

2. Approach and Methods

2.1 General Approach

The Wisconsin Wildlife Action Plan (WWAP) is a **voluntary plan** to be used by organizations and individuals in our state or region that make conservation decisions as a primary or incidental part of their activities.

WWAP updates are based largely on internal and external feedback from WWAP users. The updates are focused on 1) making the WWAP accessible to more people; 2) making the content easier to understand and use; 3) improving the collection and documentation of information to assess SGCN and their habitats so that future improvements and updates are easier to make; and 4) integrating essential data about SGCN and their habitat, as well as threats and conservation actions, that have changed in the last ten years.

The format and presentation of the WWAP has changed notably since the original hard-copy document was produced in 2005. The WWAP is currently split online into a combination of web content and original text. Moreover, some of the web content is linked to other topics or programs (e.g., SGCN profiles are linked to the Wisconsin DNR's rare species pages¹) and reports (e.g., Ecological Landscapes of Wisconsin Report²). Also, some text from WWAP1 is no longer available because its content was instructional and deemed to be readily available elsewhere.

Because of these changes in the original design of the WWAP, compiling and presenting updates while maintaining continuity with the eight required State Wildlife Action Plan (SWAP) elements developed by the USFWS was a challenge in the preparation of WWAP2. To make the best use of our available resources, we did not consider page-by-page revisions to the original large, unwieldy 1300+ page document of 2005. Some of the WWAP2 revisions are intended to be online tools that will improve use and interpretation of the WWAP and do not significantly affect the content of one of the eight required elements.

To address these challenges, our revisions are presented here in hard-copy form with numerous links, and examples and references to the online content. This requires the reader to move between text in this submittal and online content, but we believe this is the most efficient and effective way to present the revisions and understand their context. The nature and extent of the revisions and their relationship to the SWAP Eight Required Elements is summarized in Table 2.1. Which of the elements are addressed by a particular portion of text is referenced throughout this submittal to orient the reader.

This submittal is built around the portions of the first WWAP that have been significantly changed, updated or improved. That is, elements of the WWAP that have not been substantially revised (e.g., with only minor updates to dates or outdated references to programs or names) are incorporated by reference through online links and search terms as needed. While the reader will need to move between formats, it allows one to more readily distinguish “new” WWAP2 information from “old” WWAP1 information

¹ <http://dnr.wi.gov/topic/EndangeredResources/Biodiversity.html>. Search Terms: Wisconsin Endangered Resources Biodiversity.

² <http://dnr.wi.gov/topic/Landscapes/>. Search Terms: Wisconsin Ecological Landscapes.

without losing context. The Approach and Methods for each of the major revisions are described in greater detail throughout the remainder of this Section 2. Comparisons between “old” and “new” methods, data or information are distinguished as “WWAP1” or “WWAP2”. Otherwise no distinction is made and “WWAP” is generally used.

After approval of WWAP1 in 2005, another document, “Implementation: Priority Conservation Actions & Conservation Opportunity Areas”, more commonly known as “Implementation Plan”, was published in 2008.³ The primary purpose of the Implementation Plan was to identify the most important conservation actions and the most important places to implement them. For the purpose of this document, references to WWAP2 are inclusive of the Implementation Plan, except in cases where it is important to distinguish the latter. For example, Section 5 provides a basis for a future effort to update Conservation Opportunity Areas (COAs), which were originally presented in the Implementation Plan.

WWAP1 is no longer available in hard copy. It is currently available online as a combination of the original text and web-based content. SGCN and their habitat (Elements 1 and 2), issues and conservation actions (Elements 3 and 4) are presented on the species and natural community profile pages.⁴

Once the revisions are approved or finalized, WWAP2 updates presented in this document will be translated and integrated into the online content. Important links and examples from the current WWAP1 online content are repeated throughout this document to reinforce continuity between the two versions as well as the intended web landing places.

2.2 Approach and Methods for Updating Species of Greatest Conservation Need (SGCN) in the WWAP

This sub-section describes the approach and methods that were used to update the list of Species of Greatest Conservation Need (SGCN) in the Wisconsin Wildlife Action Plan (WWAP). These updates are related to Element 1 of USFWS’ eight required elements for all SWAPs. It provides an overview of how SGCN were selected in WWAP1 and the changes that were made to that process to arrive at the current list of SGCN in WWAP2, including what the changes were and why they were made.

2.2.1 What Is a Species of Greatest Conservation Need (SGCN)?

To understand how SGCN are identified in the WWAP, it is important to understand what the designation itself represents. SGCN are species with low or declining populations that are in need of conservation action. The first part of this definition calls attention to species with low abundance and/or distribution within their natural range as well as declining species that demonstrate downward trends in their populations or habitat even though they may currently be well distributed, common, or abundant in part or all of their range. A species may have low or declining populations for many reasons,

³ <http://dnr.wi.gov/topic/WildlifeHabitat/ActionPlan.html>. Search Terms: Wisconsin Wildlife Action Plan.

⁴ <http://dnr.wi.gov/topic/EndangeredResources/biodiversity.html>. Search Terms: Wisconsin Endangered Resources Biodiversity.

some of which are natural, and many of which are related to unnatural threats in our environment that can be avoided or minimized through conservation actions directed at the species and their habitat. The second half of this definition recognizes that some species are in need of conservation action, but with limited resources we are compelled to make decisions in the WWAP on the nature and extent of conservation actions—narrowing it down to the most important things we can do to benefit SGCN and their habitats.

These decisions are driven by maintaining biological and ecological diversity at multiple scales, which is necessary for a healthy and functional environment. This perspective is also what drives the criteria we use to identify SGCN.

2.2.2 What Taxonomic Groups Are Considered in WWAP2?

The following taxonomic groups are included in WWAP2 and assessed using a similar approach and method throughout:

- Reptiles
- Amphibians
- Mammals
- Birds
- Invertebrates – Aquatic: Stoneflies, Mayflies, Clams and Mussels, Crustaceans, Caddisflies, Beetles, True Bugs, Dragonflies and Damselflies; Terrestrial: Wasps, Ants, Bees, Snails, Crustaceans, Butterflies and Moths, Beetles, True Bugs, Grasshoppers and Allies, Leafhoppers, Spiders.

Invertebrate SGCN, although included in WWAP1, were identified and assessed separately and differently from vertebrates. WWAP2 identifies vertebrate and invertebrate SGCN using the same decision process. Subsequent analyses and assessments were also the same for both vertebrate and invertebrate species.

2.2.3 How Were SGCN Identified in WWAP1?⁵

Under the Original Method for identifying SGCN, two different approaches summarized in the following text were used to define vertebrate and invertebrate SGCN. Both approaches relied on the input of taxa teams comprised of state and regional experts, scientific literature, and other data sources.

Vertebrate SGCN were defined by 7 criteria:

- State rarity – abundance based on # of occurrences. The S-rank, as it was defined circa 2005, was used if the species had one.
- State threats – effects of current and future extrinsic conditions on the ability of a species to maintain healthy populations in the state.
- State population trend – indicator of vulnerability, representing the direction and magnitude of changes in the state population size over the past 30 years.

⁵ For more detail on how SGCN were identified in WWAP1 refer to Section 2.3 of <http://dnr.wi.gov/files/PDF/pubs/ER/ER0641.pdf>. Search Terms: Wisconsin Wildlife Action Plan

- Global relative abundance - like state rarity, but within a species' range.
- Global distribution – global distribution of breeding individuals of a species during the breeding season.
- Global threats – like state threats, but within a species' range.
- Global population trend - indicator of vulnerability, representing the direction and magnitude of changes in the global population size over the past 30 years.

These criteria were summed and averaged. Species with a mean risk score equal to or greater than the cutoff were identified as SGCN. The cut-off differed by taxon, ranging from 3.00 to 3.42.

Another characteristic, Area of Importance, was estimated by the taxa teams. Area of Importance reflects the relative importance of the state to a species and its conservation based on the abundance of the species in the state relative to other areas within its range. SGCN were estimated as having a High, Medium, or Low Area of Importance. This was used to sort, but not define SGCN.

Invertebrate SGCN were initially sorted based on whether there was enough information about their abundance, distribution, and life history available to make a decision. Species that had enough information were defined as SGCN 1) if they were ranked as S1, S2 and/or G1, G2, G3⁶; and 2) based on expert input and taxon team approval.

After the initial definition of vertebrate and invertebrate SGCN, some species were added or removed based on expert knowledge or criteria specific to the taxon such as recorded declines outside Wisconsin.

The Original Method was the result of extensive collaboration with internal and external experts to get the best available information. While ranking under the Original Method predated the present NatureServe conservation-assessment rank calculator, the Original Method did not predate the underlying factors that support S- and G-ranks. This is, in part, why the seven vertebrate SGCN ranking criteria used in the Original Method are similar to the factors used to derive S- and G-ranks as part of Conservation Status Assessments and that are used in our updated method for identifying SGCN.

In WWAP1, a subset of species was not considered for SGCN status because inventory and/or life history data were insufficient to make a determination of their S-rank. Taxonomic experts identified these as Species with Information Needs (SINS) to focus future survey/research efforts to be able to define them as SGCN if appropriate.

2.2.4 How Are SGCN Identified in WWAP2?

Updates to the WWAP have been driven not only by updating data and information in the elements of the WWAP that have changed over time, but also by improving WWAP1 to make it easier to understand and use.

⁶ See Tables 2.9 and 2.10 for a definition of S- and G-Ranks.

WWAP1 users have suggested that the current SGCN list is too long and it is not clear how SGCN fit with the conservation goals of other classifications that we apply to rare or declining species. The Original Method was flexible and, because it relied on consensus or rough consensus of the taxon teams, it could respond to special circumstances for each species. However, because the criteria and/or basis for decisions differed among taxon teams, it made it difficult to lay the groundwork for prioritizing needs and opportunities among SGCN. Because expert input weighs heavily in defining SGCN, decisions should be rigorously and systematically documented. Difficulties in using the Original Method to update the SGCN list became most apparent for invertebrates given the large number of species in this group.

In coming up with ways to update the SGCN list as part of our revisions to the WWAP, we looked at the approach used in WWAP1 (Original Method) and considered how to modify it to conform to NatureServe's Conservation Status Assessment methodology⁷, which is more commonly recognized through its use of S- and GRanks (S/G-Rank Method). The Original Method for identifying SGCN used factors similar to those currently used to derive S- and GRanks; however, the two methods differ somewhat in how values for each factor were estimated and subsequently used to determine SGCN status. After considering these differences, we felt that converting to the S/G-Rank Method would result in a more organized and repeatable method for defining SGCN that would also be supported by national and international conventions and resolve some of the incongruences present in the WWAP1 SGCN process. And as new information becomes available, as it will during the next ten years, the S/G-Rank Method allows species to be reevaluated more quickly without convening large groups of people. Using a standardized and consistent method to identify SGCN will add clarity to conservation goals and decisions.

Another challenge to working with SGCN in the WWAP1 came from whether and how we prioritized among SGCN and their habitats. That a species was identified as an SGCN imparted conservation priority over a non-SGCN--beyond that, all SGCN were treated equally. Priority conservation status may have been afforded to state and federal threatened or endangered species, but this was due to separate regulatory protection independent of their SGCN status.

In WWAP2 as well, SGCN are not prioritized because the objectives and interests of WWAP users are diverse. There is, however, encouragement in WWAP2 to focus conservation actions on SGCN, natural communities, and ecological landscapes that are most highly associated with one another and within natural community/ecological landscape combinations that support the most SGCN.

An improved understanding of priorities and how to define them eases pressures on limited resources and makes it easier to demonstrate effective use of those resources. Prioritizing SGCN, and, in turn, conservation actions, is a complex, but necessary subject that we will continue to work on.

⁷ Search Terms: NatureServe Conservation Assessment Methodology

2.2.5 What Are S- and GRanks and Where do They Come From?

The S/G Rank Method depends on the State(S)- and Global (G)-Ranks defined by the NatureServe Conservation Status Assessment methodology (aka Natural Heritage Methodology). Ten factors are used to assess conservation status, grouped into three categories—rarity, threats, and trends. There are two to six conservation status factors in each of the three categories to ensure that the information needed to assign conservation status is consistently and rigorously recorded.⁸ The S- and GRanks and their definitions are summarized in Tables 2.9 and 2.10 at the end of this section.⁹

NatureServe has developed a rank calculator¹⁰ program to facilitate the process of determining conservation status ranks. The calculator works in combination with NatureServe's web-enabled system for biodiversity information management (Biotics 5)¹¹, which contains the element database, including the rank factor information and assigned conservation status ranks for all elements.

Existing data and input from internal and external experts are used to assign values to the rank factors. This still involves interpretation and opinion, but the rank calculator compels an orderly and replicable process to make decisions regarding the status and vulnerability of species and ensures continuity for subsequent revisions. For species in our state that are the most common or the rarest, their S-rank may be obvious. In those cases, there is no need to formally fill out the rank calculator unless the existing rank is in question due to new information.

States assign their own S-ranks to plant and animal species. NatureServe is responsible for deriving G-Ranks for animals, whether through in-house or contracted work. The G-Ranks for plants are divided up and assigned to states within the species' range.

2.2.6 Who Participated in Updating the SGCN List Using the S/G-Rank Method for WWAP2?

Each taxon was assigned to a Taxon Team led by a staff member from the DNR's Bureau of Natural Heritage Conservation (NHC). The Taxon Teams are comprised of DNR staff and external professionals and experts with knowledge about the species and the factors used to assess them.¹²

The process to update the SGCN list using the S/G-Rank Method is described below. Some tasks were carried out by NHC leaders of each Taxon Team to ensure consistency and reduce the time burden to the team participants.

⁸See pages 6-19 of *NatureServe Conservation Status Assessments Methodology for Assigning Ranks*: https://connect.natureserve.org/sites/default/files/documents/NatureServeConservationStatusMethodology_Jun12.pdf.

⁹See pages 46-50 of *NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk*: <http://www.natureserve.org/biodiversity-science/publications/natureserve-conservation-status-assessments-factors-evaluating>.

¹⁰ <http://www.natureserve.org/conservation-tools/conservation-rank-calculator>

¹¹ <http://www.natureserve.org/conservation-tools/biotics-5>

¹² See Table 8.2 in WWAP Section 8. Agency Coordination and Public Participation for a description of teams and participants.

Decisions or recommendations were made by rough consensus. Dissenting opinions were documented and will be considered as part of adaptive management or interim updates to the SGCN list. The approach and process for making decisions, including the use of best available science and application of the precautionary principle, follow Sections II, III and IV of the *Bureau of Natural Heritage Conservation Science Guidelines (PUB-ER-724, last update June 24, 2013)*.

2.2.7 How Was the New SGCN List Developed?

The following text briefly describes the steps that were followed to update the SGCN list for WWAP2.

Step 1: Produce Draft Scope of Work to Update Wisconsin's Species of Greatest Conservation Need

The leads for each Taxon Team and the WWAP2 Coordinator developed a Draft Scope of Work to Update Wisconsin's Species of Greatest Conservation Need.

Step 2: Form WWAP Taxon Teams

The leads for each Taxon Team formed lists of potential participants for each Taxon Team based on the teams involved with WWAP1, contributors to previous working list updates, and experts and professionals from academic and research institutions, and science-based organizations. Potential participants were invited to the Taxon Teams, provided with general information regarding the scope and level of effort needed and were also encouraged to recommend other experts and professionals for the teams.

Step 3: Meeting with All WWAP Taxon Teams to Present the SGCN Update Plan and Get Feedback for Improvements and How to Complete Each Task

A kick-off meeting was convened with all Taxon Teams to present the SGCN update plan. Attendees were asked to suggest: 1) how to improve the method and the Tasks; and 2) details for carrying out each task.

Step 4: Identify Species to be Assessed by the Taxon Team

The Taxon Team Leads, with help from the Bureau's NHI staff, identified species to bring to the Taxon Teams for further assessment. S-Ranks that are somewhere in the middle (i.e., S3, S2S3, S2S4, S1S3) or species that were not assigned a numerical rank due to lack of information could have low or declining populations and qualify as SGCN, but they also could be more secure. These species was distinguished from those with ranks that clearly placed them within the SGCN category (i.e., low or declining and at risk) and those that clearly placed them out of the SGCN category (i.e., high, stable status, not at risk). This subset of species was brought to the Taxon Teams for assessment.

Step 5: Update SRanks

The Taxon Teams used the best available science to improve the accuracy of the conservation status (SRank) for the species identified in Task 5 that had mid-range SRanks or were unranked. Teams reviewed the rank factors that are part of NatureServe's Conservation Status Assessment to determine if there was additional information to change them or improve their accuracy. In some cases the team

decided there was no additional information that could be used to improve the rankings. For each species where new information was available or where there were questions about the accuracy of the existing rank, the available data were incorporated into the rank calculator and/or documented in the “General Status Comments” field of Biotics. Based on these last two steps, S-Ranks were adjusted accordingly.

Step 6: Identify Acceptable GRanks

The Taxon Team leads and the Bureau's Natural Heritage Inventory (NHI) staff considered options for dealing with “weak” G-Ranks (e.g., more than ten years old, “?”, GU=uncertain, or GNR=not ranked). Taxon Teams identified GRanks that were acceptable and could be relied on to identify SGCN from those that were not. That is, GRanks were not adjusted in this process. They were only reviewed to decide if they were acceptable or not to be used in identifying SGCN.

Step 7: Develop Decision Flowchart Using S/G-Rank Combinations and Additional Criteria (SGCN Flowchart); Derive Draft SGCN List

After the SRanks were updated by the Taxon Teams, the Taxon Team Leads defined a decision process to identify SGCN. This process had two parts. First there is a series of decisions in the Flowchart (see Appendix 2.3) based on state or federal threatened or endangered status and SRank combinations that filtered species into three categories: 1) qualifies for SGCN status; 2) does not qualify for SGCN status; and 3) species ranked S3 or S3S4 where SRank alone could not be used to decide if they met the definition of SGCN (i.e., the in-between species).

In the second part of the SGCN Flowchart, additional criteria were applied to the third category to determine SGCN status. These additional criteria included GRanks and other factors that were not well-addressed through the SRank alone such as vulnerability to genetic isolation, climate change or non-cyclical decline. These criteria are explained in detail in the SGCN Flowchart in Appendix 2.3.

Step 8: Taxon Team Review of SGCN List

The SGCN Flowchart and Draft SGCN List were reviewed by the Taxon Teams. Comments were compiled and adjustments were made to the SGCN Flowchart and the Draft SGCN List. The Draft SGCN Lists for each taxonomic group are provided in Section 3 along with their current S- and GRanks. Subsequent to producing the Draft SGCN List, Taxon Team participants were also asked to provide input into other SGCN-related updates: SGCN-Natural Community Association Scores, SGCN-Ecological Landscape Association Scores, issues affecting SGCN and their habitat, and conservation actions. The approach to these updates is described in Subsections 2.4 and 2.5.

2.2.8 What About Species That Are Not SGCN?

At various points in the SGCN Flowchart species may fall out as non-SGCN. In fact, some species may not even make it to the SGCN Flowchart. Generally, where a species falls out of the SGCN flowchart has to do with what and how much we know about it—

which is important in itself for guiding future research, survey, or monitoring needs for the species.

2.2.8.1 Species with Information Needs (SINS)

These are species that do not have enough information to carry them through the SGCN decision process. To help focus research and inventory needs, they are divided into two categories:

- **BasicSINS** = Species that are unranked and for which we have little or no information. This category includes species with taxonomic questions or that require surveys for basic information on presence/absence or breeding/nonbreeding status in the state. The most important course of action for these species or groups of species is research and inventory to gather this basic information. Species in this category may have NatureServe designations SNR, SNA, or SH, or they may not have a NatureServe designation at all. The majority of the species in this category are invertebrates.
- **RankingSINS** = Species that are unranked by NatureServe's Natural Heritage methodology but, with a reasonable amount of targeted effort over the next five to ten years, we would get sufficient information about rarity, trends, and threats to allow us to determine a rank for them. Species in this category are also benefited by surveys or inventories, but the questions are usually more specific and may include measures to understand how a species is affected by environmental factors. This category includes all species with the NatureServe designation SU, and may include species with the designation SNR, SNA, and SH.

Species with Information Needs are identified for each taxonomic group in each of the species group summaries presented in Section 3. Once the WWAP update is approved, WWAP2 SINS will replace the existing WWAP1 SINS list online.¹³

2.2.8.2 Species That Are Relatively Stable or Common

In this group remain all the other species that are not SGCN or SINS. This includes 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 criteria used in addition to S/G-Ranks). This also includes common species that were not assessed. Species that are currently stable or common may be affected by environmental changes due to disease, large- or broad-scale trends in land or resources use, climate change, etc. Therefore, like all native species in the state, they will continue to have their status evaluated. The SGCN assessment process is fluid and the factors used to assess species can be reassessed at any time as new information becomes available.

¹³ The existing WWAP1 SINS List: http://dnr.wi.gov/topic/WildlifeHabitat/documents/WAP_InfoNeed.pdf.
Search Terms: Wisconsin Wildlife Action Species Information Needs.

Species in each taxonomic group that were assessed, but are not classified as SGCN, are identified for each taxonomic group in Section 3. Once the WWAP update is approved, this list of species will be placed online with the SINS list. Currently, there is no equivalent list presented in WWAP1 that is available online.

2.2.9 What Were the Challenges Faced by Each Taxon Team When Assessing Species Ranks?

Although each Taxon Team followed the same process for identifying SGCN, there are factors or challenges that weighed differently on decisions depending on the species group.

- The proportion of species that were assigned SRanks using the rank assessment calculator varied. The rank calculator was used for many species in the herptile and mammal groups, but few invertebrates were assessed using this tool¹⁴. Teams were not required to use the calculator for all the species because it can be time consuming.
- The alternative approach was to assign ranks through team discussion of the ranking factors (rarity, threats and trends). Species that were obviously at risk (ranked S1 or S2) or those that were obviously common or stable (S4 or S5) generally were not run through the calculator.
- At the bottom of the rank calculator worksheet there is an opportunity to adjust the calculated rank based on ecological or population factors not well-captured in the ranking factors. Among the species assessed using the rank calculator groups varied in terms of the adjustments that were made after the calculator was run. For example, in some cases the group felt that the threats portion of the calculator did not adequately weigh the magnitude or immediacy of a threat and so the ranks were adjusted downward after the calculator was run to give more weight to this factor.
- Among the three categories (rarity, threats and trends) used to assign State Ranks, species groups differed in the strength of knowledge available to assign values to the factors used to assess the “threats” and “trends” categories. In many cases the factors in these categories were broadly estimated based on the group’s conclusions.
- Some species may have a State Rank of S1, S2, S3, where the primary or only action to consider is Research about taxonomy, population size or distribution, past trends, life history, ecology, issues or conservation actions. While there may be enough information to assign a rank, there is not enough information to know what conservation actions will help them.
- It was challenging to agree on which species or taxa have current or reliable Global Ranks or even National Ranks.
- There are only a few experts knowledgeable about some of the invertebrate taxonomic groups in our state (e.g., land snails, spiders or bees).

