscapes (i.e., prairie ring-necked snake, line snake, queen snake, six-lined racerunner and Western worm snake)and are all associated with the western coulee and ridges and southwest savanna landscapes,

except for the queen snake, which is only associated with the southeast glacial plains and southern Lake Michigan coastal landscapes.

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. In the case of herptile SGCN, many have been well inventoried throughout the state and it is less likely that new information will change the SGCN-EL scores. Although as more information about habitat requirements becomes available or as environmental changes alter natural community definitions, the SGCN-NC scores may warrant reassessment. These two scores are best considered together with the NC-EL opportunity scores presented in Section 4 and also in the context of surrounding land use, especially for those herptile SGCN species that depend on a combination of upland, wetland and aquatic habitats.

3.4.3 Herptile SINS and Other Herptile 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 (RankingSINS); or 2) the most basic taxonomic and/or status data are lacking to identify the species or its distribution (BasicSINS). 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

The three groups of species that qualify as SINS are identified in Table 3.4.2 to distinguish survey, monitoring, or research objectives over the next five to ten years. There are no BasicSINS or RankingSINS in the herptile SGCN group, indicating that basic information about the taxonomy and occurrence of species as well as the rarity, trends and threats factors used to assign S/G Ranks is available. There are 32 herptile species that were assessed and did not meet the SGCN criteria (i.e., all species in Table 3.4.2 are "NotSGCN"). These species will be reassessed if new information indicates changes in the factors used to identify SGCN.

There are no native herptile species that were not assessed because they were deemed relatively common or stable. There are no herptile species identified as a "not applicable" target for conservation activities (e.g., with a NatureServe rank of SNA). because their presence here is unpredictable or infrequent.

3.4.4 Issues and Conservation Actions Common to All or Most Herptile SGCN

This section summarizes issues and challenges affecting the conservation of herptile 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, if livestock encroach upon streams and adjacent wetlands and floodplains in northern cricket frog habitat they can trample frogs, or compact the soil and eliminate the small spaces they inhabit along streams and in wetlands. Conservation actions for this species may include installation of fencing to keep animals out of areas occupied by the cricket frog or they may seek to restore the microhabitat features they inhabit. 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 herptile SGCN and their habitats. The nomenclature is based on the higher level categories in the Open Standards threats and actions classification[3]. The second half is devoted to very important conservation actions for specific herptile SGCN and their habitat.[4] Key words or titles that correspond to the categories in the threats and actions classifications are used in the text to orient the reader. Unlike in

[3] 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.

[4] 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.

WWAP1, an effort has been made to pair issues affecting conservation of herptile SGCN with their relevant conservation actions.

Issues. Agricultural practices for both crops and animals can result in conversion of suitable nesting habitat (e.g., sand prairie), physical disturbance to breeding and overwintering sites, and degradation and fragmentation of riparian, shoreline and instream habitat. Livestock compact soils and overgrazing in and around wetlands, lakes, ponds, and streams destroys grasses and other vegetation that provide shelter and foraging areas for herptiles.

In addition to the agriculture footprint, agricultural effluents that move offsite and contain sediments, nutrients and chemicals, can change or decrease water quality if they reach the wetlands and aquatic habitats where herptile SGCN live. Moderate to intensive grazing can cause shoreline disturbance and impact turbidity of water, which can lead to negative impacts on frogs, eggs, and tadpoles. Runoff of pesticides and herbicides, like atrazine, may threaten frogs directly by killing eggs, larvae, or adults. Indirect effects of pesticides may include alterations in behavior (frogs are less able to escape predators) and changes in the food base (invertebrates are killed by pesticides). Contaminants may also alter sex ratios of amphibians, resulting in reduced reproductive success. This is particularly important for amphibian SGCNs and in those parts of the state where intensive agriculture occurs in close proximity to wetland and warmwater aquatic communities.

Biological resource use is also a frequently cited as an issue for herptile SGCN. One of the subcategories identified in this category is wood harvest and related practices. Wood harvest within riparian habitats that results in a loss of large and fine woody debris (loss of structural complexity) in forests results in lack of habitat for the woodland salamander species, turtles and snakes.

Conservation Actions. Seek to replace and improve the habitat elements that have been degraded or lost as a result of past forest management practices as well as agricultural development and pollution from agricultural effluents. This action category presumes that multiple objectives or uses exist on the landscape. That is, connected upland, aquatic and wetland habitats for herptile SGCNs persist in an agricultural matrix. Conservation projects or practices can be targeted at a specific aspect(s) or process that is important for herptile SGCN habitat such as restoring riparian vegetation, leaving adequate distances between disturbance and wetland or aquatic habitats, or upland nesting sites and preserving sufficient amounts of woody debris around ephemeral ponds and streams in managed forests to sustain salamanders, turtles or frogs.

