Chapter 1.
Wildlife Action Plan Foundation

"We are drowning in information, while starving for wisdom. The world henceforth will be run by synthesizers, people able to put together the right information at the right time, think critically about it, and make important choices wisely."

E. O. Wilson

In 2005, the Minnesota Department of Natural Resources (DNR) in collaboration with over 100 individuals and more than 40 organizations developed Minnesota's Wildlife Action Plan, *Tomorrow's Habitat for the Wild and Rare*. The plan was completed in September 2005 and approved by the US Fish and Wildlife Service. Approval of the plan allowed Minnesota to continue to participate in the State Wildlife Grant Program, which has provided about $1 million per year to implement the plan.

The US Fish and Wildlife Service requires that the Wildlife Action Plans address eight elements (Appendix A) and be reviewed and updated every 10 years. From 2013 to 2015 conservation partners came together again to update Minnesota's plan. This document is the result of that work. A list of partners who participated in the process can be found in Appendix B.

Minnesota's first Wildlife Action Plan included 292 Species in Greatest Conservation Need (SGCN). The updated plan includes 346 SGCN and includes bees, which were not addressed in the original plan. The 2015 list of SGCN can be found in Appendix C.

Since 2005, Minnesota has received over $10 million in State Wildlife Grant funds to invest directly in the implementation of the Wildlife Action Plan. Many successful projects and partnerships have been funded through this program. Here are a few highlights:

- Releasing more than 5,200 captive-reared mussels, including the federally endangered Higgins eye, into the Mississippi River gorge and discovering two juvenile Higgins eye mussels. This represents the first verification of successful natural reproduction from a population of reintroduced endangered mussels!
- Identifying shoreline areas most critical for the conservation of Species in Greatest Conservation Need. This information was used by counties to inform revisions to their land-use standards and identify important areas for protection and restoration.
- Restoring over 687 acres of bluff prairie habitat on 45 parcels of privately owned lands in southeastern Minnesota to complement habitat improvement work being done on public lands with state funds.

- Identifying golden-winged warbler[1] habitat preferences throughout its breeding season to enable better management of forests for this Minnesota stewardship species.
- Systematically surveying rare animals throughout the state, resulting in thousands of new records that can be used proactively by business and industry to minimize impacts to SGCN.
- Initiating a long-term prairie status and trends monitoring project for vegetation and bird communities with links to a multi-organization adaptive management effort.
- Conducting a statewide dragonfly and damselfly survey, which identified 19 new species in Minnesota.
- Working with Audubon Minnesota and other partners to identify 20 additional Important Bird Areas throughout the state.
- Acquiring over 700 acres of habitat supporting SGCN.

The results from these and many other projects implemented under the Wildlife Action Plan have provided a wealth of information that has been integrated into the 2015-25 plan. The plan also incorporates information from other conservation plans that have been developed over the past 10 years.

The 2015-25 Wildlife Action Plan builds upon the foundation established in the 2005 plan. One of the first steps in updating the plan was to survey users of the plan to determine additional information or products that would make the plan more useful. Increased prioritization, collaboration with other planning efforts that have taken place in recent years, and providing information in Geographic Information System (GIS) format were the recurring recommendations we received, and have been addressed in the plan.

Addressing Climate Change

Minnesota's climate is changing (see Appendix D), effecting both how the DNR and our conservation partners operate and the natural resources we protect. Although climate change was mentioned in the 2005 plan, updating the plan involved conducting a habitat climate change vulnerability assessment and reviewing habitat and species vulnerability assessments and other information about the changing climate. The Wildlife Action Plan addresses many of the strategies recommended in the *National Fish, Wildlife and Plants Climate Adaptation Strategy* (2012).

Audiences

The primary audiences for the plan are the same as in 2005 and include the following:

- conservation practitioners who manage conservation lands or work with regional or local governments or private citizens on conservation issues;
- researchers who seek to improve our knowledge of SGCN, their habitats, and conservation issues, including emerging issues that could affect common species;

[1] Stewardship species are those species for which populations in Minnesota represent a significant portion of their North American breeding, migrating, or wintering population, or species whose Minnesota populations are stable, but whose populations outside of Minnesota have declined or are declining in a substantial part of their range.