¹⁴ The Conservation Rank Calculator is a tool that automates the process of assigning a conservation status rank. It is supported by NatureServe: <http://www.natureserve.org/conservation-tools/conservation-rank-calculator>. Search Terms: NatureServe Conservation Rank Calculator.

- The SGCN update process would be improved if those that participated in the assessment received a brief training about how the rank calculator works and the ranking factors used to assign state and global ranks.
- Experts and professionals approach this type of assessment differently and so it is not possible to reach a consensus or near consensus for all species. For example, some assessors may tend to equate lack of information with rarity or they may be reluctant to make estimate despite the accepted uncertainty inherent in the ranking assessment.

2.3 Approach and Methods for Natural Community Updates in the WWAP

This Section describes the approach and methods that were used to complete Natural Community updates to the WWAP. It provides an overview of the role of Natural Communities in the WWAP, the changes and updates that were made to the information provided in WWAP1 and how the changes were made. These updates are related to Element 2 (habitat for SGCN) of the 8 required SWAP elements.

2.3.1 Natural Communities or Habitat?

A **natural community** is an interactive assemblage of plants, animals and other organisms, their physical environment, and the natural processes that affect them. Environmental factors such as soil type, bedrock type, moisture level, slope, slope aspect, climate, and the natural disturbance regime play a key role in determining a species' ability to survive there. Natural communities occur in patterns on the landscape, range in size and change over time. Natural community classifications help us process and interpret these factors and relationships at larger landscape and smaller species population levels. Of course, no two places are the same; each forest, wetland, grassland, stream, and lake contains a unique collection of plants and animals. But, based on environmental conditions and ecological processes, similar habitats support similar collections of species. Ecologists refer to collections of native plants and animals that consistently occur together under similar conditions as "natural communities."

Habitat is the combination of environmental factors that provide food, water, cover and space that a living thing needs to survive and reproduce. A habitat is an ecological or environmental area that is inhabited by a particular plant or animal species. Like natural communities, habitat is also made up of physical factors such as soil, moisture, range of temperature, and availability of light as well as biotic factors such as the availability of food or nutrients and the presence of predators.

Natural communities and habitat consider similar factors--but from different perspectives. Natural community characteristics (e.g., plant and animal composition, soil, climate) and the corresponding Natural Heritage Inventory community types are the most comprehensive way we have to represent habitat for SGCN.

Conservation planning for vertebrates can be done at the habitat, landscape, and ecoregional scales. Planning at these scales, however, lacks relevance for most invertebrates and many plants, which often have specific microhabitat requirements

that cannot be addressed adequately at these scales. Nevertheless, to include all of our state's fauna in conservation planning in the WWAP, habitat for invertebrates has also been associated with natural community types in WWAP2.

2.3.2 Approach and Methods for Defining Natural Communities Used in the WWAP

Generally, the natural communities included in WWAP2 are the same as those included in WWAP1 with the changes and additions described in the following text. Natural Community types follow the Wisconsin Natural Heritage Inventory (NHI) classification system.¹⁵ The NHI system was used for this analysis because it is part of a standardized national system for describing vegetative communities, and has been used to inventory natural communities in Wisconsin. Some community types that were added to WWAP2 have developed due to anthropogenic influences and present mixed opportunities for SGCN and their habitat. They occupy significant portions of the landscape in close association with natural communities and it is prudent to consider conservation in these places as well.

Changes to the natural community list from WWAP1 to WWAP2 are summarized below. Table 2.3 provides a side-by-side comparison of the Community Types included in WWAP1 versus WWAP2. Most of the communities used in WWAP2 are described on the natural community pages online.¹⁶ Section 4, Appendices 4.1 to 4.4 provides descriptions of "new" community types that are not yet online.

Separating community types that were combined in WWAP1. In WWAP1 some natural community types from the Natural Heritage Inventory (NHI) list were combined for simplicity. In WWAP2 most of these were separated and included as individual natural community types to more closely match the list maintained by the NHI classification system. In addition, WWAP2 uses a more refined classification for aquatic communities compared to the broad categories used in WWAP1.

Inland Lakes. Inland Lakes were among the community groups that were expanded in WWAP2. WWAP1 treated Inland Lakes as a single community type. A working group comprised of internal and external experts and natural resource professionals was convened to develop a classification system and definitions for inland lake natural community types. The group divided inland lakes according to major physical characteristics of size (large/small), hydrology (seepage/drainage), depth (shallow/deep) and alkalinity (hard/soft). The classification combines WDNR Waters Program types and the Wisconsin Natural Heritage Inventory types. The definition of Riverine Impoundments was updated to include only artificially created reservoirs. Natural features that had been included with Riverine Impoundments were placed in Riverine Lake - Pond. The inland lake working group also helped identify SGCN associations, threats and conservation actions. See Section 8, Public and Agency Participation, for the list of Teams and Working Groups.

¹⁵ <http://dnr.wi.gov/topic/EndangeredResources/communities.asp>

¹⁶ To support your knowledge and sources, visit the NHI Natural Community page at <http://dnr.wi.gov/topic/endangeredresources/communities.asp>. Search Terms: Wisconsin Natural Community Types.

Northern Forests. In WWAP2 Northern Dry Forest, Northern Dry Mesic Forest and Northern Mesic Forest were divided into early, mid and late seral stages, particularly to address the spectrum of natural and managed forests in northern Wisconsin. Conifer Plantation and Aspen/Birch were also added to further define managed forests, particularly in Northern and Central Wisconsin. Except for Conifer Plantation, these forest communities or seral stages can persist naturally or come about as a result of managed conditions that can exhibit some of the same ecological values as natural systems, depending on the type and intensity of silvicultural practices and objectives. They can provide habitat for SGCN, be a source of impact, or both. As with Inland Lakes, the classification and definitions for Northern Forest updates were developed by a working group comprised of internal and external experts. See Section 8, Public and Agency Participation, for a list of Teams and Working Groups.

Transportation and Utility Corridors. Linear corridors for transportation, petroleum products, energy or telecommunications extend throughout the state, independent of land use, land ownership, geography or vegetation cover. Like managed forests, they also retain some of the elements that define “natural communities” and therefore, may satisfy some habitat needs for SGCN. Depending on location, type of corridor and maintenance practices that are implemented, transportation and utility corridors may preserve habitat (e.g., limiting access or development within corridors that cross grasslands or barrens) or alter it (e.g. fragmentation in forests).

Despite the natural community and habitat updates in WWAP2, it is important to note: 1) there remain some natural communities, features or complexes listed in the NHI database that are not included in the WWAP, especially if their ecology, SGCN associations and the environmental factors that act upon them are not well-understood; and 2) large-scale, long-term natural and anthropogenic pressures will continue to act on the assemblages of plants and animals that form community types in our state. *To be clear, the list and the definitions for habitat and natural communities in the WWAP will continue to change.*

2.3.3 How Natural Communities Are Used and Presented in the WWAP

In the WWAP, Natural Communities are treated as equivalent to habitat and comprise one of the three basic elements (SGCN, Natural Communities and Ecological Landscapes) used to help identify priority conservation actions and locations in Wisconsin. Much of the information for Natural Communities is online and unchanged. In this WWAP update, the reader is directed to those online pages where appropriate.

As described in greater detail in Section 2.4, the relationship between Natural Communities and SGCN are assessed through the SGCN-Natural Community association scores. These scores are presented for each SGCN in Section 3. Management opportunities for Natural Communities and Ecological Landscapes are assessed through the Natural Community- Ecological Landscape opportunity scores presented for each natural community type in Section 4. These scores can be used individually or together to help identify the most effective conservation actions and the environmental settings in the state where they are likely to be the most successful.

Section 4 of the WWAP includes an overview of each natural community group and the Species of Greatest Conservation Need that use them. The overview also includes the most frequently cited issues that affect natural communities and the conservation actions that benefit them using nomenclature and categories in the Open Standards classification (see Section 2.5.3 of the Approach and Methods). Once the WWAP updates are approved association and opportunity scores, threats and conservation actions for each community type will be placed on the WWAP natural community web page.¹⁷

Ecological Landscapes and landscape-level management opportunities were included in WWAP1 before the *Ecological Landscapes of Wisconsin* report¹⁸ was published. The Ecological Landscapes of Wisconsin report also looks at SGCN and natural communities, but from a more strategic perspective. Hierarchically, as a planning tool, it is placed above the WWAP in terms of specificity and the reader is encouraged to use it together with the WWAP. Additional information about natural communities and ecological management opportunities in the context of ecological landscapes can be found in Chapters 5 and 6 of the *Ecological Landscapes of Wisconsin* report.

2.4 Approach and Methods for Updating SGCN, Natural Community and Ecological Landscape Association and Opportunity Scores in the WWAP

This Section describes the approach and methods that were used to update the association and opportunity scores for SGCN, Natural Communities and Ecological Landscapes. These updates are related to Element 2 (habitat for SGCN) of the 8 required SWAP elements.

2.4.1 What Are SGCN-EL and SGCN-NC Association and NC-EL Opportunity Scores?

The WWAP uses relationships among Species of Greatest Conservation Need (SGCN), natural communities and ecological landscapes to help make decisions about the nature and extent of threats and conservation actions to address them. Some of the best places on the landscape to carry out conservation action are within relatively diverse and intact or restorable natural community assemblages that can or may support multiple SGCN. The WWAP scores these relationships in three ways:

1. Species-Ecological Landscape Associations (SGCN-EL score)
2. Species-Natural Community Associations (SGCN-NC score)
3. Natural Community-Ecological Landscape Opportunities (NC-EL score)

SGCN-EL Association Score. Species' distribution patterns are compared across Wisconsin's sixteen ecological landscapes. Ecological Landscapes are delineated by associated landform groups that share common physical, biological, vegetation, geological, soil, water and climatic conditions. They are used to identify the best areas

¹⁷ A current example of the online format of threats and actions for a community type:

<http://dnr.wi.gov/topic/EndangeredResources/Communities.asp?mode=detail&Code=CTSAV006WI>

¹⁸ Ecological Landscapes of Wisconsin: <http://dnr.wi.gov/topic/landscapes/>

Search Terms: Wisconsin Ecological Landscapes.

of the state to manage for different natural communities, key habitats, aquatic features, and native plants and animals using an ecosystem management perspective.¹⁹ Taxon teams assigned SGCN-EL scores based on literature sources, databases, communication with colleagues and their own knowledge of current and historic populations of each species.

Ecological Landscapes provide a useful context to evaluate species distribution patterns for a couple reasons. First, recent state-wide inventory is lacking for SGCN, and in most cases we make informed estimates of area of occupancy or range extent. In this respect, SGCN-EL association maps, which highlight the Ecological Landscapes that an SGCN is most associated with, represent coarse scale range maps. For example, the corresponding map for the western worm snake highlights the entire Western Coulee and Ridges Ecological Landscape even though this species has only been observed in Grant County.²⁰

Secondly, Ecological Landscapes are categorized, in part, by abundance of particular habitat types. Species distributions were evaluated at the Ecological Landscape scale because the availability of critical habitat plays a major role in where species are likely to occur. Definitions for each of the four SGCN-EL association scores are provided in Table 2.4.

SGCN-EL scores are presented as data tables at the end of each taxonomic group in Section 3 for each species-ecological landscape combination. Once the WWAP update is approved, the updated scores will be translated into online content similar to that currently presented in the individual species profiles for WWAP1 (see Figure 2.1 below or go to the "Wildlife Action Plan" tab for each animal species).²¹

SGCN-NC Association Score. SGCN are also assigned scores for their level of association with Wisconsin natural community types. In WWAP2 as with WWAP1, natural community types are considered representative of habitat for SGCN. SGCN-NC scores consider habitat requirements that would not be adequately captured using Ecological Landscapes alone and are essential to identifying and describing threats and conservation actions. See Section 2.3 for a description of natural community related updates in WWAP2. Definitions for each of the four SGCN-NC association scores are provided in Table 2.5.

Whereas the SGCN-EL associations reflect the geographic extent of a species, the SGCN-NC associations reflect their ecological requirements. For example, some terrestrial snails highly associated with the Western Coulees and Ridges Ecological

¹⁹ Ecological Landscapes are described at: <http://dnr.wi.gov/topic/Landscapes/index.asp?mode=Choose>
Search Terms: Wisconsin ecological landscapes.

²⁰ The western wormsake example:

<http://dnr.wi.gov/topic/EndangeredResources/Animals.asp?mode=detail&SpecCode=ARADB02020>
Search Terms: Western wormsake Wisconsin Wildlife Action Plan; Western wormsake state status.

Sufficient data do not exist to produce scientifically defensible Wisconsin range maps for all SGCN.

²¹ Examples of online SGCN-EL scores: <http://dnr.wi.gov/topic/endangeredresources/animals.asp> and <http://dnr.wi.gov/topic/endangeredresources/plants.asp>. Search Terms: Wisconsin Species of Greatest Conservation Need; Wisconsin DNR rare plant species.

Landscape are only found on Moist Cliffs and Algific Talus Slopes within this area. SGCN-NC association scores are valuable for identifying and implementing conservation actions, which often occur at a scale smaller than the Ecological Landscape. For inventory, management, protection or research carried out on a property, or even sub-property (e.g., lake or timber stand) scale, the SGCN-NC associations provide users of the WWAP with information not available using the SGCN-EL scores alone.

The two association scores should be considered together. In the same way high Ecological Landscape association scores do not imply that a species can be found everywhere within that landscape, the natural community association scores do not imply that a species is found in all instances of that community. The combination of the coarse landscape and finer habitat-scale analysis allows WWAP users to identify conservation priorities that are appropriate to specific locations across the state.

SGCN-NC scores are provided in this WWAP update for each species-natural community combination sorted by taxonomic group and natural community group.²² Once the WWAP update is approved, the updated scores will be translated into online content (see Figure 2.2 below) similar to that currently presented in the species profiles for WWAP1 under the “Wildlife Action Plan” tab for each species.²³

NC-EL Score. Different natural communities occur in different parts of the state and as a result there are different opportunities to sustain these communities in different Ecological Landscapes. “Sustain” means ensuring that a given natural community type will be present and has high potential to maintain its natural composition, structure, and ecological function over a long period of time (e.g., 100 years). Estimating the likely degree of sustainability requires looking at each natural community type from an Ecological Landscape perspective across the state or region to determine whether occurrences of communities are large enough and/or connected enough to support the composition, structure, and ecological function of a community type over time. A key objective of sustaining natural communities is to manage for natural community types that historically occurred in a given Ecological Landscape and to have all seral stages of a community type represented. Having all seral stages represented accommodates wildlife species that require early and/or late successional habitat stages in order to complete their life history cycle.

Natural Community-Ecological Landscape Opportunity scores (NC-EL scores) illustrate what parts of the state may provide the most effective opportunities to sustain natural communities as landowners and managers strive to meet the needs of both people and diverse sustainable ecosystems. Sustainability does not preclude a “working landscape” where both traditional (e.g., forest and agricultural products) and non-

²² Natural community “groups” are groupings of natural community types (e.g., oak barrens, northern mesic forest) based on gross commonalities of structure and composition. Although they were derived by WDNR natural community ecologists, they are consistent with other regional or national natural community classification schemes.

²³ WWAP 1 online content for SGCN-NC scores: [//dnr.wi.gov/topic/endangeredresources/animals.asp](http://dnr.wi.gov/topic/endangeredresources/animals.asp) and <http://dnr.wi.gov/topic/endangeredresources/plants.asp>. Search Terms: Wisconsin Species of Greatest Conservation Need; Wisconsin DNR rare plant species.

traditional (e.g., ginseng, sphagnum moss, etc.) products are extracted from an area. Rather, the scores can help guide management activities to ensure that they are compatible with the local ecology and also maintain important components of ecological diversity and function. The score is intended for broad land and water management applications.

The NC-EL Score is not intended to suggest that Ecological Landscapes should be restored to pre-settlement conditions or that current management regimes are successfully sustaining natural communities. Opportunities for sustaining natural communities are described as major or important and are incorporated into the Species of Greatest Conservation Need and natural community analyses. Definitions to estimate or interpret the four NC-EL opportunity scores are provided in Table 2.6.

This WWAP update provides an overview of natural community groups, including their Natural Community-Ecological Landscape Opportunity scores. To support your own knowledge and sources of information, ecological landscapes are described online.²⁴ “New” natural communities added to WWAP2 for inland lakes, northern forests and some miscellaneous community types are described in an appendix at the end of these natural community groups in Section 4.

NC-EL scores are presented in WWAP2 for all natural community types at the end of each natural community group section. Once the WWAP update is approved, the updated scores will be translated into online content (see Figure 2.3).²⁵

2.4.2 How Can Association and Opportunity Scores Be Used in the WWAP?

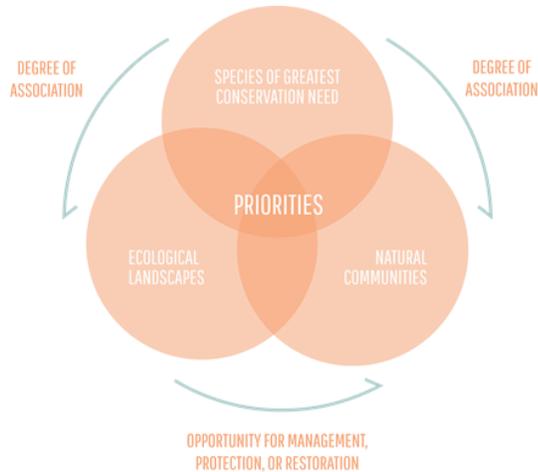
All three scores may be used individually and in combination to make decisions about protection, resource use and land management at different scales. In WWAP2, as with WWAP1, all three scores can be summed and used as a simple metric along with other criteria to help identify priority conservation actions, depending on the objectives of the user. If a conservation action is targeted at SGCN and natural communities with moderate or high association scores within ecological landscapes where those SGCN and natural communities are also rated moderate or high, the conservation action is more likely to be successful and effective in helping SGCN and their habitat. Other social and economic factors need to be considered when prioritizing conservation actions, but association and opportunity scores provide a simple and straightforward ecological perspective.

²⁴ The Ecological Landscape Descriptions: <http://dnr.wi.gov/topic/Landscapes/index.asp?mode=Choose>
Search Terms: Wisconsin ecological landscapes. Most natural communities used in the WWAP and for NC-EL opportunity scores are also described online:
<http://dnr.wi.gov/topic/endangeredresources/communities.asp>. Search Terms: Wisconsin natural community types.

²⁵ Online content will be similar to that currently presented in the natural community profiles for WWAP1 under the “Opportunities” tab for each natural community type:
<http://dnr.wi.gov/topic/endangeredresources/communities.asp>. Search Terms: DNR Natural Communities of Wisconsin.

2.4.3 How Association and Opportunity Scores Were Updated in WWAP2

Scores for SGCN and Natural Communities assigned in WWAP1 were carried over to WWAP2 so reviewers would have something to start with (i.e., for some species groups there are hundreds of species-natural community combinations to score). Scores for



“new” SGCN or Natural Communities were initially estimated by the Taxon Team Leads and then presented to the entire team to get their input.

One might assume that associations and opportunities have not changed much over the last ten years. However, this was not always the case in areas of the state where major landscape changes (e.g., rural and urban development) as well as new inventory data gathered over the last decade were good reasons to reevaluate existing scores.²⁶

There may be cases in which we cannot recognize differences in a species' association with one natural community versus another. It may be for lack of knowledge about habitat requirements or the characteristics used to distinguish the natural community are not important to the species or taxa. By all standards, assigning a score of 0 to 3 is a semi-quantitative assessment. There are over 100 natural communities, 16 ecological landscapes and over 400 animal SGCN to score. Even the most informed reviewers make assumptions. For example, some bird species may not be sensitive to the characteristics that distinguish young and mid-seral stage northern forests (“new” communities added to WWAP2) while some small mammal SGCN may be very sensitive to changes in ground cover relative to canopy cover; natural community associations for some stonefly species may be estimated by association with other stonefly species with habitat requirements that are better understood. As a result, some community types or species may be scored similarly based on these assumptions.

When the scores were reviewed and/or assigned by the Taxon Teams for WWAP2, the following instructions were also considered. These instructions are similar to those applied in WWAP1.

1. Consider all life cycle phases. Species may use different natural communities (habitats) within different ecological landscapes during their life cycle and depend on them to different degrees. Species that undertake seasonal or diurnal migrations

²⁶ Assignment of scores for Inland Lakes was particularly difficult since they don't necessarily follow the features used to delineate ecological landscapes. In general, the following suite of metrics were considered for each inland lake community type to assign scores: number of lake-type occurrences in each EL; approximate ratio of lake-type surface area to EL area; distribution/aggregation of lake-type across EL (clusters may be considered to have less influence than evenly scattered occurrences); importance to SGCN; relevant chapters from “Ecological Landscapes of Wisconsin” were reviewed where available. For each EL, we first reviewed the overall Inland Lake association score from WWAP1. We then began the process by considering the relative importance of large lakes versus small lakes within each EL.

may have more “1’s” than species that do not. On the other hand, ecological landscapes that support important stopover sites and the natural communities that dominate these sites may be scored as highly as breeding habitat for a bird SGCN.

2. Consider current conditions or historical trends. Do not score based on estimates of future trends.
3. For some species, we may be confident in baseline inventory and monitoring data and can rely more heavily on documented occurrences.²⁷ For other species, particularly invertebrates, scoring may only be feasible based on estimated habitat preferences or what is known about associated species in the taxon.
4. Keep the evaluation simple to reflect the nature of the scores and to make it easier to update them in the future as the environment changes.

2.5 Approach and Methods for Updating Issues and Conservation Actions in the WWAP

This subsection describes the approach and methods that were used to update issues affecting SGCN and their habitat and conservation actions in the Wisconsin Wildlife Action Plan (WWAP). These updates are related to Element 3 - descriptions of problems which may adversely affect SGCN or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats; and Element 4 - descriptions of conservation actions determined to be necessary to conserve the identified species and habitats and priorities for implementing such actions.

2.5.1 Methods for Defining Issues and Conservation Actions in WWAP1

Threats, issues, and conservation actions in WWAP1 were identified for habitats (natural communities within Ecological Landscapes), taxonomic groups and on a species-by-species basis.

At a habitat or natural community level, team members described threats, issues, and conservation actions primarily using personal knowledge and observations as well as literature sources such as *Ecological Landscapes of Wisconsin* (Wisconsin DNR 2004a) and *Wisconsin's Biodiversity as a Management Issue* (Addis et al. 1995). The results were presented in each of the respective natural community sections in WWAP1.