Best Management Practices (BMPs) for the forestry and agricultural sectors establish important elements for conserving and protecting habitat for SGCN herptiles. Individuals and organizations that apply these standards and practices can consider how closely their production and resource use objectives can be aligned with conservation objectives for herptile SGCNs.

Comprehensive management considers the full suite of protection, preservation and restoration activities to sustain and improve habitat for herptile SGCN. This is most applicable to public lands and conservation lands that are established to prevent habitat loss and fragmentation. In these areas it is important to preserve and manage connections between wetlands and uplands to facilitate movement of herptile SGCNs between these habitats (e.g. turtles seeking nesting sites, snakes moving from basking areas to den sites). Herptiles use a wide variety of habitats from sand prairies to streams to ephemeral ponds; restoration, management and protection of these diverse habitats are the primary actions proposed for conserving herptile Species of Greatest Conservation Need in Wisconsin. A wide variety of efforts will be needed to restore, conserve and protect these habitats, from management of prairies to reduce impacts of natural succession, to reducing densities of invasive plants, such as reed canary grass in wetland areas.

Issue. Harvest of snakes, frogs, and turtles for research, education, pet trade, and for personal use continues to be an issue for some herptile species, especially turtles.

Conservation Action. State and federal legislation and regulation establish prevention, controls and limits for the collection and harvest of herptile SGCN. Since many of these species are already listed as threatened or endangered, state endangered species laws prohibit their collection. However, more widespread compliance and enforcement of trade restrictions is also needed.

Issue. Disease and invasive species are also a concern for herptiles. This includes viral, bacterial, and fungal diseases and parasitism. Invasive species can negatively impact herptiles in a variety of ways. For example, invading reed canary grass and giant reed grass may simplify habitats in many ways, including lowering wetland and shoreline habitat quality by eliminating the soil and surface conditions that allow crayfish to burrow. Additionally, rusty crayfish, also an invasive, directly competes with native crayfish that create burrows. Burrows created by native crayfish provide the primary overwintering shelter for the Eastern massasauga rattlesnake. Seasonal use by Eastern massasauga rattlesnakes of reed canary-dominated areas is also much lower than that of areas with native wetland vegetation. Alterations of aquatic habitats may favor increasing pathogen (trematodes) vectors such as snails, resulting in an increased incidence of malformations, potentially affecting recruitment rates.

Conservation Action. Health concerns for herptiles can be addressed through a combination of state and local policies, education and partnerships between state resource agencies and local conservation groups. This effort entails developing appropriate response strategies to unusual and or acute mortality outbreaks, collaborative partnerships with groups and individuals with knowledge of reptile and amphibian disease and biology, and a system utilizing community participation to alert the appropriate agencies of unusual and or acute mortality outbreaks.

Issue. The net impacts of climate change and extreme weather events, including expected warmer and drier conditions in our state, are likely to negatively impact many herptile SGCNs. Poor water quality (e.g., low dissolved oxygen) may be a limiting factor for cricket frogs, which seem to be especially sensitive to this. Competition

among native species (green frogs, bullfrogs v. mink frogs) may occur if green and bullfrogs advance further into mink frog range with average increases in water and air temperature. Mink frog embryos have limited tolerance to warmer water temperatures and consequent lower oxygen diffusion rates. Cold winters with little snowpack result in mortality of overwintering turtles and frogs. Limited mobility of most herptile species make it difficult for them to move to more favorable areas at a pace that keeps up with changes in climate. Moreover, while trends in environmental conditions can be measured and modeled, the spatial and temporal variability of changes in climate and weather are more difficult to project, making it difficult to determine where to target adaptation measures.

Conservation Action. Comprehensive management and habitat restoration projects that incorporate or expand objectives to include adaptation to climate change remain the best strategy for addressing this issue. Adaptation strategies for herptile SGCNs include providing linkages between habitats and retaining riparian vegetation to help maintain water temperature and quality.

Issue. Residential and commercial development is a significant issue for SGCN herptiles because it results in loss of breeding and foraging habitat or changes to the composition of habitat. The residential development of shorelines is a significant issue for lake dwelling species because it degrades or eliminates habitat.

Conservation Action. Conservation actions to address this issue are focused on two primary areas. The first of these is raising awareness and education of landowners to preserve and restore riparian and floodplain habitat. Landowner and community associations are core groups that can successfully implement actions in this category. The second category is policies and regulations that maintain, encourage and support protection of these natural communities. Local policy and regulations are relatively more effective in this respect because they can more readily target aquatic systems that provide SGCN habitat. This conservation action category is also important for fish and aquatic invertebrate SGCNs.