- governmental agencies and private organizations that make land use, land management, or policy decisions that may affect SGCN and their habitats;
- members of the public who enjoy and appreciate wildlife and want to participate in its conservation; and
- managers of public and private conservation funds and other funding decision makers.

Goals

The goals of the 2005 Wildlife Action Plan have been updated to better reflect our understanding of wildlife conservation needs and the approaches needed to address them. The goals of the 2015-25 plan are to:

1) Ensure the long-term health and viability of Minnesota's wildlife, with a focus on species that are rare, declining, or vulnerable to decline;
2) Enhance opportunities to enjoy Species in Greatest Conservation Need and other wildlife and to participate in conservation; and
3) Acquire the resources necessary to successfully implement the Minnesota Wildlife Action Plan.

Wildlife Action Plan Approach

Minnesota is home to over 2,000 known native wildlife species. Approximately 16 percent (346) of these species have been identified as Species in Greatest Conservation Need (SGCN) because they are rare, their populations are declining, or they face serious threats that may cause them to decline. Minnesota's Wildlife Action Plan takes a three-pronged approach to ensuring the long-term health and viability of Minnesota's wildlife (Figure 1.1). The first and most comprehensive is the habitat approach. In identifying Minnesota's 2015 list of SGCN, experts considered a number of causes for decline, including habitat loss, habitat degradation and fragmentation, disease, pollution, and exploitation. They also considered life-history traits of species that could increase their vulnerability to threats. The primary causes of decline are habitat-related (see Table 3.1). The habitat approach focuses on sustaining and enhancing terrestrial and aquatic habitats for SGCN in the context of the larger landscapes. To facilitate the implementation of this approach, the plan identifies a preliminary Wildlife Action Network that represents quality habitats for terrestrial and aquatic SGCN. To further prioritize the implementation of on-the-ground, partner-based conservation projects, Conservation Focus Areas have been identified within the network.

The second approach focuses on specific SGCN or groups of species that are affected by non-habitat-related issues. The species approach identifies a prioritized group of species whose needs cannot be sufficiently addressed by the habitat approach, and suggests specific conservation actions. The plan also identifies species for which more information is needed to assess their conservation status or the factors contributing to population declines.