A parallel process was established to identify threats, issues and conservation actions for vertebrate SGCN. Those that were relevant to a number of SGCN within a given vertebrate taxon (birds, fish, herptiles, or mammals) were summarized for each taxonomic group. Threats, issues, and conservation actions were also listed for each SGCN to help WWAP1 users who were focused on one or a few species. Species assessments were completed by the Taxon Teams and other knowledgeable individuals. The threats, issues, and conservation actions were identified using personal knowledge, literature sources, and databases. Assessment of invertebrate species was

²⁷ Go to the Natural Heritage Inventory database for these species: <http://dnr.wi.gov/topic/NHI/Data.asp>.

based more heavily on expert and professional knowledge and issues and conservation actions were formed primarily around the state of knowledge of a species or taxonomic group.

WWAP1 contained over 1300²⁸ Conservation Actions about individual species, taxa and natural communities that were written by internal and external partners. Issues and conservation actions provided in WWAP1 were not ranked in any way. All of the species-specific and habitat related conservation actions identified in the plan were considered a priority, despite their being over 1300 of them. Subsequently however, when the Implementation Plan was produced in 2008, "priority conservation actions" were identified from the larger set of actions. These were the actions estimated as most likely to effectively conserve SGCN within each ecological landscape and were intended to give organizations and individuals a common reference to help them make conservation decisions.

Prioritizing after-the-fact presented the following difficulties of interpretation that needed to be improved and clarified in WWAP2.

Very few actions are only applicable to a single species within a specified habitat and those that are, are mostly related to information and research and needs or management of an essential habitat element (e.g., nest boxes or tree snags). In reality, actions presented for a single species or natural community are usually applicable to many species and natural communities at multiple spatial scales or levels of biological organization. But because the actions are not cross-referenced in WWAP1, their potential to benefit multiple SGCN or habitats is underrepresented.

For example, a single conservation action may have multiple actions in one statement and therefore, may be placed in multiple action categories. Many conservation actions included monitoring without an indication of the intended target. In other cases, two different people may have stated very similar actions for two different species but their combined benefit could not be recognized. This happened frequently for broadly applicable actions related to invasive species control or preservation of habitat or natural community types.

The conservation actions from 2005 WWAP1 were placed into 162 action categories, which were placed into 16 General Action categories for the 2008 Implementation Plan. The action categories were not based on standardized terminology and were unique to WWAP1 making comparisons with regional conservation efforts difficult.

Although prioritization in WWAP1 was based on quantifiable criteria, expert knowledge was used to check the results and make sure important actions were not left out. For example, the process of identifying conservation actions and the best places to implement them often contained superlatives (e.g., "largest", "most", "highest"), and this could leave out actions that affect many SGCN or natural communities on a small

²⁸ This total number varies in WWAP1 and the Implementation Plan, because in some presentations of this information an action that benefited multiple species or communities was counted multiple times.

scale. However, the adjustments to the outcome of the prioritization process made through expert opinion were not always well documented.

The WWAP1/Implementation Plan prioritization process identified threats and issues affecting for each SGCN, Natural Community and Ecological Landscape. However, they were not matched against the conservation actions that address them (lists were derived separately). Desired outcomes or targets were not identified. These factors made (and possibly still make) it difficult to monitor effectiveness and implement adaptive responses.

The Implementation Plan used several criteria and data from WWAP1 to identify priority conservation actions:

- Multiple SGCN and/or natural communities positively affected by using association and opportunity scores
- Immediacy of threat addressed by the action
- SGCN high mean risk score
- SGCN Wisconsin area of importance as high, medium, low
- Actions that target Wisconsin's Significant Ecological Features
- Actions identified in other conservation plans or initiatives as a high priority
- Not an existing initiative or otherwise addressed and without current protection or regulation

Priority conservation actions were identified in the Implementation Plan for each ecological landscape and are not distinguished by species, natural community or Conservation Opportunity Area. Issues and conservation actions listed on the species (i.e., SGCN) profile pages pull from the entire list of actions.²⁹

2.5.2 Approach and Methods for Updating Conservation Challenges and Conservation Actions for SGCN and Their Habitat in WWAP2

Since one of the major goals to the updates was to make the WWAP more accessible and easier to understand, concepts and information about issues/threats and conservation actions in WWAP1 and the Implementation Plan have been combined in WWAP2. Based on feedback from internal and external WWAP partners who have been using the WWAP over the last 10 years, the Coordination Team identified some areas on the topic of conservation actions that could be improved.

For WWAP2, we made improvements to the methods and tools used to identify, describe, record and manage issues/threats and conservation actions for SGCN and their habitat to resolve the problems described above. The following three areas of updates and improvements were made in WWAP2. The approach and methods for each are described in the following text.

²⁹ See pages 18-29 at http://dnr.wi.gov/topic/WildlifeHabitat/documents/WAP_Implementation.pdf.
Search Terms: Wisconsin Wildlife Action Plan Implementation

- Conservation actions and the issues they address are assigned to a conservation action category and one or more conservation issue categories based on a **classification (or taxonomy)** following national and international conventions recommended for SWAPs³⁰. Establishing a common language for discussing conservation issues and languages makes it easier for people to plan efforts and compare outcomes.
- **Conservation challenges (or issues) and actions were updated** together by the technical teams as part of a single task rather than sequential tasks.
- An **Actions Database** is being developed as an implementation tool for the WWAP. It will compile details and characteristics about conservation actions to help WWAP users make decisions about conservation needs and actions (i.e., who, what, where, and how). Actions described in Sections 3 and 4 of this submittal will be placed in the Actions Database.

2.5.3 Classification of Conservation Challenges and Actions in WWAP2

Conservation decisions are made at different scales and so when one talks about issues that affect conservation of SGCN and their habitat, it is important to be able to group them according to their similarities and discuss them using common nomenclature. In WWAP1 it is not always easy to see the relationship between conservation actions and the issues they address. Moreover, the challenges facing SGCN and their habitats cannot be assessed and addressed entirely within our state boundaries, so it is also important to have a common language for talking about issues and conservation actions on a regional and national level. For those reasons, our updates to Elements 3 and 4 of the eight required SWAP elements began with the incorporation of common nomenclature for threats/issues and conservation actions developed by the Open Standards Conservation Measures Partnership and also discussed by Salafsky et al. (2008).^{31,32} Four adaptations were made to the standardized classifications for use in WWAP2:

- A category titled "Research" was integrated into the Conservation Actions classification. The research category has been integrated into the WWAP2 conservation actions classification as Category 8. Research (See Appendix 2.1). This category is broadly defined to include actions related to population and habitat surveys, monitoring, and research on conservation actions.
- Additional subcategories of issues, actions and research were added to make the classifications relevant to Wisconsin's environment and circumstances. The "Wisconsin categories" are preceded by a "W" in the numbering of the

³⁰ Best Practices for State Wildlife Action Plans. Association of Fish and Wildlife Agencies (AFWA). November 2012. <http://www.teaming.com/sites/default/files/SWAP%20Best%20Practices-110212-for%20website.pdf>

³¹ The Open Standards Conservation Measures Partnership: <http://cmp-openstandards.org/>

Search Terms: Conservation Measures Partnership Open Standards. The classification can be found at: <http://cmp-openstandards.org/using-os/tools/> Search Terms: Open Standards Conservation Actions Classification.

³² <http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2008.00937.x/full>

category. The titles of all the other categories adhere to the Open Standards classifications developed by the Conservation Measures Partnership (CMP).

- Definitions and examples provided in **all** the categories, whether they were from the original classification or added for “Wisconsin”, were rewritten for clarity and to reflect our state’s circumstances and resources because the original Open Standards classifications are intended for worldwide use and contained explanations that are not applicable to Wisconsin.
- The Open Standards classifications are typically applied to species, but they can be used for ecological systems as well. They have been adapted to natural communities/habitats in WWAP2.

The Open Standards issues/threats classification or taxonomy can be found online.³³ Customizations to the Open Standards conservation actions classification support plan implementation in Wisconsin (Appendix 2.1). The categories in the threats and actions classifications are broken down into categories and subcategories. As conservation actions were being updated for WWAP2 by the Taxa and Natural Community Teams, the Team Leads assigned each one to a conservation action category and linked them to the threat categories those actions addressed³⁴ to help set the stage for effectiveness monitoring. The Wisconsin-specific subcategories (i.e., those marked with a “W”) were added as a third tier in some cases. For example, invasive species conservation actions were divided into a third tier to account for aquatic, wetland and terrestrial actions because that is important in Wisconsin.

The nomenclature for the classification of the issues and threats that affect SGCN and their habitats is based on the impacts that a conservation target may be exposed to. “Threats” are the proximate activities or processes that have impacted, are impacting, or may impact the SGCN or habitat being assessed (e.g., unsustainable resource harvest practices).

Threats are the **source** of the impact. They are not necessarily synonymous with **effects** (also referred to as stressors), which act upon the species, habitat, natural community or system. Threat sources may be intimately mixed with and difficult to distinguish from their effects on the conservation target. Threats can be past (historical, unlikely to return or historical, likely to return), ongoing, and/or likely to occur in the future. A conservation action may address one or more threats or one or more of their effects.

³³ <http://cmp-openstandards.org/tools/threats-and-actions-taxonomies/>. Search Terms: open standards conservation threats actions.

³⁴ The Actions Database is being built around conservation actions. Other fields in the database are based on that action. For that reason, when an action is entered only one conservation action category can be selected, but multiple issue or threat categories can be identified as being affected by that action. In some cases an action may have elements that overlap action categories. The action category that best represents the primary objective of the action is used.

2.5.4 Approach and Methods for Updating Conservation Challenges and Actions in WWAP2

Conservation Actions written for WWAP1 that were filtered in the Implementation Plan to arrive at a list of priority actions were used as a starting point. Team leads and reviewers from the technical teams were asked to review the Implementation Plan priority actions as a starting point. They were given instructions for how to improve the actions or recommend new ones based on the following guidelines. These guidelines were developed in part, from feedback obtained from WWAP users early in the update process.

Conservation actions are:

- not a wish list of everything that could possibly be done to conserve species or natural communities; they should focus on the most important issues that need to be addressed over the next 5-10 years;
- simply worded and clear;
- brief, but not so brief that the intent, scope and scale are unclear;
- able to provide direction of what, how and why;
- varied in scope and scale; they may have a statewide objective (e.g., statewide awareness of aquatic invasive species) or a more narrow species or community objective (e.g., restoration of shoreline buffers around Apostle Islands for the piping plover)—there is not a single scale at which actions must be defined;
- **entirely voluntary**-- they are not requirements, prescriptions or protocols;
- suggestions, ideas or opportunities to consider;
- directed at the source of the issue (e.g., sustainable construction practices near the shore of a lake) or its effect (e.g., restoring shoreline vegetation).
- “actionable” and not just statements of a problem or desired outcome;
- not generic statements (e.g., manage wetlands effectively).

In an effort to develop conservation actions for WWAP2 as efficiently as possible, a coarse filter/fine filter review can be used that considers suites of SGCN first and individual SGCN second. Most actions aimed at conserving SGCN relate to the habitat (or community where used as a proxy for habitat) they are found in and can, therefore, be applied broadly to large suites of species. Taxon teams have already grouped SGCN into these suites using factors like habitat type, ecological requirements or common threats. Developing conservation actions that apply to these suites will serve as the coarse filter. For example, most SGCN found in prairies will benefit from maintaining open habitat. Instead of developing individual conservation actions for each SGCN found in a prairie, broader statements can be made that apply to all SGCN in that group (e.g., “Maintain open habitat in prairies, savannas and barrens using a variety of management techniques, including mowing, grazing, prescribed fire and herbicide application.”).

However, because rare species often have unique ecological requirements (e.g., specific plant-pollinator relationships, unique microhabitats, host species, etc.) actions aimed at the larger group of SGCN do not always address the specific needs of an SGCN within the group. The fine filter, then, involves a closer examination of individual

SGCN. To continue the prairie example, Silphium borer moths require open habitat as well as the presence of specific prairie plants (*Silphium* spp.). It's likely that only a subset of SGCN will have these finer, species-specific requirements that are not addressed by considering the larger group as a whole. The coarse filter/fine filter approach allows us to use common language to address the needs of ecologically similar species while not overlooking the unique requirements of specific SGCN. This approach is more efficient than trying to develop individual conservation actions for each SGCN.

Conservation actions may be written specifically for natural communities and not for a particular species, suite of species or taxa. A coarse filter/fine filter approach can also be used for developing conservation actions for Communities (e.g., young northern mesic forest), or Community Types (e.g., inland lakes, northern forests, wetlands). For example, some forestry best practices may be applicable to all northern forests; whereas others may be specific to old growth northern mesic forest.

Conservation actions were assigned to the appropriate issue/threat and conservation action category in an Actions Database. The nomenclature follows the Open Standards threat/issue classification³⁵. The conservation actions classification is provided in Appendix 2.1. The animal group(s) and natural community group(s) that benefited from the action were also identified in each case.

In Sections 3 and 4 there are threats/issues and actions that are specific to one or a few species or natural community type. In general however, issues/threats and conservation actions in WWAP2 are discussed by category rather than by each action, species or natural community combination for two reasons: (1) many of the challenges facing SGCN and their habitat as well as the conservation actions that address them are overlapping and discussing them by category is more efficient and demonstrates where conservation efforts can benefit the most species or natural communities; and (2) working with partners and stakeholders to link implementation of conservation actions with effectiveness monitoring will be the first step in implementing WWAP2.

2.5.5 Actions Database

As part of WWAP implementation, characteristics like species and natural community targets, outcomes, applicable counties, ecological landscapes or conservation opportunity areas will be identified for each conservation action in the Actions Database. The Actions Database will inform, as well as be informed by, stakeholders and partners. The Actions Database will help to eliminate duplicate actions and more readily link actions with conservation issues, identify those that benefit multiple species, communities or landscapes and other important measures of priority and success that were difficult to distinguish in WWAP1.

³⁵ The Actions Database is being built around conservation actions. Other fields in the database are based on that action. For that reason, when an action is entered only one conservation action category can be selected, but multiple issue or threat categories can be identified as being affected by that action. In some cases an action may have elements that overlap action categories. The action category that best represents the primary objective of the action is used.

The Actions Database is an Access file that is being created as the platform for plan implementation that can readily be updated and translated into tools and content for WWAP users. Specific actions and other information describing important aspects of each action are entered into the fields of the database. The database will be used to populate the online presentation of issues/threats and conservation actions similar to that which is currently displayed on the Wildlife Action Plan tab on the rare animal species profile pages (see examples in Figures 2.4 and 2.5).³⁶

The database as it is currently being designed contains several fields that may be used to search and sort actions based on the user's interest and objectives. The fields in the database and what they contain are summarized in Table 2.7. All of the criteria used in WWAP1/Implementation Plan to identify and prioritize conservation actions have been carried over into the fields of the Actions Database that is being developed for WWAP2.

Conservation issues and actions for each taxonomic and natural community group provided in Sections 3 and 4 of this update were built around the issue/threats and actions classification categories for that will be used in the Actions Database. Figure 2.6 provides an example of what a conservation action in the Actions Database may look like once the database is completed during plan implementation.

As of the writing of WWAP2, the structure and the fields in the Actions Database are generally complete; however, work will continue as part of plan implementation to finalize content of the actions and the database fields. WWAP technical teams, partners and users will continue work to fill the fields in the database and finalize the most appropriate wording for the conservation actions during plan implementation. Periodic updates will be scheduled as part of an adaptive management approach to achieving positive conservation outcomes (see Section 6). WWAP users will have access to portions of the Actions Database and an ongoing opportunity to provide input to it. The Actions Database is intended to respond to changing conditions, new information and user input over time.

2.6 Approach and Methods for Updating Conservation Opportunity Areas in WWAP2

This Section describes the approach and methods that were used to update Conservation Opportunity Areas in WWAP2. It provides an overview of the role of Conservation Opportunity Areas in the WWAP, the changes and updates that were made to the information provided in WWAP1 and the Implementation Plan and how these updates were made. These updates are related to Element 2 (habitat for SGCN) and Element 4 (conservation actions for SGCN) of the 8 required SWAP elements.

³⁶ The rare animal species profile pages: <http://dnr.wi.gov/topic/endangeredresources/animals.asp>
Search Terms: Wisconsin DNR Rare Animals; Wisconsin DNR Rare Plants. Also the Threats/Actions tab on the NHI Natural Community page for each Natural Community Type page:
<http://dnr.wi.gov/topic/endangeredresources/communities.asp>. Search Terms: Wisconsin Natural Communities.

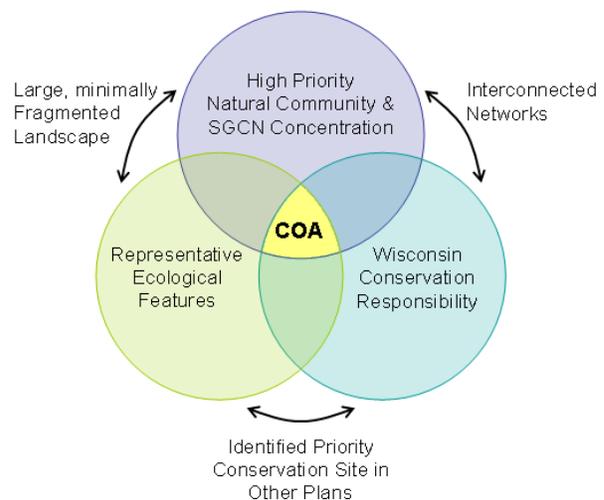
2.6.1 Methods for Identifying Conservation Opportunity Areas in WWAP1

Conservation Opportunity Areas are places on the landscape that contain ecological features, natural communities or SGCN habitat for which Wisconsin has a unique responsibility for protecting or contains habitat with dominant responsibility for conservation when viewed from the global, continental or in the upper Midwest perspectives. If we focus our actions in these conservation opportunity areas, we will be most effective and efficient with our limited conservation dollars. Many partners and stakeholders will need to be intimately involved in evaluating options, opportunities, and conservation actions for these areas.

Conservation Opportunity Areas (COAs) were identified in 2008 after WWAP1 was produced and presented in the Implementation Plan. They are organized and presented by Ecological Landscape³⁷. COA boundaries are based on a mixture of property and ecological boundaries (e.g., wetlands or rivers), but are primarily located on public lands. At the beginning of each Ecological Landscape section, species and natural communities most highly associated with that landscape are presented along with a list of threats and conservation actions that were taken as a “priority” subset of the information provided in WWAP1. COAs can be a key means of delivering spatial information and data in WWAP2. Current COA reports for each Ecological Landscape and maps can be found online.³⁸

Conservation Opportunity Areas were identified in the Implementation Plan according to the following criteria:

- Presence of high priority Natural Community (uncommon, unique or declining) and/or multiple Species of Greatest Conservation Need (SGCN)
- Wisconsin's Conservation Responsibility - Representative and significant ecological features on a state, regional, continental or global scale (See excerpt from the 2008 Implementation Plan in Appendix 2.2 at the end of this Section).
- Identified as a priority conservation site in other initiatives or plans (e.g., Land Legacy, TNC, etc.)
- Establishes an interconnected network
- Large, minimally-fragmented, ecologically functioning systems



³⁷ <http://dnr.wi.gov/topic/Landscapes/>. Search Terms: Wisconsin Ecological Landscapes

³⁸ Current COA reports for each Ecological Landscape and maps: <http://dnr.wi.gov/topic/WildlifeHabitat/ActionPlan.html> by selecting “Implementation Plan” and also the “Explore” and “View” options on the right of the page.

Identification of COAs was completed in workshops with WDNR staff throughout the state using the geographical layers that were available at the time, plan documents and other sources. The rationale for including or excluding particular sites was recorded by hand on maps and in notes.

Many states have or are in the process of identifying the best places to implement conservation for SGCN and their habitats. The reasons for this are straightforward, but the process and the criteria used to identify priority sites for conservation are often complex, varied and controversial. The following distinctions for the current list of COAs should be considered when comparing them to other states or conservation planning and design efforts.

Current COAs are weighted toward public state-owned properties or sites where the WDNR has a partnership role. These are the sites we have the most information about with respect to the above-referenced criteria. COAs boundaries are deliberately fuzzy because the criteria used to identify them are general and largely come from large-scale data layers; the boundaries are not field verified. Not all the area within a COA presents the same level of opportunity for successful conservation; conversely, opportunities exist outside COA boundaries.

COAs within a given Ecological Landscape are organized into subgroups based on “significant ecological features” (e.g., Great Lakes and their shorelines, Niagara Escarpment). The species lists for the COA subgroups are based on the SGCN-Natural Community and SGCN-Ecological Landscape association scores. *An important distinction arises from this approach. The SGCN list for the COAs represents “potential” for the site. Species associated with the natural communities present in the COA or the landscape in which the COA is located could be present or they could be established by implementing conservation actions. This is not a list of SGCN occurrences recorded at that COA. Recorded occurrences of SGCN in each COA can be obtained through the Natural Heritage Inventory database.³⁹*

COAs are weighted toward sites that already have some habitat value—which is why we can estimate that conservation actions implemented at these sites are more likely to have successful outcomes. This approach does however, underrepresent sites that may be important, but need restoration or protection to realize their ecological value to SGCN and their habitat (e.g., restorable wetlands under the wetland mitigation program)⁴⁰.

Conversely, COAs tend not to consider development as a means of anticipating current or future landscape changes that may affect the quality of a COA(s). While habitat value is implicit in current COA criteria, risk or vulnerability to loss due to development or environmental change is not—assessments are made based on the current snapshot of the site (i.e., for the current list of COAs, that would be circa 2007).

³⁹ The Natural Heritage Inventory database: <http://dnr.wi.gov/topic/NHI/data.asp>. Search Terms: Wisconsin Natural Heritage Inventory Database.

⁴⁰ <http://dnr.wi.gov/topic/Wetlands/Mitigation/index.html>. Search Terms: Wisconsin wetland compensatory mitigation.

COAs are currently defined by readily accessible ecological data and expert knowledge. Many sites that meet the criteria of a COA certainly exist on private lands or other conservation properties that authors of the Implementation Plan could not assess. The SGCN-Natural Community, SGCN-Ecological Landscape and Natural Community-Ecological Landscape scores help individuals and organizations to recognize characteristics of potential COAs on their own properties.

2.6.2. Approach and Methods for Updating COAs in WWAP2

Updates or improvements to COAs need to start with the role and definition of COAs, which is a large effort unto itself. In the interim, we've identified considerations for revising existing COAs and new COAs to serve as a starting point for a COA update project that will take place during Plan implementation.