Issue. Lack of information for herptile SGCN in the following areas are among the most important for conservation in the next five to ten years:

- Statewide distribution of herptile SGCN. Information is concentrated in publically protected or preserved lands. More inventory work is needed on private lands through citizen-based monitoring or other surveys, depending on the target species.
- Reptiles have little or no long-term monitoring taking place. It is crucial for status assessments and identifying viable populations, which leads us to identify conservation actions and opportunity areas.
- For some of our most endangered species, there is a need to conduct focused research to answer question that will inform management and decision-making. For example, we need to determine the long term viability of extant populations of ornate box turtles via quantitative surveys, modeling, mark- recapture studies, and other appropriate scientific methods.

- New and emerging diseases will continue to jeopardize herptile SGCN. Monitoring efforts are needed to help identify new disease cases, to track the spread of existing cases.
- Research to identify causes, mechanisms of transport, etc. is needed for new and emerging disease. Disease is a threat to amphibians and reptiles. For example, snake fungal disease has affected a number of Wisconsin snake species and research is ongoing to learn more about the extent and spread of this disease.

Conservation Action. A combination of inventory and monitoring is needed as well as research on transmission and ecology of herptile diseases. Creation and support of herptile citizen-based monitoring projects is important to assist filling information gaps.

3.4.5 Issues and Conservation Actions Specific to One or a Few Herptile SGCN

The Actions Database has some actions that are species-specific or relevant to a particular natural community or habitat. This section briefly identifies those that currently reside at the forefront of species-specific efforts.

Issue. Lack of information about locations of SGCN turtle nesting sites (especially for large river species in the Western Coulees and Ridges and Lake Superior Ecological Landscape) hinders our ability to manage and protect nesting sites.

Conservation Action. In landscapes containing natural communities with moderate or high association for herptile SGCNs, engage the public in citizen-based monitoring of turtles; increase awareness of landowners to identify and report turtle nesting sites.

Issue. Poorly timed mowing practices along roads that intersect herptile habitat affects turtle, lizard and snake SGCNs associated with transportation corridors. Road mortality is also a significant issue for many turtle species and snakes.

Conservation Action. The Wisconsin Turtle Conservation Program aims to identify areas with high road mortality for turtles in the state and implement measures to publicly mark these areas and increase citizen awareness. Also, continued interaction with state and local field transportation crews is essential.

Issue. Some species, like the four-toed salamander, required targeted monitoring efforts as they are unlikely to be found using techniques used for other species.

Conservation Action. Targeted searches for four-toed salamanders and eggs in sphagnum-covered logs overhanging ephemeral ponds.

Issue. The distribution and abundance of some Wisconsin herptiles. In some cases, it is because the species is known (or believed) to be exceedingly rare (e.g. eastern and western ribbonsnakes; lined snake).

Conservation Action. Surveys to document the range and status and to map the locations of these species using species specific protocols.

3.4.6 References for Herptile Species of Greatest Conservation Need

The following references were used in the evaluation and assessment of herptile 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[5] 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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[5] 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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Figure 3.4.1 Sum of All Herptile SGCN-Natural Community Association Scores for those Associations Marked as Moderate (2) or High (3) for Each Community Type