COA database. The COA database contains the key factors used to identify and describe COAs in the Implementation Plan. Prior to this, COA-related information was dispersed in various locations and formats, which made it difficult to update or track COAs or to add new ones. This database was created for WWAP2 and will be the basis for updating existing COAs or identifying new ones, some of which are proposed in Section 5. Conservation Opportunity Areas. The fields in the database are summarized in the Table 2.8. A more detailed guide for the database as well as an example of a completed entry for one of the Conservation Opportunity Areas is provided in Figure 2.7 at the end of this Section.

Proposed considerations for existing COAs. WDNR field ecologists were asked to review the database for COAs in their area and propose changes to the boundaries, update confirmed species or natural communities in each COA obtained from the NHI database, and update potential species and natural communities.

Readily available information for COAs was provided. This included Important Bird Areas and other ecologically significant places.⁴¹ The original COA map notes from 2008 and WDNR - Bureau of Wildlife EcoSummit results⁴² were also reevaluated for proposed updates.

Proposed considerations for new COAs. WDNR field ecologists and the Technical Advisory Team were asked to make some initial proposals for new COAs based on the original concepts and criteria used in the Implementation Plan. The original list of COAs generally got at most of the sites that met the criteria—at least with the available information. Proposals for new COAs come from ecologically significant areas

⁴¹ <http://dnr.wi.gov/topic/landscapes/index.asp?mode=Choose> (Search Terms: Learn Wisconsin's Ecological Landscapes). (Choose the ecological landscape, select the "maps" tab and then select map "5. Ecologically Significant Places".)

⁴² In approximately 2010, "EcoSummits" were held in each region of the WDNR to identify priority sites for wildlife management within the Bureau of Wildlife Management. While the objectives for identifying sites differed from those of the WWAP to include sites with recreational and game habitat value, sites of value to SGCN and their habitat were also identified.

designated after 2008 (e.g., some Important bird areas, high diversity forests designated by the US Forest Service within the Chequamegon-Nicolet National Forest).

One exception to proposals for new COAs is The Nature Conservancy's portfolio lakes⁴³. Portfolio lakes are the result of a classification and assessment process that recognizes Wisconsin's diversity of lake types, allowing practitioners to compare apples to apples in selecting the "best of the best" for a conservation portfolio. This assessment was in itself a modeling of COA-like inland lake sites. The authors of this assessment developed a comprehensive, ecologically-based classification that organizes lakes based on natural biophysical potential and condition, and serves to help establish appropriate goals and strategies such as restoration, protection, or maintenance of shoreland versus watershed land use, water quality or habitat.

An initial effort was made to winnow down the thousands of lakes identified in the portfolio to meet COA objective. Some of the selection criteria used in the portfolio were broader than the COA criteria these were dropped and data more appropriate to SGCN and their habitat were used (e.g., Natural Heritage Inventory occurrences for a fuller suite of aquatic species). Sites were also screened for distance from existing COAs to narrow down lakes to be in sync with the ecological criteria used for the existing COAs. The results of this effort are provided at the end of Section 5.

Unknown or Unmapped COAs. Certainly many sites that present conservation opportunities in our state remain unknown and unmapped. This is where we apply the associations among the three major elements of the Wildlife Action Plan – species, natural communities (habitat) and ecological landscapes to help identify them. WWAP users who want to estimate conservation objectives for species and their habitat can use the sum of the SGCN-NC, SGCN-EL and NC-EL scores provided at the end of Sections 3 and 4 or some other means of analyzing them to help them assess whether a site or area presents ecological opportunities for conservation. Section 5.3 provides an assessment of how to identify potential COAs and ecological opportunities by combining association and opportunity scores.

⁴³ Lake Classification and Conservation Portfolio to Support Lake Conservation Planning in Wisconsin (TNC 2014) http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/programs/convention/2014/KristenBlannJohnWagner_LakeClassificationConservationPortfolioforWI.pdf

Table 2.1 Road Map and Summary of Revisions and/or Updates to the WWAP

Element	Element Description	Nature of the Update, Improvement or Revisions	Affects Element Content or Result	Location in the WWAP
1	Information on the distribution and abundance of species of wildlife, including low and declining populations as the State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State's wildlife.	Revised process for identifying SGCN based on Nature Serve's state and global ranks and other criteria relevant to Wisconsin. Same process applied to all taxonomic groups, including invertebrates.	Yes. While factors used to assess SGCN status are very similar to WWAP1, there are differences.	New process explained in Section 2.2 and illustrated in Appendix 2.3
		SGCN assessments electronically compiled and stored; documents rationale, decisions and future updates as new information becomes available.	No	Retained in internal database for future updates as new information becomes available.
		Updated SGCN list.	Yes	Section 3. Tables at the end of each taxonomic group subsection.
2	Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in the 1st element.	Updated natural communities list and definitions for northern forests, inland lakes and other miscellaneous community Types.	Yes. There are more options for assigning habitats to SGCN.	Approach in Section 2.3 and Table 2.3; Natural community definitions are found online, some new community types added to the WWAP are also found in Appendices at the end of Sections 4.4.1 Aquatic Group, 4.4.5 Northern Forest Group, 4.4.7 Wetlands Group and 4.4.8 Miscellaneous Group.
		SGCN-Natural Community association scores. Scores were also assigned to invertebrates in WWAP2.	Yes. Scores were updated.	Approach described in 2.4. Scores provided in Section 3 in tables at the end of each taxonomic group

Element	Element Description	Nature of the Update, Improvement or Revisions	Affects Element Content or Result	Location in the WWAP
				subsection.
		SGCN-Ecological Landscape association scores. Scores were also assigned to invertebrates this time.	Yes. Scores were updated.	Approach described in 2.4. Scores provided in Section 3 at the end of each taxonomic group subsection.
		Natural Community – Ecological Landscape opportunity scores.	Yes. Scores were updated.	Approach described in 2.4. Scores provided in Section 4 at the end of each taxonomic group subsection.
3	Descriptions of problems which may adversely affect species identified in Element 1 or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats.	Established a taxonomy/classification of issues and impacts to SGCN and their habitat.	No. Improvement to the WWAP that does not change the nature of the issues that affect SGCN or their habitat, but rather how they are classified.	Approach explained in Section 2.5.3.
		Link issue and impact categories to conservation action categories through development of an Actions Database.	No. Support tools that are part of Plan implementation.	Approach explained in Section 2.5.5.
		Complete Natural Community Climate Change Vulnerability Workshops and incorporate into the WWAP.	Yes. Helps to identify issues for SGCN and their habitats	Results summarized in Section 4 for the Natural Community Groups covered by the workshops.

Element	Element Description	Nature of the Update, Improvement or Revisions	Affects Element Content or Result	Location in the WWAP
		Update issues affecting SGCN and their habitat; write them together with conservation actions; organize them according to categories and subcategories in the issues/impacts classification for each SGCN and Natural Community group.	Yes. Primary content for this element.	Sections 3 and 4, for each SGCN and natural community group.
4	Descriptions of conservation actions determined to be necessary to conserve the identified species and habitats and priorities for implementing such actions.	Established a taxonomy/classification of conservation actions.	No. Improvement to the WWAP that does not change the nature of the issues that affect SGCN or their habitat, but rather how they are classified.	Approach explained in Section 2.5.3 and Appendix 2.1.
Starting proposals for updates to existing COA's and new ones based on significant ecological areas.		Yes. Helps people identify some of the best places to implement voluntary conservation actions.	Section 5.	
Develop an Actions Database that links conservation actions to issue/impact categories and other characteristics about the action.		No. Plan implementation tool to help WWAP users and track actions.	Approach and Example explained in Section 2.5.5.	
Update conservation actions for each SGCN and Natural Community group according to categories and		Yes. Primary content for this element.	Sections 3 and 4 for each SGCN and natural community group.	

Element	Element Description	Nature of the Update, Improvement or Revisions	Affects Element Content or Result	Location in the WWAP
		subcategories in the conservation actions classification.		
5	Descriptions of the proposed plans for monitoring species identified in Element 1 and their habitats, for monitoring the effectiveness of the conservation actions proposed in Element 4, and for adapting these conservation actions to respond appropriately to new information or changing conditions.	Monitoring species and habitat is included as a category in the actions taxonomy. Conservation actions related to monitoring were updated.	Yes. Identifies actions related to monitoring.	Approach explained in Section 2.5; monitoring actions included as conservation actions in Sections 3 and 4.
		Species, habitats and other targets and intended outcomes are being included as fields in the Actions Database that is part of plan implementation. Will eventually link with an effectiveness monitoring process and potentially TRACS or similar.	Yes. This is part of the proposed plan to monitor effectiveness of conservation actions.	Approach Explained in Section 2.5; effectiveness monitoring presented in Section 6.
		Updated Monitoring and Adaptive Management; adopt effectiveness monitoring process linked to TRACS as part of plan implementation.	Yes. Part of Plan implementation, some aspects dependent on completion of other projects like TRACS and/or additional Department approvals to use adaptive management software.	Section 6

Element	Element Description	Nature of the Update, Improvement or Revisions	Affects Element Content or Result	Location in the WWAP
6	Descriptions of procedures to review the Strategy/Plan at intervals not to exceed ten years.	Minor updates. Describe how WWAP tools and COA updates will be undertaken as part of plan implementation, continued involvement of Technical and Advisory Teams.	Yes. Some aspects determined by input from WWAP users and partners.	Section 7
7	Descriptions of the plans for coordinating development, implementation, review, and revision of the Plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the State or administer programs that significantly affect the conservation of identified species and habitats.	Combined with Element 8. Describes all technical, governmental and public input and outreach for the revisions and updates. Plan review in Section 7 includes agencies and tribes.	Yes.	Sections 7 and 8
8	Descriptions of the necessary public participation in the development, revision, and implementation of the Plan.	Combined with Element 7. Describes all technical, governmental and public input and outreach for the revisions and updates.	Yes.	Section 8

Table 2.2 Where to Currently Find the Online Components of WWAP1⁴⁴

Element	Location	Description
1 SGCN	http://dnr.wi.gov/topic/endangeredresources/animals.asp	Rare Species pages; select the species group; then select the species; then select the “Wildlife Action Plan” tab.
2 Habitats	http://dnr.wi.gov/topic/endangeredresources/communities.asp	Natural community profile pages; select the appropriate community group; then select the natural community type; then select each of “definition”, “rare animals”, “rare plants” and “opportunities” tabs.
	http://dnr.wi.gov/topic/Landscapes/	Ecological landscapes of Wisconsin page; select “Learn”; then select the ecological landscape from the map; then select and view each of the tabs.
3 Threats to SGCN and their habitats	http://dnr.wi.gov/topic/endangeredresources/animals.asp	SGCN - See Element 1. Scroll down to the bottom of each species profile page.
	http://dnr.wi.gov/topic/endangeredresources/communities.asp	Natural communities – go to the natural community profile page; then select the “Threats/Actions” tab.
4 Conservation actions	http://dnr.wi.gov/topic/endangeredresources/animals.asp	SGCN - See Element 1. Scroll down to the bottom of each species profile page.
	http://dnr.wi.gov/topic/endangeredresources/communities.asp	Natural communities – go to the natural community profile page; then select the “Threats/Actions” tab.
	http://dnr.wi.gov/topic/WildlifeHabitat/COA.html	Conservation opportunity areas - Select the COA report and maps by ecological landscape; priority conservation actions and locations are provided for COAs in that landscape.
5 Monitoring	http://dnr.wi.gov/files/PDF/pubs/ER/ER0641.pdf	Original WWAP1 text in .pdf format.
6 Plan review	http://dnr.wi.gov/files/PDF/pubs/ER/ER0641.pdf	Original WWAP1 text in .pdf format.
7 Agency coordination	http://dnr.wi.gov/files/PDF/pubs/ER/ER0641.pdf	Original WWAP1 text in .pdf format.
8 Public participation	http://dnr.wi.gov/files/PDF/pubs/ER/ER0641.pdf	Original WWAP1 text in .pdf format.

⁴⁴ This table is intended to help the USFWS Regional Review Team. After the WWAP is approved and the contents of the revised WWAP are placed online, these links to WWAP1 content will no longer be valid.

Table 2.3 Comparison of Natural Communities Evaluated in WWAP1 Versus WWAP2

Community Group	WWAP2 Community Name	WWAP1 Community Name	SRank
Aquatic (lakes-rivers)	Coldwater streams	Coldwater streams	
	Coolwater streams	Coolwater streams	
	Warmwater rivers	Warmwater rivers	
	Warmwater streams	Warmwater streams	
	Riverine Impoundment	Impoundments/Reservoirs	
	Riverine Lake - Pond		SU
	Lake Michigan	Lake Michigan (Great Lakes)	
	Lake Superior	Lake Superior (Great Lakes)	
	Large Lake--deep, hard, drainage	Inland Lakes	S3
	Large Lake--deep, hard, seepage		S2
	Large Lake--deep, soft and very soft, seepage		
	Large Lake--deep, soft, drainage		S1
	Large Lake--shallow, hard and very hard (marl), drainage		
	Large Lake--shallow, hard, seepage		SU
	Large Lake--shallow, soft, drainage		S3
	Large Lake--shallow, soft, seepage		S4
	Small Lake--hard, bog		S2
	Small Lake--meromictic		S1
	Small Lake--Other		SU
	Small Lake--soft, bog		S4
Spring Pond, Lake--Spring			
Springs and Spring Runs (Hard)		S4	
Springs and Spring Runs (Soft)		SU	
Barrens	Great Lakes Barrens	Great Lakes Barrens	S1
	Oak Barrens	Oak Barrens	S2
	Pine Barrens	Pine Barrens	S2
	Sand Barrens		SU
Grassland	Bracken Grassland	Bracken Grassland	S2
	Dry Prairie	Dry Prairie	S3
	Dry-mesic Prairie	Dry-Mesic Prairie	S2
	Mesic Prairie	Mesic Prairie	S1
	Sand Prairie	Sand Prairie	S2
	Surrogate Grasslands	Surrogate Grasslands (CRP, pasture, hay)	SNR
	Wet Prairie	Wet Prairie	SU
	Wet-mesic Prairie	Wet-Mesic Prairie	S2

Community Group	WWAP2 Community Name	WWAP1 Community Name	SRank
Miscellaneous	Algific Talus Slope	Algific Talus Slope	S1
	Alvar	Alvar	S1
	Bedrock Glade	Bedrock Glade	S3
	Bedrock Shore		S2
	Caves and Subterranean Cultural		SU
	Clay Seepage Bluff	Alkaline Clay Bluff	S2
	Dry Cliff	Dry Cliff	S4
	Glaciere Talus (Felsenmeer)		S2
	Great Lakes Alkaline Rockshore	Great Lakes Alkaline Rockshore	S2
	Great Lakes Beach	Great Lakes Beach	S2
	Great Lakes Dune	Great Lakes Dune	S2
	Great Lakes Ridge and Swale	Forested Ridge and Swale	S2
	Inland Beach	Inland Beach	S3
	Lacustrine Mud Flat		SU
	Moist Cliff	Moist Cliff	S4
	Transportation-Utility Corridor		
Northern Forest	Aspen-Birch		
	Black Spruce Swamp		S3?
	Boreal Forest	Boreal Forest	S2
	Conifer Plantation		
	Forested Seep		S2
	Mesic Cedar Forest		S1
	Mesic Floodplain Terrace		S2
	Northern Dry Forest--late seral	Northern Dry Forest	S3
	Northern Dry Forest--mid-seral		
	Northern Dry Forest--young seral		
	Northern Dry Mesic--late seral	Northern Dry-Mesic Forest	S3
	Northern Dry Mesic--mid-seral		
	Northern Dry Mesic--young seral		
	Northern Hardwood Swamp	Northern Hardwood Swamp	S3
	Northern Mesic Forest--early seral	Northern Mesic Forest	
	Northern Mesic Forest--late seral		S4
	Northern Mesic Forest--mid seral		
	Northern Mesic Forest--young seral		
	Northern Wet Forest	Northern Wet Forest	S4
	Northern Wet-mesic Forest	Northern Wet-Mesic Forest	S3S4
Tamarack Swamp (poor)		S3	
Savanna	Cedar Glade	Cedar Glade	S4

Community Group	WWAP2 Community Name	WWAP1 Community Name	SRank
	Oak Opening	Oak Opening	S1
	Oak Woodland	Oak Woodland	S1?
Southern Forest	Central Sands Pine - Oak Forest	Central Sands Pine-Oak Forest	S3
	Floodplain Forest	Floodplain Forest	S3
	Hemlock Relict	Hemlock Relict	S2
	Pine Relict	Pine Relict	S2
	Southern Dry Forest	Southern Dry Forest	S3
	Southern Dry-mesic Forest	Southern Dry-Mesic Forest	S3
	Southern Hardwood Swamp	Southern Hardwood Swamp	S2
	Southern Mesic Forest	Southern Mesic Forest	S3
	Southern Tamarack Swamp (rich)	Southern Tamarack Swamp	S3
White Pine - Red Maple Swamp	White Pine - Red Maple Swamp	S2	
Wetland	Alder Thicket	Alder Thicket	S4
	Bog Relict	Bog Relict	S3
	Boreal Rich Fen	Boreal Rich Fen	S2
	Calcareous Fen	Calcareous Fen (Southern)	S3
	Central Poor Fen		S3
	Coastal Plain Marsh	Coastal Plain Marsh	S1
	Emergent Marsh	Emergent Aquatic	S4
	Emergent Marsh - Wild Rice	Emergent Aquatic-Wild Rice	S3
	Ephemeral Pond	Ephemeral Pond	SU
	Floating-leaved Marsh		S4
	Interdunal Wetland	Interdunal Wetland	S1
	Moist Sandy Meadow		SU
	Muskeg		S4
	Northern Sedge Meadow	Northern Sedge Meadow	S3
	Open Bog	Open Bog	S4
	Patterned Peatland		S1
	Poor Fen		S3
	Riverine Mud Flat		SU
	Shore Fen	Great Lakes Coastal Fen	S2
	Shrub Carr	Shrub Carr	S4
Southern Sedge Meadow	Southern Sedge Meadow	S3	
Submergent Marsh	Submergent Aquatic	S4	
Submergent Marsh - Oligotrophic	Submergent Aquatic-Oligotrophic marsh	S3	

Table 2.4 Key to SGCN-EL Association Scores

Level of Association	Score	Description
High	3	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	2	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	1	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	0	Species does not (and did not historically) or is highly unlikely to use or be present in this Ecological Landscape.

Table 2.5 Key to SGCN-NC Association Scores

Level of Association	Score	Description
High	3	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	2	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	1	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	0	Species does not (and did not historically) or is highly unlikely to use this Ecological Landscape.

Table 2.6 Key to NC-EL Association Scores

Level of Opportunity	Score	Description
High	3	A major opportunity for sustaining the natural community in the Ecological Landscape exists, either because many significant occurrences of the natural community have been recorded in the landscape or restoration activities in areas of historical occurrence are likely to be successful maintaining the community's composition, structure, and ecological function over a long period of time.
Moderate	2	Although the natural community does not occur extensively or commonly in the Ecological Landscape, one to several significant occurrences do occur and are important in sustaining the community in the state. In some cases, important opportunities may exist because the natural community may be restricted to just one or a few Ecological Landscapes within the state and should be considered for management there because of limited geographic distribution and a lack of better opportunities elsewhere.
Low	1	The natural community occurs in the Ecological Landscape, but better management opportunities appear to exist in other parts of the state.
None	0	The natural community is not known to occur in this Ecological Landscape.

Table 2.7 Fields Proposed for the Actions Database Support Tool

Field Name	Description
WWAP2-Action	Text of the Conservation Action brief, but specific enough to give direction to the user.
Action ID	An ID specific to each action that allows them to be linked to other databases, Conservation Opportunity Areas, etc.
Action Lead	Internal DNR Bureau of Natural Heritage staff assigned to completing and maintaining information about the action in the database.
Action Classification	– Most appropriate category assigned from the Conservation Action Taxonomy
Action Rationale	Slightly more detail explaining why the Action was developed and why it's important
Threat(s) Classification	One or more categories from the Conservation Threat Taxonomy indicating which threats are addressed by an action.
Action Intent	Intended outcome of the action. Entries in this field will be used to link with Effectiveness Measures, Section 5.
Threat-Category 11	If the assessor assigns threat category 11. Climate Change and Severe Weather to an action, they are given the opportunity to explain separately in this text box how the action addresses this threat because this category often overlaps with other threat categories.
SGCN	SGCN that may benefit by the action.
Communities	Natural Communities that may benefit by the action.
Target	Helps define the scale of the effort, whether it is a species, taxon, community, landscape, watershed, etc.
Statewide	Whether the action can be implemented across the state.
Ecological Landscapes	If the action is not statewide, which of the sixteen Ecological Landscapes are most appropriate for implementation of this action.
Ecological Features	Whether the action affects biological, ecological or geographical features that have state, regional, continental or global significance.
Threat-Impact	A measure of the severity and magnitude of the threat based on NatureServe's conservation assessment methodology.
Entity	Who can implement this action (e.g., landowners, academic institutions, etc.)
Site, COA or County	Names sites, Conservation Opportunity Areas or Counties where the sites are or may be implemented.

Table 2.8 Fields included in the COA database

Field	Description
COA Name	The common name of the COA.
COA Number	The number assigned to the COA. The numbers that were assigned to Aquatic COAs start with an "A".
Ecological Landscape	The name of the Ecological Landscape where the COA is located.
Ecological Feature Group	Briefly describes the attributes that qualifies the area to be labelled as a COA and what scale the attributes are considered unique.
WWAP 2 Proposed Changes	Multiple selections describing the changes being proposed. Includes selections such as "edit shape-boundaries" and "add SGCN" and "name change".
Sources	Sources that support the proposed change can be cited.
Edit/Change Comments	Internal and external comments may be recorded gathered during the editing process.
Proposed SGCN + Communities	Proposed changes are more fully explained.
New/Proposed COA Criteria	The person proposing the change may select which COA criteria the new change goes under.
New COA: Comments, rationale, SGCN, etc.	When a COA is proposed for the first time. The person proposing can explain fully why a new area should be considered for COA designation.
COA, WWAP2 SGCN, NHI, Bird Atlas Intersect	A compiled list of SGCN, all plants and animal hits in the Natural Heritage Inventory, and birds within the bird atlas that may reside in or around the COA.
COA, NHI Mapped Community Intersect	A compiled list of all natural communities within the Natural Heritage Inventory that may or may not be contained in or around the COA.
WWAP 1 Description	A list of the natural communities represented within the COA. The natural communities were assigned during the WWAP 1 process.
WWAP 1 SGCN (confirmed and probable)	A list of the SGCN(s) that have been confirmed or are probable within the COA and were assigned during the WWAP 1 process.
Public Lands	Which public lands (state, county, federal) overlap with the COA?
Land Legacy Places	A list of which land legacies overlap with the COA.
Important Bird Areas	A list of which Important Bird Areas overlap with the COA.