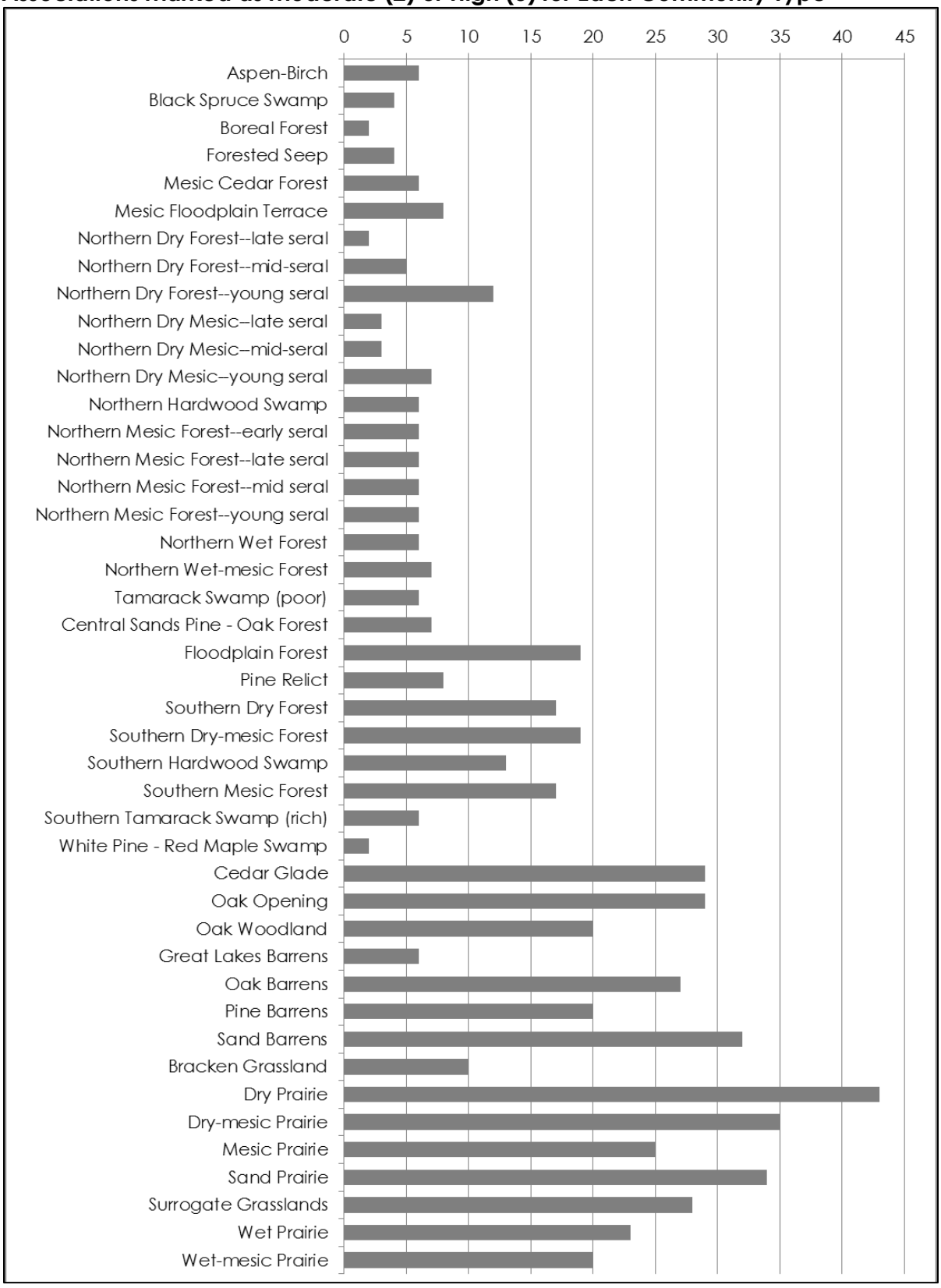

Figure 3.4.1 (continued) Sum of All Herptile SGCN-Natural Community Association Scores for those Associations Estimated to be Moderate (2) or High (3) for Each Community Type