Table 2.9 Naturereserve Definitions for Global (G) Conservation Status Ranks

Rank	Definition
GX	Presumed Extinct (species)- Not located despite intensive searches and virtually no likelihood of rediscovery. Presumed Eliminated (ecosystems, i.e., ecological communities and systems) — Eliminated throughout its range, due to loss of key dominant and characteristic taxa and/or elimination of the sites and ecological processes on which the type depends.
GH	Possibly Extinct (species) or Possibly Eliminated (ecosystems) - Known from only historical occurrences, but still some hope of rediscovery. Examples of evidence include (1) that a species has not been documented in approximately 20–40 years, despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is extinct or eliminated throughout its range.
G1	Critically Imperiled - At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2	Imperiled -At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	Vulnerable - At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	Apparently Secure - At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5	Secure - At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
GU	Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Note: whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.
GNR	Unranked - Global rank not yet assessed.
GNA	Not Applicable - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities.

Table 2.10 Natureserve Definitions for State (S) Conservation Status Ranks

Rank	Definition
SX	Presumed Extirpated - Presumed to be extirpated from Wisconsin. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SH	Possibly Extirpated - Known only from historical records. The element may no longer be present in Wisconsin, but there is not enough evidence to state this with certainty. The SH rank is used when an element's presence has not been documented in decades despite some searching and evidence of significant habitat loss or degradation, or when an element has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in Wisconsin.
S1	Critically Imperiled - Critically imperiled in Wisconsin due to a very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
S2	Imperiled - Imperiled in Wisconsin due to a restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3	Vulnerable – Vulnerable in Wisconsin due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4	Apparently Secure – Apparently secure in Wisconsin due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5	Secure — Secure in Wisconsin due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.
SU	Unrankable -Unrankable due to lack of information or to substantially conflicting information about status or trends.
SNR	Unranked —Not ranked. State conservation status not yet assessed.
SNA	Not Applicable – A state rank is not applicable because the element is not a suitable target for conservation activities, typically because it is non-native, accidental, irregular, a long-distance migrant/transitory, or the element's presence in Wisconsin is unconfirmed.

***State Ranking of Long Distance Migrants:**

Ranking long distance aerial migrant animals presents special problems relating to the fact that their non-breeding status (rank) may be quite different from their breeding status, if any, in Wisconsin. In other words, the conservation needs of these taxa may vary between seasons. In order to present a less ambiguous picture of a migrant's status, it is necessary to specify whether the rank refers to the breeding (B) or non-breeding (N) status of the taxon in question. (e.g. S2B, S5N).

Figure 2.1 Example of Online Content for SGCN-Ecological Landscape Association Scores for the Prairie Ring-necked Snake

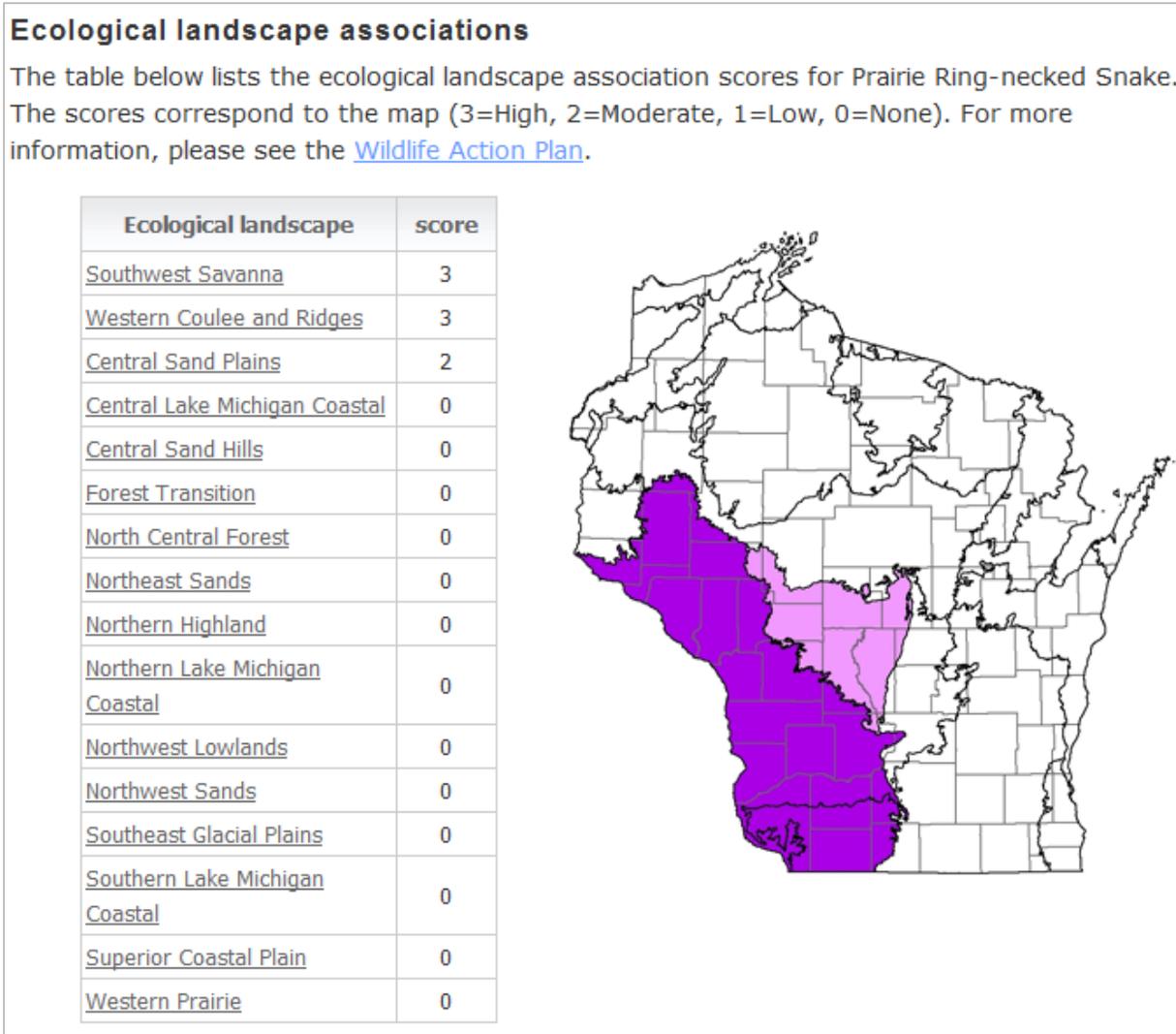


Figure 2.2 Online Example of SGCN - Natural Community (Habitat) Association Scores for the Prairie Ring-necked Snake

Overview
State status
Species guidance
Other resources
Photos / Video
Wildlife Action Plan

Information from Wisconsin's [Wildlife Action Plan](#).

Native community (habitat) associations

The table below lists the natural communities that are associated with Prairie Ring-necked Snake. Only natural communities for which Prairie Ring-necked Snake is "significantly" (score=3) or "moderately" (score=2) associated are shown. Please see the [Wildlife Action Plan](#) to learn how this information was developed.

Natural community	score
Bedrock Glade	3
Cedar Glade	3
Dry Prairie	3
Dry-Mesic Prairie	3
Oak Opening	3
Central Sands Pine-Oak Forest	2
Oak Barrens	2
Oak Woodland	2
Sand Prairie	2
Southern Dry Forest	2
Southern Dry-Mesic Forest	2



Wildlife Action Plan

Figure 2.3 Online Example of Natural Community-Ecological Landscape Opportunity Scores for Pine Barrens Natural Community Type

Pine Barrens



Photo by Eric Epstein - WDNR

State Rank: **S2** Global Rank: **G2** [what are these ranks?](#)

Definition	Rare animals	Rare plants	Opportunities	Threats / Actions	Considerations	Photos
------------	--------------	-------------	---------------	-------------------	----------------	--------

The following Ecological Landscapes have the best opportunities to manage for **Pine Barrens**, based on the [Ecological Landscapes of Wisconsin Handbook](#).

Ecological Landscape	Opportunity
Central Sand Plains	Major
Northeast Sands	Major
Northwest Sands	Major
Central Sand Hills	Important
Western Coulee and Ridges	Important
Northern Highland	Present

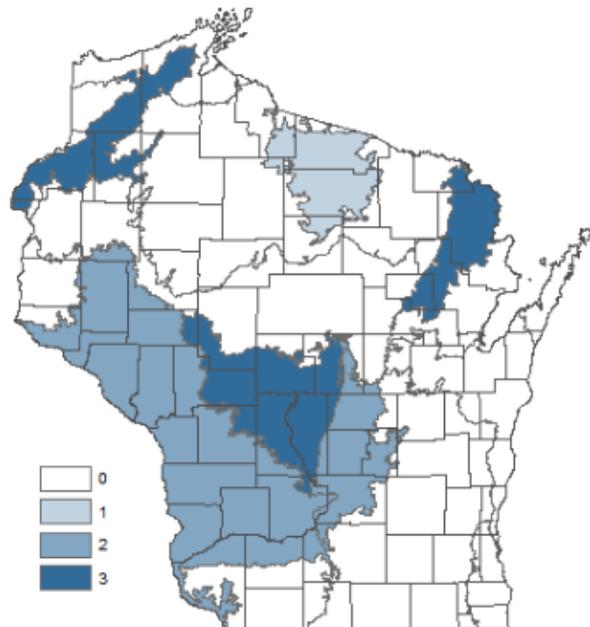


Figure 2.4 Example of Threats and Conservation Actions Listed Online for Each Rare Species Profile Page

Prairie Ring-necked Snake (*Diadophis punctatus arnyi*)



Photo © A.B. Sheldon

Overview	State status	Species guidance	Other resources	Photos / Video	Wildlife Action Plan
<p>Information from Wisconsin's Wildlife Action Plan.</p>					
<h3>Conservation actions</h3> <ul style="list-style-type: none"> • Bluffland zoning is needed to protect rare habitats and dependent species. • Land management efforts are needed to set back natural succession and maintain prairie habitat. • Landowner education is needed to help increase prairie habitat restoration efforts. • Long-term monitoring is needed to evaluate population status and track trends of representative populations. • Long-term protection of habitat supporting several viable populations of prairie ringneck snakes is needed. • Major strides in policy and education are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions. • Partnering with prairie restoration groups like the Prairie Enthusiasts will help accomplish habitat management more efficiently. <p align="right">Back to Top</p>					
<h3>Threats and issues</h3> <ul style="list-style-type: none"> • Natural succession has reduced available habitat for this species. • Road mortality may be an issue in some areas. • Motorized recreation may be damaging habitats in some areas. • Excessive grazing has degraded habitat for this species and led to the invasion of non-native invasive plants. • Bluffland urbanization is becoming increasingly problematic for the prairie-dependent snakes. <p align="right">Back to Top</p>					

Figure 2.5 Example of Online Content for Each Natural Community Type, Including Threats and Conservation Actions

Pine Barrens



Photo by Eric Epstein - WDNR

State Rank: **S2** Global Rank: **G2** [what are these ranks?](#)

Definition	Rare animals	Rare plants	Opportunities	Threats / Actions	Considerations	Photos
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General natural community overview

This savanna community is typically characterized by scattered jack pines, or less commonly, red pines, sometimes mixed with scrubby Hill's and bur oaks. The scattered trees or groves are interspersed with openings in which shrubs such as hazelnuts (*Corylus americana* and *C. cornuta*) sand cherry, and prairie willow are prominent, along with prairie grasses and forbs. The groundlayer often contains species characteristic of "heaths", such as blueberries (*Vaccinium angustifolium* and *V. myrtilloides*), bearberry, and sweet fern. Other characteristic plants include dry sand prairie species such as june grass, little bluestem, silky and



Definition	Rare animals	Rare plants	Opportunities	Threats / Actions	Considerations	Photos
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The following [Species of Greatest Conservation Need](#) are listed according to their level of association with the **Pine Barrens** natural community type, based on the findings in the Wisconsin Wildlife Action Plan.



Scores: 3 = "significantly associated," 2 = "moderately associated," and 1 = "minimally associated."

Birds		Score
Brown Thrasher	<i>Toxostoma rufum</i>	3
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	3

Figure 2.5 (continued) Example of Online Content for Each Natural Community Type, Including Threats and Conservation Actions

Definition	Rare animals	Rare plants	Opportunities	Threats / Actions	Considerations	Photos												
<p>The following Ecological Landscapes have the best opportunities to manage for Pine Barrens, based on the Ecological Landscapes of Wisconsin Handbook.</p> <table border="1"> <thead> <tr> <th>Ecological Landscape</th> <th>Opportunity</th> </tr> </thead> <tbody> <tr> <td>Central Sand Plains</td> <td>Major</td> </tr> <tr> <td>Northeast Sands</td> <td>Major</td> </tr> <tr> <td>Northwest Sands</td> <td>Major</td> </tr> <tr> <td>Central Sand Hills</td> <td>Important</td> </tr> <tr> <td>Western Coulee and Ridges</td> <td>Important</td> </tr> </tbody> </table> 							Ecological Landscape	Opportunity	Central Sand Plains	Major	Northeast Sands	Major	Northwest Sands	Major	Central Sand Hills	Important	Western Coulee and Ridges	Important
Ecological Landscape	Opportunity																	
Central Sand Plains	Major																	
Northeast Sands	Major																	
Northwest Sands	Major																	
Central Sand Hills	Important																	
Western Coulee and Ridges	Important																	

Definition	Rare animals	Rare plants	Opportunities	Threats / Actions	Considerations	Photos
<p>These threats and priority conservation actions were identified for the Pine Barrens community type in Wisconsin, and they apply to all of Wisconsin's Ecological Landscapes unless otherwise indicated. Please see the Wisconsin Wildlife Action Plan, Chapter 3.3, for more information</p> <p>Threats</p> <ul style="list-style-type: none"> Some existing sites are small, overgrown with woody vegetation, and isolated. Small patch size may be a problem for some species; research is needed on the appropriate range of sizes needed to maintain all barrens species. <p>Conservation actions</p> <ul style="list-style-type: none"> This complex of community types is globally rare. Conservation will depend largely on restoration, and Wisconsin has some of the best opportunities in North America. Research on restoration techniques is needed, and should be applied where appropriate. Identify locations where restorable sites exist. Limit additional development on and around restorable sites to maintain management options. 						

Figure 2.6 Example of What a Completed Conservation Action May Look Like in the Actions Database Support Tool*

WWAP2 Action 109	Restore and manage for oak barren characteristics for vegetation and age structure, patch size and plant species composition in Northwest Sands and Central Sands Ecological Landscapes and Lower Wisconsin State Riverway at sites where the effective habitat for area sensitive species will be increased such as uplands between wetlands.		
Action Classification:	2.3.3 Terrestrial (upland)	Action Intent:	Site managed to sustain ecological community, Stressors reduced (effect of the threat on the resource), Viability of SGCN habitats
Threat Classification(s):	1 Residential & commercial development, 11. Climate change & severe weather, 4 Transportation & service corridors, 5 Biological resource use, 6 Human intrusions & disturbance, 7 Natural system modifications, 8 Invasive & other problematic species, genes & diseases		
Threat-Impact	3	Threat-Cat11_Rationale	Entity: DNR, Conservation Groups, Landowner-Individuals, Other Federal, State or Local Agencies
Action-Rationale:	Will increase effective habitat patch size for area sensitive SGCNs. Sandy or ruderal oldfields may be reclaimed in this action in addition to sites already identified as barrens or sand prairies.		
External Reviewer Comments March2015		Post Review Internal Comments	
Pre-External Review Comment			
Ecological Landscapes:	2, 7, 10, 11	Ecological Features:	14
Counties:	Burnett, Clark, Iowa, Jackson, Monroe, Sauk		
Sites:	Crex Meadows, Fish Lake SWA, LWSR, Fort McCoy, Necedah NWR		
COAs:	02.02, 02.03, 02.07, 07.04, 07.05, 07.07, 11.07, 11.16		
Communities:	Oak Barrens		
Target:	gophersnake, N. American racer, slender glass lizard, six-lined racerunner, nesting turtles, prairie vole, prairie deer mouse		
SGCNs	Tympanuchus phasianellus, Colinus virginianus, Chordeiles minor, Antrostomus vociferus, Poocetes gramineus, Chondestes grammacus, Spermophilus (Poliocitellus) franklinii, Peromyscus maniculatus bairdii, Microtus ochrogaster, Aquatic Turtles, Emydoidea blandingii, Ophisaurus attenuatus, Aspidoscelis sexlineata, Coluber constrictor, Pituophis catenifer, Sistrurus catenatus catenatus		

*The Actions Database support tool is part of WWAP implementation that will help organize information and characteristics about conservation actions to help WWAP users. Updated issues and conservation actions presented in Sections 3 and 4, as well as other characteristics about each conservation action will be compiled in this database. Its development, with the input and collaboration of WWAP partners, is in progress.

Figure 2.7 Example of Potential Conservation Opportunity Area Updates in the COA Database*

Rock Lake End Moraine

COA_Num: 04.12 Ecol_Landscape: North Central Forest Ecological Feature Group: Northern Highland Kettle Lakes and Pine Forest Global

WWAP2_Proposed_Changes: Edit Shape-Boundaries Sources: Ecological Landscape maps, Important Bird Area map

Edit/Change Comments: The OTF-Owen Teal Forest IBA is larger than COA. Propose expanding 04.12 to include the rest of the IBA.

Proposed SGCN + Communities:

New/ Proposed COA_Criteria:

New COA: Comments, rationale, SGCN, ...

COA x WWAP2 SGCN NHI + Atlas (intersect 3/2015)				COA x NHI mapped community (intersect 3/2015)					
COA_NI	SciName	ComName	taxagrps	Max	COA_NI	ComGrp	Community	Max'	probabl
04.12				-2	04.12		Northern Wet Forest	1981	

Record: 1 of 11 No Filter Search

Record: 1 of 5 No Filter Search

WWAP1 Description
Large extensive area of pine – oak dominated forest with a continuum of Northern Dry Forest, Northern Dry-Mesic Forest, Northern Mesic Forest, and Northern Wet Forest. Also embedded within the upland features is a concentration of glacial lakes with a continuum of Submerged Aquatic, Submerged Aquatic-Oligotrophic, Open Bog, Northern Sedge Meadow, and Inland

WWAP1-SGCN (confirmed and probable)
Four-toed Salamander, Mink Frog, Mudpuppy, Wood Turtle, Bald Eagle, Black-throated Blue Warbler, Canada Warbler, Connecticut Warbler, Least Flycatcher, Northern Goshawk, Olive-sided Flycatcher, Osprey, Red Crossbill, Spruce Grouse, Veery, Whip-poor-will, Eastern Red Bat, Gray Wolf, and Northern Flying Squirrel.

Public_Lands (intersect) Chequamegon-Nicolet National Forest, Sawyer County Forest.	Land_Legacy_Places (intersect) Chequamegon-Nicolet National Forest.	Important_Bird_Areas (point intersect; IBA polygon layer wa:
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*Information about the location of species included in the Natural Heritage Inventory database is confidential and has been redacted from this example.

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Appendix 2.1 Conservation Actions Classification

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Assessors are asked to use this taxonomy to indicate the conservation actions that are needed to address the issues and impacts that biodiversity targets (plants or animals, habitat, natural communities or ecosystems) are or may be exposed to. The work of conservation ultimately involves taking action to achieve certain desired outcomes among factors (direct threats, underlying causes, and opportunities) that affect biodiversity targets. In suggesting what actions are needed, assessors are asked to be realistic and not simply suggest everything. The selection should be for those actions that respond to the most urgent, significant and important threats; and that they could realistically be achieved within the next five to ten years. This conservation actions taxonomy is part of the Open Standards for the Practice of Conservation developed by the Conservation Measures Partnership (CMP). <http://cmp-openstandards.org/tools/threats-and-actions-taxonomies/>. Subcategories preceded by "W" (for Wisconsin) and the accompanying description have been added to the original taxonomy to reflect our state's circumstances and resources. The names of categories without a "W" remain true to the CMP taxonomy; however, the text of the descriptions has been edited for clarity and relevance to our state. At the end of each "tier one" description (e.g., 1., 2.), there is a "List" of the minimum information that should be available to adequately describe the action that benefits conservation of a species or its habitat.

ID	ActionCategory		Action_Description_Examples
1	1 Land/water protection		Actions to establish, identify, or expand parks or protected areas. All actions tied to directly protect biodiversity through parks, reserves, easements, or similar means. List the resource, purpose, name, ownership, location and type of protection.
1.1.	1.1 Site/area protection		Establishment or expansion of public or private areas. The action is ostensibly permanent and with legal designation. An area with boundaries, property. Actual management of protected areas falls under 2. Land/Water Management. Examples: strict nature reserve, wilderness area, national park, natural monument or feature, habitat/species management area, protected landscape, protected area with sustainable use of natural resources, nature reserves, town wildlife sanctuaries, private/communal reserves, conservancy property.
1.2.	1.2 Resource & habitat protection		Establishing protections or easements of some specific aspect of the resource on public or private lands outside 1.1 Site/area protection . Protects some feature, function or piece of the resource rather than the entire area. The action is ostensibly permanent and with legal designation. Examples: permanent easements, development rights, water rights, wild and scenic river program, streambank protection area.
2	2 Land/water management		Actions to conserve or restore sites, habitats, and the wider environment. Direct management of the land/water on both private and public lands. List the type of management and how it is carried out, purpose and outcome, target resources, site location and ownership.
2.1.	2.1 Site/area management		Management of protected areas and other resource lands for conservation. This category addresses parks and reserves that are designated but lack management. Covers the actual management of land/water protected under 1. Land/Water Protection . May include lands that are not permanently protected if they are generally not degraded, otherwise the actions should be placed in 2.3. Habitat & Natural Process Restoration. If the primary objective of the Conservation Action is preventing or controlling invasives, like controlled burn primarily to keep invasive species out of prairies or barrens communities rather than control native woody species, then use 2.2 Invasive/Problematic Species Control . Examples: maintenance of habitat, site design, demarcating borders, erecting fences, training park staff, control of poachers, maintain management easements.
2.2.	2.2 Invasive/problematic species control		Controlling and/or preventing invasive and/or problematic species plants, animals and pathogens. Specific management actions tied to invasives. Conservation actions listed here may overlap with 2.1 Site/Area Management or 2.3 Habitat & Natural Process Restoration , but it is such a vital action it has been assigned its own category. This is not restricted to areas, habitat, natural communities or systems protected under 1.1 Site/Area Protection or 1.2 Resource & Habitat Protection and extends beyond these areas to restoration sites.
2.2.1.		W2.2.1 Prevention	W. Practices for preventing the introduction of invasive species into new areas or slowing the rate of invasion. Place best management practices (BMPs) and other forms of guidance for specific business sectors, activity sectors or environments here instead of in 5.3 Private Sector Standards & Codes .
2.2.1.1.			W2.2.1.1 Aquatic
			W. Practices that apply to aquatic activities or species, habitats, natural communities or systems. Examples: actions described in the Clean Boats Clean Waters program, preventing ballast water discharge, boat washing stations.
2.2.1.2.			W2.2.1.2 Wetland
			W. Practices that apply to activities in upland environments, or upland species, habitats, natural communities and systems. Examples: Forestry, Recreation and ROW Best Management Practices for Invasive Species.
2.2.1.3.			W2.2.1.3 Terrestrial (upland)
			W. Practices that apply to activities in upland environments, or upland species, habitats, natural communities and systems. Example: cut-stump control of invasive shrubs; goat and sheep grazing; parasitic wasp (<i>Agathis pumila</i> and <i>Chrysocharis laricinellae</i>) which were introduced to control larch casebearer (<i>Coleophora laricella</i>) infestations in tamarack.
2.2.2.		W2.2.2 Control	W. Practices for controlling (i.e., minimizing the abundance and density) and eradicating invasive species from an affected area. Control programs can include one or a combination of manual, mechanical, chemical, biological and cultural components.
2.2.2.1.			W2.2.2.1 Aquatic
			W. Practices that apply to aquatic activities or species, habitats, natural communities or systems. Example: using rotenone to kill carp; cutting and crushing aquatic invasives.
2.2.2.2.			W2.2.2.2 Wetland
			W. Practices that apply to activities in wetlands or wetland species, habitats, natural communities and systems. Example: cutting and herbiciding phragmites.
2.2.2.3.			W2.2.2.3 Terrestrial (upland)
			W. Practices that apply to activities in upland environments, or upland species, habitats, natural communities and systems. Example: cut-stump control of invasive shrubs; goat and sheep grazing; parasitic wasp (<i>Agathis pumila</i> and <i>Chrysocharis laricinellae</i>) which were introduced to control larch casebearer (<i>Coleophora laricella</i>) infestations in tamarack.
2.2.3.		W2.2.3 Inventory & early detection	W. Surveys to locate, identify and map occurrences of invasive species should be placed here. For those species or occurrences new to an area, report as early detection to allow for control before becoming widespread. If the primary target of the surveys, inventory and monitoring is not invasives, the Conservation Action should be placed in the appropriate category in 8.1 Research or 8.3 Monitoring. Example: road right-of-way surveys for invasive plants.

ID	ActionCategory		Action_Description_Examples
2.3.	2.3 Habitat & natural process restoration		Enhancing degraded or restoring missing habitats and ecosystem functions; dealing with pollution. Private lands that are not protected under 1.1 Land/Water Protection or 1.2 Site/Area Protection should be placed here. Private lands that are generally not degraded, and the Conservation Activities are focused on "management" of the current conditions should be placed in 2.1 Site/Area Management or 2.2.1 Invasive/Problematic Species - Prevention/BMPs .
2.3.1		W2.3.1 Aquatic	W. Restoration goals cannot be achieved without enhancing or restoring aquatic habitat or processes. If controlling invasives is the primary action use 2.2.2.2 Control - Aquatic . Examples: removing dams, restoring streams to original stream beds and meanders.
2.3.2		W2.3.2 Wetland	W. Restoration goals cannot be achieved without enhancing or restoring wetland habitat or processes. If controlling invasives are the primary actions use 2.2.2.2 Control - Wetland . Examples: restoring floodplain hydrology, removing sediments.
2.3.3		W2.3.3 Terrestrial (upland)	W. Restoration goals cannot be achieved without enhancing or restoring terrestrial habitat. If invasive control is the primary action use 2.2.2.3 Control - Terrestrial . Examples: restoring fire management to fire dependant landscapes; connecting prairie and savanana habitats by removing brush.
2.4.	W2.4 Comprehensive management		W. Where management overlaps actions in 2.1 Site/Area Management , 2.2 Invasive/Problematic Species Control , 2.3 Habitat & Natural Process Restoration and cannot readily distinguish one from the other. Very common on DNR managed lands. Examples: management regimes that regenerate oaks while maintaining core areas of older forests for Cerulean Warbler; facilitated shifts of habitats that are vulnerable to climate change such as planting resilient native species.
3	3 Species management		Actions directed at managing or restoring species, focused on the species of concern itself. If the action targets >2 species, the Conservation Action should be placed in category 2. Land/Water management . List the species, purpose, intended outcome, type of management, how it is carried out and location.
3.1.	3.1 Species management		Managing specific SGCN plant and animal populations of concern. Managing a problematic species that affects one to two SGCN should be placed in 2.2 Invasive/Problematic Species .
3.1.1.		3.1.1 Harvest management	Applies to any SGCN species that would benefit from harvest management or fishing controls. Action does not have to be through regulation. Examples: protected reptiles that are not listed as threatened or endangered; harvest of threatened or endangered plant species on public lands for research would require a permit; other SGCN can be collected or harvested with permits or during some seasons of the year..
3.1.2.		3.1.2 Trade management	Setting harvest quotas, trade regulations, regulation of trade in non-timber forest products should go here. Although trade of many SGCN animal species is restricted or prohibited, this is not an important conservation action in our state.
3.1.3.		3.1.3 Limiting population growth	Actions to limit populations of SGCN to ecologically and socially sustainable levels. Typically applies to local populations or site-specific circumstances where SGCN such as bats, toxic native plants or insects present some risk to humans or populations stress available food resources. Examples: culling or relocating individuals or a portion of the population; reducing prey or host plant populations.
3.2.	3.2 Species recovery		Manipulating, enhancing, or restoring specific plant and animal populations, vaccination programs. Examples: manual pollination of trees, artificial nest boxes/platforms, clutch manipulations, supplementary feeding, disease/pathogen/parasite management. W. Headstarting of reptiles (turtles); hand pollination of orchids.
3.3.	3.3 Species re-introduction		Reintroducing species to places where they formerly occurred or benign introductions into suitable habitat.
3.3.1.		3.3.1 Reintroduction	Reintroduction to formally occupied sites/areas. Example: American marten in northern Wisconsin.
3.3.2.		3.3.2 Benign introduction	Benign introductions are to areas outside of the species historical range, but within an appropriate suitable habitat and done deliberately for conservation reasons. This may include facilitated migration of species or planting species outside their current range during restoration as a climate adaptation measure.
3.3.3		W3.3.3 Translocation	
3.3.3.1		W3.3.3.1 Rescue translocations	W. Moving rare species out of harm's way and to a site more likely to allow them to survive. Examples: mussel translocations for bridge repairs; plant translocations for highway expansions.
3.3.3.2		W3.3.3.2 Supplemental Translocations	W. Bringing species to a location to supplement existing populations (i.e., occupied habitat) to increase reproductive success, genetic diversity, etc. Example: supplementing American Marten in Chequamegon National Forest.
3.4.	3.4 Ex-situ conservation		Protecting biodiversity out of its native habitat, which might be undertaken by zoos, aquaria, etc.
3.4.1.		3.4.1 Captive breeding/artificial propagation	Captive breeding of animals, head-start of hatchlings, propagation of plants from seeds or cuttings, artificial propagation of plants, etc. Example: Northern monkshood propagation and planting on cliffs in driftless area; whooping crane captive breeding program.
3.4.2.		3.4.2 Genome resource bank	Gene-banking and cryopreservation. Example: Center for Plant Conservation Seed Bank.

ID	ActionCategory		Action_Description_Examples
4	4. Education & awareness		Actions directed at people to improve understanding and skills, and influence behavior. This action overlaps with category 7. External Capacity Building , but actions in this class tend to target general public, stakeholders, landowners rather than organizations. List the audience, content, methods and intended outcome.
4.1.	4.1. Formal education		Enhancing knowledge and skills of students in a formal degree program at public schools, colleges, continuing education, internships and workstudy programs.
4.2.	4.2. Training		Enhancing knowledge, skills, and information exchange for practitioners, stakeholders, and other relevant individuals in structured settings outside of degree programs. Conservation Actions to develop and implement informal, short-term education through workshops, non-degree training courses, specific stakeholder education should be placed here. Training teaches people how to do something, master a particular skill or become knowledgeable about a relatively defined or limited topic. If the Conservation Action's objective is to give people a broader education on the topic, it should be placed in 4.1 Formal Education . If the objective is to inform the target, make people aware of an issue and/or alter behavior, the Conservation Action should be placed in 4.3 Awareness & Communications .
4.2.1.		W4.2.1. Management and Conservation Training	Training to inform target audiences about management, restoration and protection practices. LIP program, SNA Volunteer program. Training geared towards informing specific target audiences about any practices developed to minimize harm and maximize benefit. Example: Pesticide Applicators Certification, DNR-Certified Reviewer Training.
4.2.2.		W4.2.2. Inventory and Monitoring Training	Training to help target audiences learn monitoring, inventory and identification methods and protocols.
4.3.	4.3. Awareness & communications		Raising environmental awareness and providing information through various media. This is a large category that involves many different efforts to raise awareness about conservation issues in specific stakeholder groups and the general public. Campaigns to enact specific legislation belong in 5. Law and Policy . Generally these Conservation Actions the target is passive and will not necessarily act upon or implement a skill after receiving the information. Conservation Actions in this category may be the first step to other actions in 4.1 Formal Education , 4.2 Training or other categories.
4.3.1		W4.3.1 General ecology, biology, habitat related to conservation needs	W. Communication focused on general ecology, biology, habitat and conservation needs. Examples: WDNR-Natural Heritage Conservation Species webpages, presentations, radio shows, Cedarburg Bog Natural History Workshop.
4.3.2.		W4.3.2 Harvest, roadkill, or other sources of illegal, incidental mortality, nonlethal threats	W. Communicating about behaviors or actions that may result in mortality or are generally detrimental to a species, habitat, natural community or system. The goal is to inform the target about the consequence of the action or behavior and alternatives. Behaviors or actions that are the subject of the communication may be illegal, require a permit, unregulated or incidental to another action or behavior. Examples: Keep Wildlife Wild Campaign, turtle crossing signs.
4.3.3.		W4.3.3 Negative perceptions	W. Communication to correct negative perceptions that an SGCN is harmful or a nuisance. Examples: EEK! Critter Corner; WDNR - Saving Wisconsin's Bats.
5	5 Law & policy		Actions to develop, change, influence, and help implement formal legislation, regulations, and voluntary standards. This includes strategies aimed at using government powers at all levels to protect biodiversity; includes awareness aimed at changing legislation. Name the law or policy, goal and major responsibilities or obligations, affected SGCN or related resources and affected parties, activities or locations.
5.1.	5.1 Legislation		Making, implementing, changing, influencing, or providing input into formal government sector legislation or policies at all levels. The official legal code governing society or "hard law".
5.1.1.		5.1.1 International level	International legislation. Example: wildlife trade laws like Convention on International Traded in Endangered Species (CITES).
5.1.2.		5.1.2 National level (Federal)	National legislation. Example: Federal Endangered Species Act, legislative appropriations, Lacey Act.
5.1.3.		5.1.3 Sub-national level (State, Tribal, Local)	State, Local, Tribal legislation. Examples: State--providing data to state legislators, stormwater control performance standards, endangered resources review in dam relicensing, invasive species control rule NR40; Local--developing zoning regulations, countryside laws, huntings bans; Tribal--creating tribal laws. W. Invasive species control and prevention statute, Endangered Species Law.
5.1.4.		5.1.4 Scale unspecified	Legislation (scale unspecified). W. Amend the State Endangered Species Act to include protection of habitat for listed species.
5.2.	5.2 Policies and regulations		Making, implementing, changing, influencing, or providing input into policies and regulations affecting the implementation of laws at all levels. How legislation is implemented--"soft law".
5.2.1.		W5.2.1 National (Federal)	W. National policies and regulations. Examples: Federal agency plans, USFWS Recovery Plans, National policies and regulations. List the type of policy or regulation and the specific action being taken.
5.2.2.		W5.2.2 State and Tribal	
5.2.2.1		W5.2.2.1 State	W. State policies and regulations. Examples: State agency plans, Forest Certification Plans, Master Plans for state properties, sustainable forestry practices - on state lands. List the type of policy or regulation and the specific action being taken.

ID	ActionCategory		Action_Description_Examples
5.2.2.2		W5.2.2.2 Tribal	W. Treaties established between tribes and the federal and state governments. These often have policies about species and habitat management and harvest allowances. Voigt decision over Chippewa harvest rights to fish, wildlife and non-timber forest products.
5.2.3.	W5.2.3 Local		W. Local policies and regulations. Examples: local zoning regulations, local Noxious Weed or Sand Mining Ordinances.
5.2.3.1.		W5.2.3.1 County	W. Examples: County land use ordinances
5.2.3.2.		W5.2.3.2 Municipal	W. Examples: Municipal parks regulations
5.3.	5.3 Private sector standards & codes		Setting, implementing, changing, influencing, or providing input into standards and professional codes that govern private sector practice. This category recognizes a range of obligation within these practices from those that are truly voluntary to those required by state statute to those that are part of policy or some other institutional requirement that fall somewhere in between. In these latter two scenarios individuals may be required to implement BMPs or standards while allowed varying degrees of interpretation of how, when and where to apply them. All Invasive BMPs in Wisconsin should be placed in 2.2.1 Invasive & Problematic Species Control - Prevention . Mandatory laws and regulations fall under 5.1 Legislation or 5.2 Policy and Regulation . Examples: Wisconsin Forest Management Guidelines, Stormwater Technical Standards, Avian Protection Plan Guidelines, nursery and landscape industry Code of Conduct for invasive species, open standards and corporate practices.
5.4.	5.4 Compliance and enforcement		Monitoring and enforcing compliance with laws, policies, and regulations, and standards and codes at all levels. Laws, policies, regulations and standards are ineffective if they are not implemented and enforced. Some organizations merely try to monitor compliance whereas others have the power of enforcement. Communication and awareness intended to educate people about obligations under laws or regulations that affect SGCN and their habitat should be placed in the appropriate category in 4.3 Awareness & Communications .
5.4.1.	5.4.1 International level		Conservation Actions that affect international compliance and enforcement of laws, regulations and policies to conserve SGCN and their habitat. Examples: Conservation Actions that affect CITES enforcement, international customs agents.
5.4.2.	5.4.2 National level (Federal)		Conservation Actions that affect national compliance and enforcement of laws, regulations and policies to conserve SGCN and their habitat. Example: USFWS enforcement of the Federal Endangered Species Act.
5.4.3.	5.4.3 Sub-national level (State, Tribal, Local)		Conservation Actions that affect compliance and enforcement of state laws, regulations and policies to conserve SGCN and their habitat. Examples: eradication of prohibited species under NR40 Wisconsin's Invasive Species Rule, water quality standard monitoring, State Game Wardens.
5.4.4.	5.4.4 Scale unspecified		Conservation Actions that affect compliance and enforcement at an unspecified scale or at multiple scales.
6	6 Livelihood, economic & other incentives		Actions to use economic and other incentives to influence behavior. If the Conservation Action is intended to inform or educate people to influence behavior this should be placed in 4.3. Awareness & Communication . List the type and nature of the incentive, intended outcome, how it is carried out and how the incentive is supported or funded.
6.1.	6.1 Linked enterprises & livelihood alternatives		Developing enterprises that directly depend on the maintenance of natural resources or provide substitute livelihoods as a means of changing behaviors and attitudes. Examples: Ecotourism, non-timber forest product harvesting, Bird City USA designation.
6.2.	6.2 Substitution		Promoting alternative products and services that substitute for environmentally damaging ones. Example: recycling, use of farm-raised versus wild game, Green Tier Certification program.
6.3.	6.3 Market forces		Using market mechanisms to change behaviors and attitudes. This category is used for Conservation Actions that affect business or financial sectors. Standards without incentives should be placed in 5.2 Policies and Regulations . Examples: energy star appliances, organic certifications, grass and forest banking, valuation of ecosystem services such as flood control, Certified Forest Program, Green Tier Certification.
6.4.	6.4 Conservation payments		Using direct and indirect payments to change behaviors and attitudes. Examples: tax credits, quid pro quo performance payments; resource tenure incentives, Landowner Incentive Program (LIP), Conservation Reserve Program (CRP).
6.5.	6.5 Non-monetary values		Using intangible values to change behaviors and attitudes. These are non-financial incentives--cultural, spiritual, life-style, human health. Some judgement is needed to distinguish this from Conservation Actions that should be placed in 4.3 Awareness & Communication . Use this category for Actions that go beyond passive communication with the target and that do not have a strong financial incentive. Examples: no child left indoor initiatives.
7	7 External capacity building		Actions to build the infrastructure to do better conservation. Every organization has to develop its own capacity to design, implement, manage and learn from its own work. However, if a group does this type of work to help partners then it should be placed in this category. Note the highlighted distinctions in each subcategory. List the involved parties, the type of capacity being built or supported, how it is done, affected SGCNs or resources and expected outcome.
7.1.	7.1 Institutional and civil society development		Building conservation institutions. Creating or providing non-financial support and capacity building for non-profits, governmental agencies, communities, and for profits. Example: creating new local land trusts; share expertise.

ID	ActionCategory		Action_Description_Examples
7.2.	7.2 Alliance and partnership development		Promoting cross-organizational informational sharing, learning and collaboration. Forming and facilitating partnerships, alliances, and networks or organizations. Examples: country networks, Conservation Measures Partnership, conservation initiatives.
7.2.1.		W7.2.1 Research	W. Partnership and alliances to improve research efforts. Example: University research partnerships.
7.2.2.		W7.2.2 Inventory and Monitoring	W. Partnership and alliances to improve inventory and monitoring efforts. Post management monitoring is included here. Citizen based monitoring.
7.2.3.		W7.2.3 Management and Protection	W. Partnership and alliances to improve management and protection efforts. Local work parties and volunteer efforts on State Natural Areas
7.3.	7.3 Conservation finance		Raising and providing funds for conservation work. Providing the financial resources for conservation. This applies to all private or public sector sources and mechanisms.
7.3.1.		W7.3.1 Research	W. Raising and providing funds specifically for research efforts to develop methods or protocols, develop conservation actions, etc. Applying for grants.
7.3.2.		W7.3.2 Management and Protection	W. Raising and providing funds specifically for management and protection efforts such as restoration, vegetation management, and land acquisition. State Conservation Tax (similar to MN or MO).
8	8 Research needed		"Research" is used broadly to cover research, monitoring and conservation planning. This category can easily become inflated and so users are asked to be realistic and not propose everything. The selection should be for those subjects that are most needed to improve the status of the taxon being assessed and that could realistically be achieved within the next five years. May include efforts to validate and get more detailed information on the factors used to rank species. This category includes research for natural habitat, natural communities and systems as they support SGCN. Most of the options are self-explanatory. Applicable to SGCN only. Species with Information Needs (SINS) and species that were assessed, but not classified as SGCN, are addressed through a different path.
8.1.	8.1 Research		Species and habitat. List the affected species, habitat, natural community, landscape or resource. List how this research will help conservation of SGCN or their habitat, overall approach and methods.
8.1.1.		8.1.1 Taxonomy	Research to clarify taxonomy.
8.1.2.		8.1.2 Population size, distribution & past trends	Research to answer population size, distribution and past trends. Includes inventory work for species and habitat. Monitoring future trends should be place in category 8.3 Monitoring . This category is for SGCN only, Inventory and mapping of invasive species should be placed in 2.2.3 Invasive & Problematic Species - Inventory & Early Detection .
8.1.2.1.		W8.1.2.1 Distribution and Mapping	W. Research to determine and locate current distribution/range/sites. Sufficient information should already exist or the species would not have been able to be assessed for SGCN status. This category assumes more targeted and detailed information is being gathered. Example: Kirtland's warbler.
8.1.2.2.		W8.1.2.2 Composition and Quality	W. Research to determine habitat needs, population viability and more complex population characteristics needed for effective conservation. Example: Powersheik skipperling.
8.1.3.		8.1.3 Life history & ecology	Research to clarify life history and ecology/habitat questions. Life history and ecology of invasive or problematic species should be placed in 8.1.5 Threats .
8.1.3.1.		W8.1.3.1 Life History	W. Research to clarify life history and habitat needs for the purpose of conservation actions. Example: host plant and foraging plant studies for Powersheik skipperling.
8.1.3.2.		W8.1.3.2 Habitat Elements	W. Research to identify essential habitat elements, features or preferences for effective conservation.
8.1.3.3.		W8.1.3.3 Species Interactions and Associations	W. Research to understand species interactions and associations for effective conservation. If invasive species are involved, this may overlap with 8.1.5 Threats and some judgment is needed to determine whether the focus is more on the SGCN or the invasive species.
8.1.4.		8.1.4 Harvest, use & livelihoods	Research for setting harvest levels, use and livelihoods.
8.1.5.		8.1.5 Threats	Research to determine the nature and extent of threats as well as characteristics of the threat for the purposes of prevention or control. Examples: effects of invasive species and disease; cumulative effects of development and climate change on habitat fragmentation.
8.1.6.		8.1.6 Actions	Research to determine how to avoid and prevent, mitigate or compensate for particular threats at the source or their effects. Examples: biocontrols, head-starting, adaptation strategies, invasive species control and prevention.
8.1.7		W8.1.7 Natural Community Inventory and Ecology	W. Current or historical composition, distribution and function of a "natural" community that includes the plants, animals and physical elements that occupy a common area and interact. This category acknowledges natural communities as habitats for groups of SGCN. Some judgment is needed as to whether the objective is from the species or community perspective. In the latter case we assume the research has some benefit to SGCN and their habitat to be listed here. Actions to address habitat for one or two SGCN should probably be placed in 8.1.2 Population Size, Distribution & Past Trends or 8.1.3 Life History & Ecology .