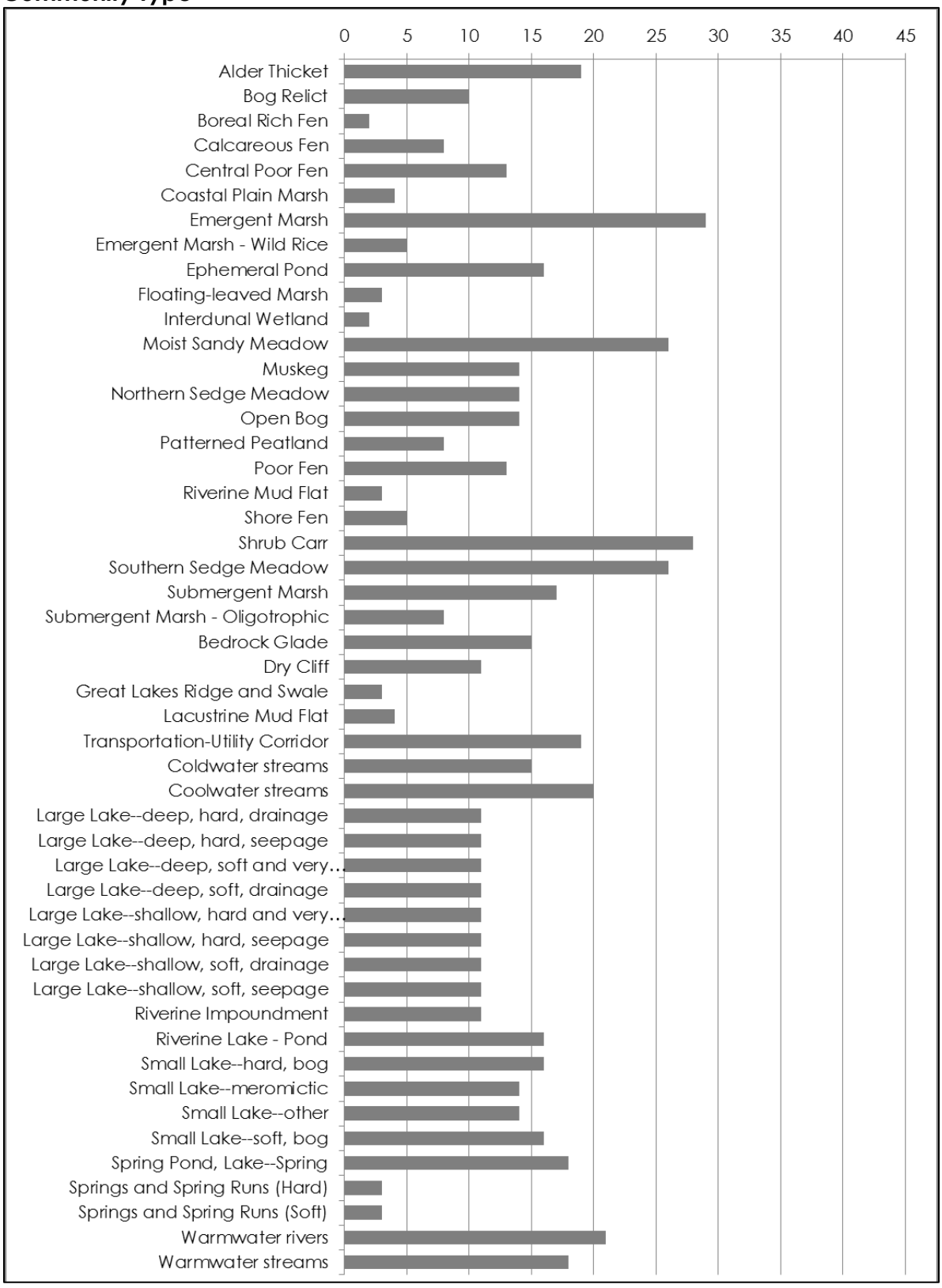

Figure 3.4.2 Sum of All Herptile SGCN-Ecological Landscape Association Scores for those Associations Estimated to be Moderate (2) or High (3) for Each Landscape

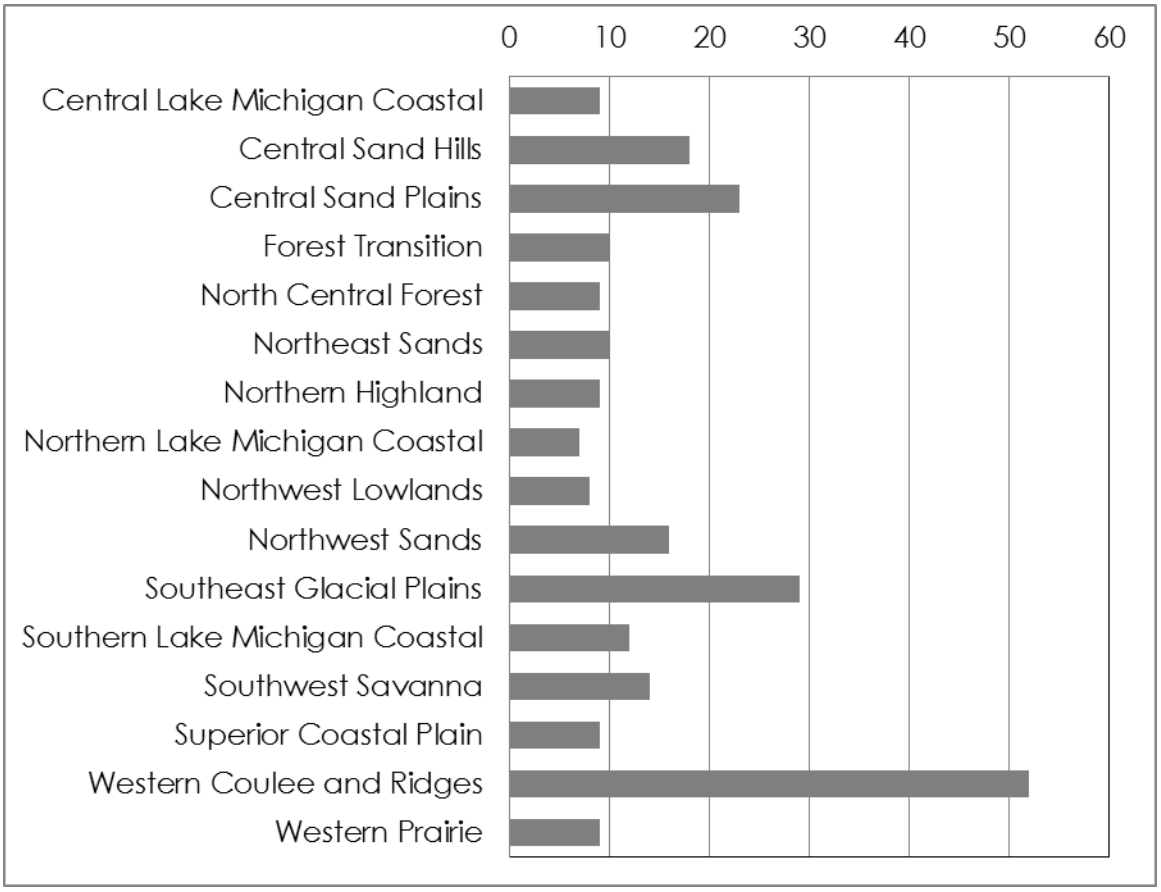

*Figure 3.4.2 takes all herptile SGCN with an association of moderate and high for a given ecological landscape and then sums all the 2's" and "3's". Each bar in the graph represents that sum for the stated landscape. If herptile SGCN have only a low or no association with a landscape, the landscape is not listed. Higher scores indicate higher overall association of herptile SGCN with that ecological landscape.