ID	ActionCategory		Action_Description_Examples
8.1.8		W8.1.8 Natural Community Threats and Actions	W. Research to determine nature and extent of threats (at the source) or the effect on the natural community and how to avoid, mitigate or compensate for this. Some judgment is needed as to whether the objective is from the species or community perspective. In the latter case we assume the research has some benefit to SGCN and their habitat to be listed here. Actions to address habitat for one to two SGCN should probably be placed in 8.1.5 Threats or 8.1.6 Actions .
8.2.	8.2 Conservation Planning		Research to inform and develop Conservation Plans, including recovery, management, harvest plans. Includes development and writing of the Plans. Data and information obtained from 8.1 Research and 8.3 Monitoring may be used in development of conservation plans. This category includes not only species and habitats, but natural communities and landscapes, because objectives from all three perspectives overlap in some Conservation Plans. In any case, we assume that development of the plan has benefit for SGCN and their habitat to be listed here.
8.2.1.		8.2.1 Species Action/Recovery Plan	Gathering information and development of species action/recovery plans. Example: development of Federally listed plant recovery plans, Wisconsin Wildlife Action Plan.
8.2.2.		8.2.2 Area-based Management Plan	Gathering information for and writing area-based management plans. Example: development of Biotic Inventory Reports, Rapid Ecological Assessments, Regional Planning Assessment, Master Plans.
8.2.3.		8.2.3 Harvest & Trade Management Plan	Research to inform and write harvest and trade management plans. Not common for SGCN in our state.
8.3.	8.3 Monitoring		Long-term monitoring to inform future trends. This implies a long-term dataset with the same variables or locations being sampled over time. There must be baseline information on the SGCN population or its habitat that already exists for future monitoring to occur. If this is not the case, then baseline information gathering should be placed in 8.1 Research . This is for SGCN and their habitat, including natural communities and systems. Invasive species monitoring should be placed in 2.2.3 Invasive & Problematic Species - Inventory & Early Detection .
8.3.1.		8.3.1 Population trends	Long-term monitoring of population trends. Example: Wisconsin Bald Eagle and Osprey Survey, Wisconsin Breeding Bird Atlas, Frog and Toad Survey.
8.3.2.		8.3.2 Harvest level trends	Long-term monitoring of harvest level trends. Example: Mississippi Flyway Council.
8.3.3.		8.3.3 Trade trends	Long-term monitoring of trade trends. Example: Timber economic analyses.
8.3.4.		8.3.4 Habitat trends	Long-term monitoring of habitat trends (this does not include inventory/mapping/identification of current distribution and status unless part of a long-term project). We have broadened this category to include not only species habitat, but natural communities and systems as well, because monitoring objectives may overlap (i.e., monitoring habitat elements may coincide with natural community characteristics).
8.3.4.1		W8.3.4.1 Distribution & mapping	W. Long-term, regular, periodic habitat distribution monitoring programs.
8.3.4.2		W8.3.4.2 Composition, Quality & Function	W. Long-term, regular, periodic habitat composition and condition monitoring programs. Example: water quality monitoring; wetland functional assessment.
8.3.5		W8.3.5 Effectiveness monitoring	W. Actions where the primary objective is to assess effectiveness of avoidance, prevention, mitigation, restoration, acquisition in achieving a desired outcome(s) for the target(s), which may be SGCN or its habitat. Other objectives may be part of the action, but this is the primary one. Examples: controlled burning and SGCN invertebrate host plant cover, biodiversity indices over time post habitat management.
8.4.	8.4 Other		Other research needs to cover emerging issues, changing environment, miscellaneous monitoring needs and initiatives.

Appendix 2.2

Representative and Significant Ecological Features for Wisconsin

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Appendix 2.2

Representative and Significant Ecological Features for Wisconsin

The ecological features described here are those for which Wisconsin has an opportunity and responsibility in helping maintain regionally, continentally, and globally significant populations and/or natural communities. This information, along with maps identifying locations in Wisconsin where these features occur, was used to help set priorities for the State Wildlife Action Plan.

Globally Important Resources in Wisconsin

Great Lakes and their Shorelines.

The Great Lakes are the largest freshwater lakes in the world. Great Lakes shorelines support a diverse and distinct mosaic of natural communities and many regional endemic species. Lake Superior has important fisheries and bird habitat (e.g. lake trout and whitefish spawning and nesting piping plovers). Lakes Superior and Michigan and their shorelines are important migratory bird corridors and provide habitat for wintering waterfowl. The Apostle Islands have exceptional examples of old growth forests, beach and dune complexes, coastal wetlands, and bedrock features. There is a tremendous regional repository of rare biota and intact natural communities here. The freshwater estuaries on the southwest shore of Lake Superior are in relatively good condition (some are “pristine”) and unique. Many other Great Lakes estuaries, especially to the east of Wisconsin on the “lower” lakes, are degraded due to poor water quality, development, and serious infestations of invasive species. Ridge and swale complexes are unique features of the Great Lakes shorelines, contain diverse assemblages of natural communities, and are especially prominent along Lake Michigan. The lakeplain prairie complex on southwestern Lake Michigan is the only non-forested ridge and swale system in the state and includes Chiwaukee Prairie. “Sandscapes” (these include sandspits, coastal barrier spits, cusped forelands, and tombolos) protect a diverse array of important natural communities and provide critical habitat for rare species (e.g., Piping Plover). Major concentrations of migratory birds occur on some of these sandscapes, especially the coastal barrier spits such as Long Island and Wisconsin Point. The Door Peninsula and Grand Traverse Islands have high concentrations of rare species associated with the calcareous soils and exposures of dolomite that characterize shoreline environments. Some “maritime” forests on the mainland and on offshore islands are of high quality.

Great Lakes and their Shorelines

Including dune, beach, forested ridge and swale, boreal forest (restoration sites), shore fens, and estuaries. Protect and restore harbor and river mouth shoreline and wetland habitats.

Preserve and maintain large expanses of sedge meadow, coastal fen and forested wetlands along the coast and manage in the context of a mosaic of community types.

Monitor community level vegetation changes within coastal fen in light of climate change and lowering lake levels.

Protect intact examples of forested ridge and swale sites, monitor for invasive exotic species and implement an eradication plan.

Increase representation of near-shore boreal forest by encouraging retention of white spruce, white pine, white cedar, and balsam fir, especially in older age classes, by adaptive management and selective planting.

Northern Highland Kettle Lakes and Pine Forest.

This sandy outwash plain has one of the highest densities of glacial kettle lakes in the world. It is a complex heterogeneous landscape of forested uplands, diverse wetlands, and many lake types. Some lake types, unmanipulated spring ponds, and undeveloped connecting streams, are now quite rare. Some rare lake types feature clear circumneutral water, hard bottoms, exceptionally low nutrient levels, and support rare invertebrates and fish species that are far better represented in this Landscape than anywhere else in the state. Some lakes and low gradient streams support wild rice beds, which are important both ecologically and culturally.

The pine-dominated dry-mesic forests that occur here are different than the matrix of hemlock-hardwood forest that historically vegetated most of northern Wisconsin and surrounds the Landscape. This is the best place in Wisconsin to practice large-scale white pine/red pine forest management, with opportunities to represent all age classes and patch sizes, including those which are currently scarce or absent. Natural red pine forest is at the

center of its continental range here, (which is limited to the northern Lake States, Ontario, and the Appalachian Mountains). Wildlife species associated with coniferous forests are especially well-represented here.

Pine-Oak Barrens.

Pine barrens found in Wisconsin are globally significant due to their distinctive ecological characteristics, restricted range, and rangewide rarity. Their species composition differs from the New Jersey pine barrens (which are pitch pine-dominated and well east of the range of many of the prairie species that are so important in the Upper Midwestern barrens). Elsewhere in the upper Midwest, pine barrens are degraded or the remnants small, offering limited opportunities for restoration or management. Wisconsin pine barrens support a high number of rare species, including some that are globally rare (such as the federally endangered Karner blue butterfly and the Kirtland's Warbler), and many on the state list of Species of Greatest Conservation Need. Pine barrens in Wisconsin are dynamic and highly variable fire-driven ecosystems, and can be managed for a continuum of natural structurally distinct community types from semi-open brush prairie, to savannas with scattered trees, to closed canopy dry forest.

Bur Oak Openings.

The Great Plains has savanna communities all along its eastern edge, but those farther south and west are much different than those in Wisconsin. The Nature Conservancy called the savanna found in southern Wisconsin the "northern bur oak opening". This savanna type occurs from central Illinois in a thin strip into Minnesota. The type has a limited range, and Wisconsin is the center of the feature and has the best opportunity for restoration, especially at larger scales. The Southern Unit of the Kettle Moraine State Forest, portions of the Central Sand Hills and Central Sand Plains, and some places in the Western Coulees and Ridges Ecological Landscape, are areas where significant management opportunities exist for this globally rare community. Some of today's scrub oak barrens, or brush prairie communities, were historically Pine Barrens that lost their coniferous component and have been partially restored through mechanical and chemical reduction of woody cover and frequent prescribed burning. "Scrub" oak savannas with short, brushy structure, composed primarily of black and northern pin oaks, could be restored in the Central Sand Plains, Northwest Sands, and Northeast Sands Ecological Landscapes.

Niagara Escarpment.

The Niagara Escarpment is a bedrock feature composed mostly of Silurian dolomite (strictly speaking, it's the steep, exposed side of a gently sloping bedrock ridge or "cuesta") that stretches from Lake Champlain in the northeastern United States westward across the Great Lakes to Wisconsin. Here the Escarpment is exposed from the islands off of the northern tip of the Door Peninsula southwest for over 150 miles into southeastern Wisconsin where it disappears beneath glacial deposits. The Escarpment supports many rare species, most notably a group of globally rare snails, the oldest trees known in Wisconsin, karst topography, and contains important hibernacula for bats. It has value for migratory birds and bats by providing updrafts and generally north-south 'leading line'. Rare or otherwise important natural communities and habitats associated with the Escarpment include dripping cliffs, dry cliffs, talus slopes, unusual conifer forests that contain the state's oldest trees, and, at one site on the Door Peninsula, the globally-rare alvar community.

Global

Northern Highland Kettle Lakes and Pine Forest

Including hemlock-hardwoods and forested wetland types in north central and pine forest in Northern Highland. Develop tax incentives to preserve old-growth forest.

Manage forest adjacent to old-growth stands and ephemeral ponds to complement the ecological values of the primary feature.

Work towards a balanced mosaic of age-classes; older age-classes are currently underrepresented.

Increase representation of red and white pine forests, especially older age classes.

Use adaptive management techniques to develop pine dominated forest structure and composition.

Develop techniques for using prescribed fire to reduce other woody competition when establishing and maintaining red and white pine forests.

Develop educational tools and demonstration areas to articulate the benefits of utilizing prescribed burning for ecological management.

Develop reliable natural regeneration techniques for red pine and mixed red and white pine forests.

Pine-Oak Barrens

Create financial incentives to develop jack pine – northern pin oak forests.

Create financial incentives to address differential market values between plantation forestry and natural regeneration dry forests, for retention of old-growth patches, or prescribed burning in and around core managed areas.

Develop educational tools and demonstration/training areas that promote prescribed fire and other barrens management practices.

Manage the full range of barrens succession stages and diverse habitats in a landscape context. A comprehensive landscape plan requires identification and management of early succession cores. The “barrens” also needs to have places managed in a shifting mosaic utilizing timber harvest with many clearcuts, some older than rotation age stands, some thinning of stands for savanna structure and a few protected groves. Many stands should be thinned to a safe amount of residual standing timber, and then burned for stand regeneration while leaving charred legacies. A few selected shallow, publicly owned lakes should have plans for open shorelines on the west and south sides.

Identify additional sites containing high quality or restorable barrens.

Develop a practical “toolkit” for maintaining structural and compositional characteristics of barrens ecosystems.

Integrate planning efforts across federal, state, county, local and industrial ownership boundaries.

Bur Oak Openings

Focus management and restoration efforts in the southern Kettle Moraine conservation opportunity area to emphasize oak openings, oak woodland and low prairie communities with smaller patches of dry prairie, open marshy wetlands, and patches of older closed canopy forest.

Focus management and restoration efforts in the sandstone-influenced conservation opportunity areas to emphasize oak barrens, oak woodland and sand prairie communities with smaller patches pine relicts, dry prairie, open shrubby barrens, closed canopy oak forest, and rock outcrops.

Create financial incentives similar to the either the Farmland Preservation Program or Managed Forest Law to protect and manage high quality examples of dry prairie, oak opening, oak woodland or retention of old-growth patches including hemlock and pine relicts, on private land.

Create financial incentives similar to the Wisconsin Forest Landowner Grant Program (WFLGP) to address the differences in market values between oak savanna restoration and oak forest management or prescribed burning in and around prairie and savanna managed areas.

Develop educational tools and demonstration/training areas that promote prescribed fire and other prairie and savanna management practices.

Identify additional sites containing high quality or restorable oak barrens, oak savannas and woodlands.

Develop a practical “toolkit” for maintaining structural and compositional characteristics of oak savanna ecosystems.

Niagara Escarpment.

In the Niagara Escarpment Conservation Opportunity Area, encourage public and private landowners to maintain natural forest cover, protect surface areas that drain into natural fissures, minimize pesticide infiltration, and do not physically block sinkholes.

Preserve habitat and protect from conversion to other land uses, those unique areas on the Niagara Escarpment currently occupied by SGCN species.

On Wisconsin’s only large alvar, minimize impacts from quarrying, road construction, and housing development by acquisition of fee title, development rights, transfer of development rights, and zoning.

Manage alvars by thinning densely vegetated areas and removing aggressive exotic shrubs.

Continently Important Resources in Wisconsin

Driftless Area Features.

The Driftless area occurs in southeast Minnesota, northeast Iowa, and northwest Illinois, however approximately 75% of the Driftless Area is in Wisconsin. Unlike most of Wisconsin and the Upper Midwest, the topography here

formed over millions of years without glaciation, and is characterized by deep erosional valleys, exposed bedrock-controlled ridges, steep forested side slopes with strong aspect differences that support high species and community diversity, and landscape heterogeneity. The rugged topography led to greater abundance and persistence of remnant community types that have been destroyed or more greatly diminished elsewhere. Forest cover is relatively extensive compared to other parts of southern Wisconsin. Natural community types and habitats that are especially well-represented here are oak forests, mesic maple-basswood forests, floodplain forests, hemlock and pine “relicts”, algific talus slopes, dry (goat) prairie, caves (and abandoned mines) with bat and herptile hibernacula, cliffs and associated rare plants and snails, and spring-fed cold-water streams. The lower reaches of several of Wisconsin’s largest rivers occur here including the Wisconsin, Black, and Chippewa Rivers which all flow into the Mississippi River. These river systems are associated with broad floodplains, containing extensive floodplain forests, marshes, and oxbow lakes. Where these are associated with large blocks of upland forest, the diversity of forest dependent wildlife is especially high and many rare species are present. The largest stand of southern bottomland hardwoods in the upper Midwest is located along the Lower Chippewa River.

Large Blocks – Old Deciduous-Coniferous Forest

Large contiguous blocks of this forest type are embedded in a relatively unbroken forested matrix. These deciduous-coniferous forests have some of the most diverse assemblages of breeding birds on the continent. This strip of habitat stretches from Algonquin Park in Ontario to central Minnesota but does not extend very far north or south. Wisconsin is in the heart of this high diversity bird area. These forests are centers of abundance for many species, and are believed to be a source area for broadly distributed species. Distribution maps of many warbler species follow the same boundary and are associated with this forest. Locations in Wisconsin where these forests are extensive and offer good opportunities for large-block management are the Winegar Moraine and Penoque Range.

The Baraboo Hills occur on an outcrop of a unique quartzite formation, and also represent a part of the largest remaining block of dry-mesic and mesic forest in southern Wisconsin. The area has a high diversity of species and is considered one of the state’s most important breeding sites for area-sensitive birds, especially those associated strongly with “southern” hardwood forests and Driftless Area conifer “relicts”. The best of the conifer stands are imbedded within a matrix of extensive hardwood forest, and are often associated with deep gorges cut through the bedrock by intact and ecologically important headwaters streams. The Baraboo Hills support a wealth of rare species and natural communities, and have been a major focus of conservation efforts for many decades. The unique geological features have attracted worldwide attention.

Boreal Transition Forest.

This forest type is only seen in parts of the coastal strip of Michigan and Wisconsin along the Lake Superior clay plain. It is not found in Minnesota. It is an edaphic feature associated with the local climate and has very different properties from the boreal forests in Canada. Wisconsin historically had white pine and white cedar abundantly represented in this community type, but virtually no primary forest is left. It was heavily converted and much of the area is still managed for aspen. The Lake Superior Clay Plain forest differs from boreal transition forests in Door County. In Door County, the overstory is similar, but the substrate consists of shallow soils over dolomite bedrock, and the ground flora includes Great Lakes shoreline specialists and calciphiles. In the Lake Superior Clay Plain the substrate is mostly deep lacustrine clay soils. Clay soils also have a high calcium status but are relatively impermeable to moisture infiltration, resulting in more wetland-like conditions. The Lake Superior forest has some boreal species not found on Door Peninsula. This area is important to boreal birds in Wisconsin. Climate change modeling suggests that areas next to the Great Lakes may retain the current climate the longest and might be places to concentrate efforts for protecting examples of temperate community types. The “snowbelt” along the Great Lakes may be the best place to manage for hemlock and other species requiring cool climates and constant, relatively high moisture levels.

Kettle Moraine Features.

This is a large glacial interlobate moraine starting east of Lake Winnebago and running southwest for almost 90 miles into southern Wisconsin. It features rugged topography and contains many glacial features such as kames, drumlins and eskers. The vegetation is a complex mosaic of savanna, prairie, sedge meadow, marsh, calcareous fen, and southern forest communities. Presently it is a large forested block in the midst of agricultural lands. Michigan has some similar topography but the interlobate moraine in Wisconsin was less suitable for conversion to agriculture than other regions and many of the natural features that have persisted here have all but disappeared elsewhere. Interlobate moraines with this combination of natural features at this scale are very rare, and possibly restricted to just a few locations in the Upper Midwest.

Large River Corridors.

Wisconsin has a large number of lakes, rivers, and streams. Large rivers such as the Upper Mississippi, Wisconsin, Chippewa, Black, St. Croix, Brule, Wolf and Namekagon, Rivers are significant. An abundance of smaller coldwater streams emanating from glacial moraines and sedimentary bedrock in the unglaciated Driftless Area also occur here. The lower Wolf River is considered to be one of the few remaining rivers with a high degree of natural meandering which is needed by some aquatic species. The Winnebago pool lakes have a very significant population of the lake sturgeon. These waters contain significant populations of fish and rare invertebrates such as mussels and dragonflies, and the larger waterbodies also serve as major migratory bird stopover areas.

Upper Midwest Regionally Important Resources in Wisconsin

Glacial Lake Wisconsin.

This area in central Wisconsin is in and around the bed of extinct Glacial Lake Wisconsin and is a biodiversity hotspot. The feature occurs in the Tension Zone and supports a unique mixture of southern and northern species. Many SGCN, especially habitat and area-sensitive species, thrive in the area. Wet-mesic white pine-red maple forests are found here, which support many sensitive species, and have few if any extant occurrences elsewhere in the Upper Midwest (those in Michigan were cut and have not been restored). Large expanses of dry forest and barrens occur here and the potential for barrens restoration is high. This is one of the two best places in the state and continent to manage for Midwestern barrens vegetation and its associated species. The state's largest area of contiguous wetland occurred here - 'The Great Swamp of Central Wisconsin' – and there are large expanses of wetlands remaining, though many have been altered hydrologically by ditches and dikes. Sandstone buttes, mesas, cliffs, pinnacles, and gorges occur here; some with rare species. These features do not occur in other parts of the Upper Midwest.

Large Blocks of Predominately Older Northern Forest.

The Blue Hills have quartzite bedrock and are similar in some ways to the Baraboo Hills. The area supports large blocks of relatively unfragmented forests. The high-gradient, softwater streams drain intact, forested watersheds, have significant diversity values, and look similar to mountain streams. The area contains unique geological features especially the Felsenmeers ("sea of rocks"), which consist of extensive slopes of open, shattered quartzite talus with unusual lichen communities and dramatic cold air drainages which are responsible for the presence of several notably disjunct northern species.

The Menominee Reservation has vast relatively unbroken hemlock-hardwood forests, scattered lakes, and ecologically important streams within forested watersheds. Large white cedar swamps are common in the eastern portion, where marl lakes supporting calciphilic plants occur. Prominent exposures of granitic bedrock occur along the Wolf River. Most of the forest is older than average for the state and supports significant populations of forest interior species that have become scarce in forests elsewhere.

Other northeast Wisconsin Forest have rock outcrops, rivers, and extensive forests, some with bedrock close to the surface including cliffs, talus slopes, and glade communities. It needs more study as to its regional importance.

Large Sedge Meadows, Fens and Prairies.

Although most of the tallgrass prairie has been lost, Wisconsin has some significant prairie remnants. Avoca Prairie is the largest contiguous prairie east of the Mississippi River. Scuppernong Prairie and Military Ridge have significant numbers of remnants and have very good potential for restoration. Chiwaukee Prairie is the largest wet-mesic prairie in the state. These remnants have high prairie species diversity. Among the largest concentrations of bluff ("goat") prairies in the Upper Midwest occur in Wisconsin's portion of the Driftless Area. Many of these are associated with significant stands of oak forest and restorable oak savanna. The bracken grasslands occurring at Spread Eagle are part of this category.

Wisconsin has a large number of wetlands covered under the heading sedge meadow, especially floodplain forests, marshes, and peatlands (however, Minnesota and Michigan also have many peatlands; Michigan has patterned peatlands that are more diverse) and to a lesser degree, fens, and prairie wetland types. Wetland loss in neighboring states has been greater than Wisconsin's on a percentage basis. Cedar swamps are common in some parts of the state and harbor many rare plants.

Caves and Abandoned mines.

Wisconsin has several caves and abandoned mines that have become hibernacula for large populations of bats. Neda Mine is considered to contain the largest number of hibernating bats in the Midwest. Even though many parts of the mine were inaccessible for censusing, the population was estimated to include at least 300,000 little brown bats (*Myotis lucifugus*), and hundreds of northern long-eared bats (*Myotis septentrionalis*), eastern pipistrelles (*Pipistrellus subflavus*) and big brown bats (*Eptesicus fuscus*) (Altenbach, unpublished data, 1995). Other abandoned mines known to harbor large numbers of hibernating bats occur along the Mississippi River and in the Penoque Range of far northern Wisconsin. Driftless Area caves also support bat hibernacula.

Medium-sized Rivers and Streams.

These waters contain significant populations of fish and rare invertebrates such as mussels and dragonflies, but have fewer species than the larger waterbodies. River systems such as the Wolf, Jump, Bark and Namekagon fall into this category. They also serve as major migratory bird stopover areas and often times harbor significant streamside natural communities.

The combined relevance of the fore mentioned ecological role goes well beyond our borders. Global, continental and upper Midwest features of importance, for which Wisconsin has a major role to play in the continued existence of a natural communities or species, indicates they should be our foremost conservation priorities. If we don't do it here, then conservation probably will not get done elsewhere and species will suffer the consequences of our actions (or inaction).