Table 3.4.1 Herptile Species of Greatest Conservation Need

Common Name	State THR/END	Federal LT/LE	Natural Heritage Inventory Global Rank	Natural Heritage Inventory State Rank	New SGCN for WWAP2
Northern Cricket Frog	END		G5	S1	
Smooth Softshell			G5	S3	
Six-lined Racerunner			G5	S2S3	
Western Wormsnake			G5	S1	
North American Racer			G5	S2	
Timber Rattlesnake			G4	S2S3	
Prairie Ring-necked Snake			G5T5	S2S3	
Blanding's Turtle			G4	S3S4	
Wood Turtle	THR		G3	S3	
Four-toed Salamander			G5	S3?	
Mink Frog			G5	S3	
Slender Glass Lizard	END		G5	S1	
Gophersnake			G5	S2S3	
Queensnake	END		G5	S1	
Eastern Massasauga	END		G3G4T3Q	S1	
Ornate Box Turtle	END		G5	S1	
Butler's Gartersnake			G4	S3S4	
Western Ribbonsnake	END		G5	S1	
Plains Gartersnake			G5	S2?	Y
Eastern Ribbonsnake	END		G5	S1	
Lined Snake			G5	S1S2	Y
Pickerel Frog			G5	S3?	
Prairie Skink			G5	S3	
Gray Ratsnake			G5	S3	

*For rank definitions see Tables 2.9 and 2.10 in Section 2.

Table 3.4.2 Herptile SINS and Other Herptile 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
Northern Ring-necked Snake	G5T5	S3S4	NotSGCN	
False Map Turtle	G5	S3?	NotSGCN	
Mudpuppy	G5	S3S4	NotSGCN	
American Bullfrog	G5	S3S4	NotSGCN	
Common Five-lined Skink	G5	S3S4	NotSGCN	
Eastern Hog-nosed Snake	G5	S3S4	NotSGCN	
Spotted Salamander	G5	S4	NotSGCN	
Tiger Salamander	G5	S4	NotSGCN	
Red-backed Salamander	G5	S4	NotSGCN	
Central Newt	G5	S4	NotSGCN	
Wood Frog	G5	S4	NotSGCN	
Ouachita Map Turtle	G5	S4	NotSGCN	
Stinkpot Turtle	G5	S4	NotSGCN	
Eastern Milk Snake	G5	S4	NotSGCN	
Northern Water Snake	G5	S4	NotSGCN	
Smooth Green Snake	G5	S4	NotSGCN	
Northern Leopard Frog	G5	S4?	NotSGCN	
Blue-spotted Salamander	G5	S4S5	NotSGCN	
Common Snapping Turtle	G5	S4S5	NotSGCN	
Map Turtle	G5	S4S5	NotSGCN	
Eastern Spiny Softshell Turtle	G5	S4S5	NotSGCN	
Western Fox Snake	G5	S4S5	NotSGCN	
Northern Red-bellied Snake	G5	S4S5	NotSGCN	
Eastern Garter Snake	G5	S4S5	NotSGCN	
Boreal Chorus Frog	G5	S5	NotSGCN	Y
Eastern American Toad	G5	S5	NotSGCN	
Cope's Gray Treefrog	G5	S5	NotSGCN	
Eastern Gray Treefrog	G5	S5	NotSGCN	
Spring Peeper	G5	S5	NotSGCN	
Green Frog	G5	S5	NotSGCN	
Painted Turtle	G5	S5	NotSGCN	
Brown Snake	G5	S5	NotSGCN	
Mudpuppy	G5	S3S4	NotSGCN	Y

*For rank definitions see Tables 2.9 and 2.10 in Section 2.

Table 3.4.3 Herptile 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)
Northern Cricket Frog																					
Smooth Softshell																					
Six-lined Racerunner																					
Western Wormsnake																					
North American Racer																					
Timber Rattlesnake																					
Prairie Ring-necked Snake																					
Blanding's Turtle										M			L								
Wood Turtle	H	M			L	H	H	M	H	H	H	H	H	M	H	H	H	H	M	M	M
Four-toed Salamander	H	M	M		M	H	H							M	H	H	H	H	M	H	M
Mink Frog	L	L	L		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Slender Glass Lizard								L	M	H	L	L	M								
Gophersnake									L	M			L								
Queensnake																					
Eastern Massasauga										L											
Ornate Box Turtle																					
Butler's Gartersnake																					

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)
Western Ribbonsnake																					
Plains Gartersnake																					
Eastern Ribbonsnake																					L
Lined Snake																					
Gray Ratsnake																					
Prairie Skink				L					L	M		L	M								
Pickerel Frog	L	L		M	L	M								M	L	L	L	L	M	M	M

Table 3.4.4 Herptile 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
Northern Cricket Frog										
Smooth Softshell										
Six-lined Racerunner										
Western Wormsnake					M	M		L		
North American Racer					M	M				
Timber Rattlesnake		M		H	H	H	M	H		
Prairie Ring-necked Snake	M				M	M				
Blanding's Turtle		M				M	M	M	M	
Wood Turtle		H					M	M		
Four-toed Salamander		H					H	H	M	
Mink Frog										
Slender Glass Lizard										
Gophersnake	M			M	M	M		M		
Queensnake										
Eastern Massasauga		H					M			
Ornate Box Turtle	H				H	H		M		
Butler's Gartersnake		M								
Western Ribbonsnake										
Plains Gartersnake										
Eastern Ribbonsnake									L	
Lined Snake										
Gray Ratsnake		M	L	H	H	H	L	H	L	
Prairie Skink										
Pickerel Frog		M					M	L	M	M

Table 3.4.5 Herptile 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
Northern Cricket Frog			
Smooth Softshell			
Six-lined Racerunner	H	H	
Western Wormsnake	H		
North American Racer	H	M	
Timber Rattlesnake	H	H	H
Prairie Ring-necked Snake	H	H	M
Blanding's Turtle	M	H	M
Wood Turtle		M	M
Four-toed Salamander			
Mink Frog			
Slender Glass Lizard	L	M	L
Gophersnake	H	H	H
Queensnake			
Eastern Massasauga			
Ornate Box Turtle	H	H	H
Butler's Gartersnake	L	L	L
Western Ribbonsnake		L	
Plains Gartersnake	L	L	L
Eastern Ribbonsnake			
Lined Snake		L	
Gray Ratsnake	H	M	H
Prairie Skink	H	H	M
Pickerel Frog			

Table 3.4.6 Herptile 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
Northern Cricket Frog				
Smooth Softshell				
Six-lined Racerunner		H	L	H
Western Wormsnake				
North American Racer		M	M	H
Timber Rattlesnake				H
Prairie Ring-necked Snake		M		M
Blanding's Turtle	H	H	H	H
Wood Turtle	H	H	H	H
Four-toed Salamander				
Mink Frog				
Slender Glass Lizard		H	H	H
Gophersnake		H	H	H
Queensnake				
Eastern Massasauga		H	H	H
Ornate Box Turtle		L		H
Butler's Gartersnake				
Western Ribbonsnake		M		
Plains Gartersnake		L	L	L
Eastern Ribbonsnake				
Lined Snake				
Gray Ratsnake		L	L	L
Prairie Skink		H	H	H
Pickerel Frog				

Table 3.4.7 Herptile 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
Northern Cricket Frog						L	H	M
Smooth Softshell								
Six-lined Racerunner		H	L		H	L		
Western Wormsnake		H	L					
North American Racer		H	M		H	M		
Timber Rattlesnake		H	M	M	H	L		
Prairie Ring-necked Snake		H	H		M	L		
Blanding's Turtle	H	H	M	M	H	M	H	M
Wood Turtle	H	H	M	M	H	M	M	M
Four-toed Salamander								
Mink Frog								
Slender Glass Lizard	L	H	H		H	M		
Gophersnake	L	H	H	M	H	M		
Queensnake							H	
Eastern Massasauga		M	H	H	H	H	H	H
Ornate Box Turtle	L	H	M	M	H	M		
Butler's Gartersnake	L	L	H	H	L	M	H	H
Western Ribbonsnake			L	M		L	L	M
Plains Gartersnake	M	H	H	H	L	H	H	H
Eastern Ribbonsnake						L	L	L
Lined Snake		H	M			H		

Common Name	Bracken Grassland	Dry Prairie	Dry-mesic Prairie	Mesic Prairie	Sand Prairie	Surrogate Grasslands	Wet Prairie	Wet-mesic Prairie
Gray Ratsnake		M	M	M	M	M		
Prairie Skink	M	H	H	L	H	H		
Pickerel Frog				M			H	H