State Important Resources in Wisconsin

Even though other natural communities and species ranges may be better addressed elsewhere, we cannot assume they will. We also, have a responsibility to keep natural communities and species native to the state for future generations. Natural community assessments describing the importance in maintaining community types, assess their current condition in the state, and identify opportunities for managing the community type form the basis for additional high priority areas within the confines of the state. These highly rated natural communities and species are also considered priorities in the state.

Extensive Grassland Communities.

Native communities (prairies, sand barrens, and fens) and non-native grasslands such as pastures, hay fields, etc. make up the grassland communities. Wisconsin has some of the best opportunities in the Midwest to preserve and restore tallgrass prairie, and provide habitat for Henslow's Sparrow.

Working Northern Forest Communities.

The 37 counties north of the Tension Zone have about 70% of the state's forested area. The area was drastically disturbed during the Cutover Period (1870 – 1930) and by subsequent fires. Currently maple-basswood and aspen-birch are the two most common forest types. Wisconsin is now one of the nation's top two forestry production states, and forestry is the largest employer in 27 northern forest counties. These large expanses of forest provide habitat for some of our most beloved species such as Ruffed Grouse, Scarlet Tanager, Black Bear, and White-tailed Deer. These species thrive precisely because we have abundant habitat for them. Most places need not be identified for changes in focus, because they are accomplishing many conservation goals with existing direction, but other areas harbor large blocks of mature forest, forested wetland, conifer uplands, or beech-hardwood forest where tweaks in management direct could enhance the viability for several SGCN.

Floodplain Forest Communities.

A mix of hardwoods and wetlands characterize floodplain forest. Smaller patches along mid sized streams harbor some species not found in the forests along the major river ways. Fragmentation by agriculture, water impoundment, and development has reduced connectivity. Patch size is shrinking, and invasive species are an increasingly serious problem. With these combined factors, a few smaller floodplain forest systems merit priority to focus on resolving the threats and enhancing the potential the species will still be with us in the future.

High Quality Wetland Communities.

Many different kinds of wetland communities have water-saturated soils or other substrates as their common characteristic. Ecological functions and food web relationships are different in wetlands than uplands. In

Wisconsin 46% of the original wetlands were lost between 1780 and 1980. Wetlands are used by 43% of all federal listed threatened and endangered species and 32% of the state threatened/endangered species. Large patches of intact ash swamps or even disturbed, ditched and diked wetlands, such as Crex Meadows and Horicon Marsh provide habitat for and often times the largest populations of SGCN in the state.

Diverse Aquatic Communities.

The amount and high quality of Wisconsin's water resources is rare on a global scale. It ranges from small ephemeral ponds to the largest freshwater lake by surface area in the world, and includes a plentiful supply of groundwater. Runoff pollution, urbanization and development, recreation, fish stocking and harvest, and exotic species invasions are significant threats. Large river systems harbor a vast majority of the aquatic diversity, but several reaches of mid-sized streams provide habitat for specialized species.

Bedrock Communities

These small areas of the landscape often times harbor rarely found or unique species occurrence due to the specialized habitat and harsh growing conditions. Bedrock communities can take the form of relatively flat glades communities, buttes and mesas, or steep-walled gorge communities.

Priority Conservation Actions Tied to Conservation Opportunity Areas

Focus habitat work in on the natural communities that Wisconsin has an especially significant role in perpetuating the ecological features, natural communities, and species habitat. For Wisconsin, the ecological features listed above harbor pine-oak barrens, bur oak openings, warm water rivers, Great Lakes shoreline and estuarine communities, large sedge meadows, dry prairies, large blocks of older southern oak forest and woodland, large blocks of older northern forests, floodplains – including forests and backwaters, and cliffs/karst features of the Niagara Escarpment. Specific conservations actions include:

Global

Great Lakes and their Shorelines

Including dune, beach, forested ridge and swale, boreal forest (restoration sites), shore fens, and estuaries. Protect and restore harbor and river mouth shoreline and wetland habitats.

Preserve and maintain large expanses of sedge meadow, coastal fen and forested wetlands along the coast and manage in the context of a mosaic of community types.

Monitor community level vegetation changes within coastal fen in light of climate change and lowering lake levels.

Protect intact examples of forested ridge and swale sites, monitor for invasive exotic species and implement an eradication plan.

Increase representation of near-shore boreal forest by encouraging retention of white spruce, white pine, white cedar, and balsam fir, especially in older age classes, by adaptive management and selective planting.

Northern Highland Kettle Lakes and Pine Forest

Including hemlock-hardwoods and forested wetland types in north central and pine forest in Northern Highland. Develop tax incentives to preserve old-growth forest.

Manage forest adjacent to old-growth stands and ephemeral ponds to complement the ecological values of the primary feature.

Work towards a balanced mosaic of age-classes; older age-classes are currently underrepresented.

Increase representation of red and white pine forests, especially older age classes.

Use adaptive management techniques to develop pine dominated forest structure and composition.

Develop techniques for using prescribed fire to reduce other woody competition when establishing and maintaining red and white pine forests.

Develop educational tools and demonstration areas to articulate the benefits of utilizing prescribed burning for ecological management.

Develop reliable natural regeneration techniques for red pine and mixed red and white pine forests.

Pine-Oak Barrens

- Create financial incentives to develop jack pine – northern pin oak forests.
- Create financial incentives to address differential market values between plantation forestry and natural regeneration dry forests, for retention of old-growth patches, or prescribed burning in and around core managed areas.
- Develop educational tools and demonstration/training areas that promote prescribed fire and other barrens management practices.
- Manage the full range of barrens succession stages and diverse habitats in a landscape context. A comprehensive landscape plan requires identification and management of early succession cores. The “barrens” also needs to have places managed in a shifting mosaic utilizing timber harvest with many clearcuts, some older than rotation age stands, some thinning of stands for savanna structure and a few protected groves. Many stands should be thinned to a safe amount of residual standing timber, and then burned for stand regeneration while leaving charred legacies. A few selected shallow, publicly owned lakes should have plans for open shorelines on the west and south sides.
- Identify additional sites containing high quality or restorable barrens.
- Develop a practical “toolkit” for maintaining structural and compositional characteristics of barrens ecosystems.
- Integrate planning efforts across federal, state, county, local and industrial ownership boundaries.

Bur Oak Openings

- Focus management and restoration efforts in the southern Kettle Moraine conservation opportunity area to emphasize oak openings, oak woodland and low prairie communities with smaller patches of dry prairie, open marshy wetlands, and patches of older closed canopy forest.
- Focus management and restoration efforts in the sandstone-influenced conservation opportunity areas to emphasize oak barrens, oak woodland and sand prairie communities with smaller patches pine relicts, dry prairie, open shrubby barrens, closed canopy oak forest, and rock outcrops.
- Create financial incentives similar to the either the Farmland Preservation Program or Managed Forest Law to protect and manage high quality examples of dry prairie, oak opening, oak woodland or retention of old-growth patches including hemlock and pine relicts, on private land.
- Create financial incentives similar to the Wisconsin Forest Landowner Grant Program (WFLGP) to address the differences in market values between oak savanna restoration and oak forest management or prescribed burning in and around prairie and savanna managed areas.
- Develop educational tools and demonstration/training areas that promote prescribed fire and other prairie and savanna management practices.
- Identify additional sites containing high quality or restorable oak barrens, oak savannas and woodlands.
- Develop a practical “toolkit” for maintaining structural and compositional characteristics of oak savanna ecosystems.

Niagara Escarpment.

- In the Niagara Escarpment Conservation Opportunity Area, encourage public and private landowners to maintain natural forest cover, protect surface areas that drain into natural fissures, minimize pesticide infiltration, and do not physically block sinkholes.
- Preserve habitat and protect from conversion to other land uses, those unique areas on the Niagara Escarpment currently occupied by SGCN species.
- On Wisconsin’s only large alvar, minimize impacts from quarrying, road construction, and housing development by acquisition of fee title, development rights, transfer of development rights, and zoning.
- Manage alvars by thinning densely vegetated areas and removing aggressive exotic shrubs.

Continental

Driftless Area Features

- Focus management and restoration efforts in the loess-influenced forest Conservation Opportunity Areas to emphasize a matrix of older oak-central hardwood forest with smaller patches of oak woodland, oak opening, regenerating younger forest, native prairies and relict forests.
- Focus management and restoration efforts in the sandstone-influenced Conservation Opportunity Areas to emphasize dry oak savanna, oak woodland and sand prairie communities with smaller embedded patches containing regenerating oak forest, pine relicts, dry prairie, open shrubby barrens, closed canopy oak forest, and rock outcrops.

- Create financial incentives similar to either the Farmland Preservation Program or Managed Forest Law to protect and manage up to 20,000 acres of high quality examples of goat prairie, oak opening, oak woodland or retention of old-growth patches including hemlock and pine relicts, on private land.
- Create financial incentives similar to the Wisconsin Forest Landowner Grant Program (WFLGP) to address the differential market values between oak savanna restoration and oak forest management, reforestation of old fields to reduce fragmentation, or prescribed burning in and around prairie and savanna managed areas.
- Restore oak openings and woodlands and expand and enhance goat prairie and shrub habitats on public lands in appropriate Conservation Opportunity Areas through fire, ground layer enhancement, and timber management.
- Develop incentives for the start-up cost of converting from row-crop agricultural systems to a rotational grazing or biofuels production systems, which will keep permanent cover on the land, provide grassland habitat and significantly reduce soil loss into streams.
- Develop educational tools and demonstration/training areas that promote prescribed fire and other prairie and savanna management practices.

Identify additional sites containing high quality or restorable oak barrens, oak savannas and woodlands.

- Zoning of blufflands needs to recognize the critical importance of maintaining goat prairies, oak savanna restoration opportunities, connecting habitat corridors, migratory bird stopover sites, and forested habitat is essential for long-term maintenance of viable SGCN populations.
- Partnering with prairie/savanna/forest restoration groups to manage and protect habitats is vital to effectively keep SGCN on the landscape.
- Conduct large-scale planning efforts with agencies, state government and partners regarding the upper Mississippi River and its adjacent blufflands.

Large Blocks – Old Deciduous-Coniferous Forest

Baraboo Hills and Boreal Forest Transition

Develop tax incentives to preserve old-growth forest.

Manage forest adjacent to old-growth stands and ephemeral ponds the complement to the ecological values of the primary feature.

Work towards a balanced mosaic of age-classes; older age-classes are currently underrepresented.

Encourage regeneration or reestablishment of eastern hemlock, Canada yew, yellow birch, white cedar, and other conifer, where appropriate through adaptive management techniques.

Increase representation of red and white pine forests, especially older age classes.

Conduct an inventory and map the locations of ephemeral ponds.

Conduct additional survey work in northern wet forest for boreal birds, invertebrates and other taxa.

In areas free of exotic earthworms, minimize the likelihood of invasion by earthworms by preventing transportation of worms in soil, potted plants, mulch and compost.

Kettle Moraines Features

Concentrations of calcareous fens, prairies, oak woodlands, oak/central hardwood forest, forested wetlands, and glacial features.

Focus management and restoration efforts in the middle and north Kettle Moraine areas forest conservation opportunity areas to emphasize a matrix of older oak-central hardwood forest with smaller patches of oak woodland, oak savanna, native prairies and relict forests.

Develop a practical “toolkit” for maintaining structural and compositional characteristics of dry oak forest and oak savanna ecosystems.

Develop cost share incentives for landowners to burn, eradicate invasive exotic species, and restore oak openings and forests, prairies, fens and sedge meadows.

Preserve and manage all wet-mesic prairie sites, restore degraded sites (emphasizing restoration of hydrology), and manage the sites in a matrix of surrogate grasslands and other shrub and savanna habitats for area sensitive species.

Promote private land management of small sites where possible by offering incentives to private landowners for preservation or restoration of prairies.

Monitor wet-mesic prairies to determine whether prescribed burning and other management activities are maintaining invertebrate diversity.

Preserve and manage all wet-mesic prairie, calcareous fen and tamarack fen sites; restore degraded sites (emphasizing restoration of hydrology), and manage the sites in a matrix of sedge meadow, surrogate grasslands and other shrub and savanna habitats for area sensitive species.

Large River Corridors, including floodplain forests and backwater areas

Protect the ecological river corridor gradients from lowlands to uplands, along with protection of the floodplain corridor. This will enlarge the amount of habitat available, allow for the movement of species upslope and downslope as environmental conditions change over time, provide suitable habitat for species that require large areas, provide migratory bird stopover habitat, or are dependent upon a mosaic of interconnected habitats, including a full range of seral stages for their long-term survival.

Conduct large-scale planning efforts with agencies, state's and partners regarding the upper Mississippi River, its large river tributaries and the adjacent bluffslands.

Manage the sand and gravel-influenced floodplains of the Lower Chippewa and Lower Black Rivers for floodplain savanna conditions to help the recovery of Eastern Massasauga Rattlesnake.

Manage appropriate native sand prairie and sand prairie restoration sites for nesting Ornate Box and Blanding's Turtles.

Monitor long-term population status and trends for Eastern Massasauga Rattlesnake.

Continue head starting program for Ornate Box Turtles.

Conduct research on the interspecies competition between increasing "channel" shiners and the greatly decreasing Pallid Shiner.

Protection and restoration of natural lake and stream habitat, including establishment of refuge areas and appropriate management of aquatic plants, are needed for conservation of the Pugnose Shiner, which requires clear waters and littoral zone vegetation.

Protect and restore appropriate habitat in the lower Wolf River, Mississippi and Lower Wisconsin Rivers for Shoal Chub.

Upper Midwest

Glacial Lake Wisconsin.

Maintain large blocks of open bog/muskeg habitat and other surrounding wetlands and manage as co-occurring peatland communities by maintaining hydrology and eradicating invasive plant species.

Maintain large blocks of open sedge meadow and manage as complex in conjunction with associated wetlands such as open bog, poor fen, emergent marsh, shrub-carr, alder thicket and northern wet forest by maintaining hydrology, tree cutting and harvest, prescribed fire and eradicating invasive plant species.

Maintain lowland shrub communities, especially alder thickets and shrub-carr, and manage the working forest surrounding the shrub communities to benefit Golden-winged Warblers by leaving scattered off site aspen, ash and tamarack in the shrub areas and manage the uplands in a shifting mosaic to provide continuous habitat.

Survey large peatlands for presence of boreal birds, Lepidoptera and other boreal taxa.

Restore oak barrens on sites that will increase effective landscape for area sensitive species, such sand areas between large wetlands.

Manage oaks in the context of oak forest, oak woodland, oak savanna in a gradient from forest to open wetlands.

Maintain or restore mixed pine-oak forests to represent the range of variability expressed by this type, in a range of patch sizes and age classes.

Identify and restore oak/conifer barrens and shrub habitats through fire and timber management.

Large Blocks of Predominately Older Northern Forest – Blue Hills and Northeast Wisconsin Forests

Develop tax incentives to preserve old-growth forest.

Manage forest adjacent to old-growth stands and ephemeral ponds the complement to the ecological values of the primary feature.

Work towards a balanced mosaic of age-classes; older age-classes are currently underrepresented.

Encourage regeneration or reestablishment of eastern hemlock, Canada yew, yellow birch, white cedar, and other conifer, where appropriate through adaptive management techniques.

Increase representation of white pine forests, especially older age classes.

Develop reliable natural regeneration techniques for mixed white pine-hardwood forests.

Conduct an inventory and map the locations of ephemeral ponds.

Conduct additional survey work in northern wet forest for boreal birds, invertebrates and other taxa.

In areas free of exotic earthworms, minimize the likelihood of invasion by earthworms by preventing transportation of worms in soil, potted plants, mulch and compost.

Large Sedge Meadows, Fens, and Prairies

Maintain large blocks of habitat; manage complexes of sedge meadow in conjunction with associated wetlands such as open bog, poor fen, emergent marsh, shrub-carr, alder thicket and northern wet forest where possible.

Maintain large blocks of open bog/muskeg habitat and other surrounding wetlands and manage as co-occurring peatland communities.

Where possible, manage for complexes of wet prairie, calcareous fen, shrub-carr and tamarack swamp in the south.

Utilize prescribed fire or fluctuating water levels to keep an open aspect and prevent woody species invasion.

In high quality remnants avoid soil disturbance such as pothole creation, or level ditching.

Focus research on the development of management techniques for maintenance of calcareous fens.

Caves and Abandoned Mines

Develop statewide bat conservation plan.

Medium-sized Rivers and Streams.

Protect the ecological river corridor gradients from lowlands to uplands, along with protection of the floodplain corridor. This will enlarge the amount of habitat available, allow for the movement of species upslope and downslope as environmental conditions change over time, provide suitable habitat for species that require large areas, provide migratory bird stopover habitat, or are dependent upon a mosaic of interconnected habitats, including a full range of seral stages for their long-term survival.

Protection and restoration of natural lake and stream habitat, including establishment of refuge areas and appropriate management of aquatic plants, are needed for conservation of the Pugnose Shiner, which requires clear waters and littoral zone vegetation.

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Appendix 2.3 SGCN Selection Flowchart

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Appendix 2.3 SGCN Selection Flowchart Rationale

Decision: State listed as THR (threatened) or END (endangered), federally listed as THR or END or federally identified as NEP (nonessential experimental population) with a state B, N or migratory SNA rank? The objective of the SWAPs and the State Wildlife Grant program is to help species before they become listed as THR or END. However, the scope of the WWAP and its potential user base create an inevitable need to **NOT** exclude THR, END, and NEP species because it may make the WWAP incompatible with other regulatory responsibilities, incorrectly imply these are low priority, and/or create a disconnect with the mission of potential WWAP users. Species that are federally listed as THR or END without a numerical SRank may not be assigned “Yes” (i.e., federally listed species for other states).

Decision: SRank = S1, S2 or range rank w/ S1 or S2 (e.g., S1S3)? NatureServe’s conservation assessment ranking system relies on three categories (i.e., risk, threats and trends) with weighted factors in each category. We feel this is a systematic, reproducible and recognized method for evaluating and identifying SGCN. With minor variations in definition, the factors used in each category are commonly used among biologists and ecologists to assess the status of a species and its vulnerability to impacts. Range ranks mean there is a range of estimated values for the weighted factors in each of the three categories such that there is roughly an equal chance that the species “could be as low as” or “could be as high as”. Interpretation is conservative; the lower end of the range is used to determine SGCN status.

Decision: SRank = S4, S5, S4S5, SX or SNA? Species with these ranks are not of greatest conservation need relative to species in other categories. Some SNA species may be placed on the SINS list depending on the reason for the rank. New information may move a species in one of these non-SGCN ranks to an SGCN rank.

- **S4** = Apparently secure in Wisconsin due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
- **S5** = Secure in Wisconsin due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.
- **SX** = Presumed to be extirpated from Wisconsin. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
- **SNA** = A state rank is not applicable because the element is not a suitable target for conservation activities, typically because it is non-native, accidental, irregular, a long-distance migrant/transitory, or the element’s presence in Wisconsin is unconfirmed.

Decision: SRank = SU, SH or SNR? This determines whether a species should be placed on the SINS list or if it continues with the SGCN evaluation. A species is assigned one of these ranks if there is not enough information to reasonably estimate the factors of rarity, threats and trends that are used to derive the SRanks. Avoid equating lack of information with rarity or vulnerability. For example, if decision makers are unable to estimate (even conservatively) a range for number of occurrences, population size, or habitat vulnerability, this is a strong indication that the species should be ranked as SU or SNR rather than S1 or S2. Species marked as SH may be placed on the SINS list if the lack of verification in the past 20 years is because no surveys have been undertaken (again, lack of information). Not all species ranked as SH or SNR are placed on the SINS list. Species on the SINS list are highlighted for surveys when this information can inform ranking categories of rarity, threats and trends. The best action we can undertake for them is to gather basic information about their status and habitat needs.

- **SH** = Known only from historical records. The element may no longer be present in Wisconsin, but there is not enough evidence to state this with certainty. The SH rank is used when an element's presence has not been documented in decades despite some searching and evidence of significant habitat loss or degradation, or when an element has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in Wisconsin.
- **SNR** = Not ranked. State conservation status not yet assessed.
- **SU** = Unrankable due to lack of information or to substantially conflicting information about status or trends.

Decision: SRank = S3 or S3S4? At this decision, only species with a rank of S3 or S3S4 should remain. If that is not the case, then the species has an unusual or mistaken SRank and the user should contact the Natural Heritage Inventory program. These are the species in the "middle" that need the additional filters in the second part of the flowchart.

- **S3** = Vulnerable in Wisconsin due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors)

Decision: Weak GRank? The quality and quantity of data and information that go into GRanks varies. Some GRanks are "old" and it is difficult to verify the data used to derive them. In some cases, experts identify recent information that has not been incorporated yet into the ranks. Some species do not have a GRank. GRanks for some taxa are based on a small dataset. If decision makers estimate that the GRanks do not have important weaknesses, it is used to determine SGCN status.

Decision: GRank < 5 (e.g., G4S3, G4S3S4)? Species that are rare or uncommon and at moderate risk in our state (S3) or that range from moderate risk to apparently secure (S3S4) and are globally secure (GRank = 5) do not have a

conservation need relative to other species that are vulnerable both within our state and globally.

Decision: Is species at risk in Wisconsin because of: vulnerability to climate change; genetic isolation; low genetic diversity; significant range contraction; and/or non-cyclical decline? If you cannot reasonably estimate these answers based on evidence for the species itself, an associated species, or the species' habitat, the species cannot be added to the SGCN list at this time. These questions get at specific issues of biodiversity and environmental change that decision makers felt were not sufficiently addressed by SRanks or GRanks.

- Vulnerability to Climate Change: Based on a vulnerability assessment using a "low", "medium", "high" scale or equivalent. The SRank "threat" category looks at vulnerability to all threats. Climate change vulnerability needs specific emphasis.
- Genetic Isolation: Populations or individuals are geographically isolated or subject to other isolation mechanisms such that changes in the environment may prevent successful reproduction.
- Low Genetic Diversity: Few or limited genetic characteristics make it difficult for this species to adapt to changes in its environment.
- Significant Range Reduction: A recent (<5 years) or unusual change in the environment of a species or its distribution that cannot be adequately conveyed in the "range" factor used to derive the "rarity" score for the SRanks.
- Non-Cyclical Decline: A decline in range, occurrence numbers, or population size that cannot be adequately conveyed in the "short-term" or "long-term" factors used to derive the "trend" score for the SRanks.

Decision: Is it a Wisconsin Responsibility species? SRanks, rather than proportion of range or population in Wisconsin, are used to be consistent with the overall approach of using SRanks. For states that do not use SRanks, decision makers may use a different estimator from that state, but should document that it is similar to the factors used in deriving SRanks.

Document the sources used to make the final two decisions (i.e., risk in Wisconsin and Wisconsin responsibility species). This may include expert knowledge, references or other documentable sources that you considered.

Appendix 2.3 SGCN SELECTION FLOWCHART