Table 3.4.8 Herptile 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 Carr	Southern Sedge Meadow	Submergent Marsh	Submergent Marsh - Oligotrophic
Northern Cricket Frog							H		L			H									H	H	
Smooth Softshell																							
Six-lined Racerunner																							
Western Wormsnake																							
North American Racer																							
Timber Rattlesnake																							
Prairie Ring-necked Snake																							
Blanding's Turtle	M	L	L	L	L	M	H	H	H		L	M		M	L	L	L		L	M	M	H	H
Wood Turtle	H		L		L				M			M		M		L	L		L	H	M	M	
Four-toed Salamander	H	H			H		H		H			M	H	M	H	H	H		H	H	M		
Mink Frog	M	M	M		M		H	M	M				H	M	H	M	M			M		H	M
Slender Glass Lizard																							
Gophersnake																							
Queensnake	M						H					H								H	H	H	
Eastern Massasauga	H			H	H		H		H			H	H		H		H			H	H	L	
Ornate Box Turtle																							
Butler's Gartersnake				H			H					H		H						H	H		
Western Ribbonsnake							M					H								H	H		

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 Carr	Southern Sedge Meadow	Submergent Marsh	Submergent Marsh - Oligotrophic
Plains Gartersnake	L			L	L	M	H	L	L		M	M		L	L	L	L			M	M		
Eastern Ribbonsnake	M	H			H		L		L				H		H	H	H			M			
Lined Snake																							
Gray Ratsnake																							
Prairie Skink												L		L									
Pickerel Frog	M	M	L	M	M	L	H	L	H	H		H	M	H	M	L	M	H	M	M	H	H	H

Table 3.4.9 Herptile 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
Northern Cricket Frog														L		L
Smooth Softshell																
Six-lined Racerunner			M													L
Western Wormsnake							L									
North American Racer							M									L
Timber Rattlesnake			M				H	L								
Prairie Ring-necked Snake			H													
Blanding's Turtle														L		H
Wood Turtle														M		H
Four-toed Salamander												H			L	
Mink Frog																
Slender Glass Lizard																M
Gophersnake			H				H									M
Queensnake																
Eastern Massasauga														M		M
Ornate Box Turtle																L
Butler's Gartersnake																M
Western Ribbonsnake			H											L		
Plains Gartersnake																M
Eastern Ribbonsnake														L		

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
Lined Snake																
Gray Ratsnake	L		L		L		H	L							L	L
Prairie Skink			M				L									H
Pickerel Frog					L											

Table 3.4.10 Herptile 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
Northern Cricket Frog	H	H			H	H	H	H	H	H	H	H	H	H	H	H	H	H	H			H	H
Smooth Softshell																						H	
Six-lined Racerunner																							
Western Wormsnake																							
North American Racer																							
Timber Rattlesnake																							
Prairie Ring-necked Snake																							
Blanding's Turtle	M	M			H	H	H	H	H	H	H	H	H	H	H	H	H	H	H			M	M
Wood Turtle	H	H												M	M	L	L	M	L			H	H
Four-toed Salamander	M	M																					
Mink Frog	M	H			H	H	H	H	H	H	H	H	H	H	H	H	H	H	H			H	H
Slender Glass Lizard																							
Gophersnake																							
Queensnake	L	M																	M			H	H
Eastern Massasauga	L	L																				M	
Ornate Box Turtle																							
Butler's Gartersnake														L					L				

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
Western Ribbonsnake														L	L	L	L	L	L				
Plains Gartersnake	L	M											L	L					M			L	M
Eastern Ribbonsnake					L	L	L	L	L	L	L	L		H	H	H	H	H	H				
Lined Snake																							
Gray Ratsnake																							
Prairie Skink																							
Pickerel Frog	H	H			M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	H	H	M	M

Table 3.4.11 Herptile 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
Northern Cricket Frog	L	L	L								M	L	H		H		7
Smooth Softshell		H	M												H		3
Six-lined Racerunner															H		1
Western Wormsnake													L		H		2
North American Racer		M	M								M		H		H	M	6
Timber Rattlesnake		L											L		H	H	4
Prairie Ring-necked Snake															H		1
Blanding's Turtle	M	H	H	M	L	M	L	M	L	H	H	H	M	L	H	L	16
Wood Turtle	M	L	H	H	H	H	H	H	M	H	L			H	H	L	14
Four-toed Salamander	H	M	H	H	H	M	H	M	H	M	H	L		H	H	L	15
Mink Frog				L	H	H	H	L	H	M				H			8
Slender Glass Lizard		H	H												H		3
Gophersnake		L	M						L	H			L		H		6
Queensnake											H	M					2
Eastern Massasauga		L	H								H	M			H		5
Ornate Box Turtle		H	L								H				H		4
Butler's Gartersnake	M										H	H					3
Western Ribbonsnake		L	L								L				L		4
Plains Gartersnake											M	M	L		M		4
Eastern Ribbonsnake	L	L				L		L		L	M						6

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
Lined Snake													H		L		2
Gray Ratsnake													L		H		2
Prairie Skink			L	M						H					M	M	5
Pickerel Frog	L	M	M	L	L	L		L	L	L	H	L	H	L	H	M	15

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