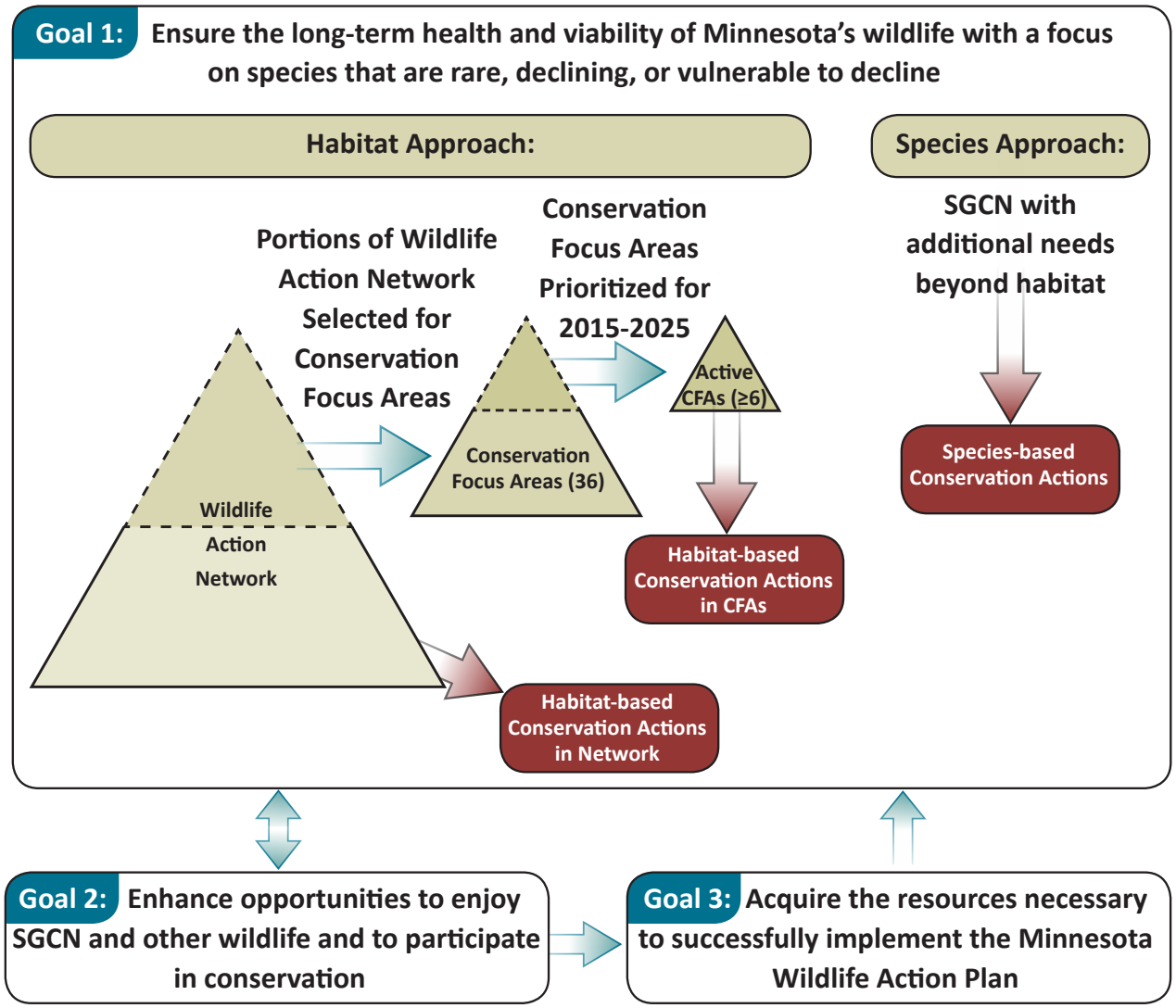

Figure 1.1. Wildlife Action Plan Approach.

The third approach recognizes that providing people with opportunities to enjoy wildlife and habitats and to actively participate in their conservation helps to ensure an engaged conservation community now and into the future that supports conservation funding and contributes to Minnesota's outdoor recreation-based economies.

The Habitat Approach

The habitat approach emphasizes sustaining and enhancing terrestrial and aquatic habitats for SGCN in the context of the larger landscapes (including watersheds). Local habitat is considered part of a larger habitat system across the landscape. The goals for managing local habitat should include sustaining or enhancing landscape-scale biological diversity, improving the functions of conservation lands and waters, and supporting ecosystem resilience. Resilience, as it applies to Minnesota's Wildlife Action

Plan, is the capacity of an ecological system to absorb some level of disturbance and reorganize while still retaining essential functions, structures, and feedbacks. The focus of the habitat approach is to implement conservation actions that will maintain or enhance the conditions that increase a system's resilience. Examples of such actions include protecting large habitat areas from fragmentation, restoring natural levels of connectivity while maintaining natural barriers, reducing invasive species, an emphasis on managing habitats for biological and functional diversity (vs. single-species needs), minimizing pollution and impervious surfaces, restoring watershed hydrology, and reintroducing disturbance when appropriate. Measuring ecosystem resilience is an emerging concept that needs additional research and refinement but includes developing ways to assess functional groups (e.g., decomposers, producers, predators), redundancy of functional groups at multiple scales, structural diversity, ecosystem services, and human social/ecological connections. Measures of changes in resilience will be defined and used as possible over the next 10 years.

To implement this habitat approach, the Wildlife Action Plan lays out the basis for the long-term vision of a Wildlife Action Network composed of terrestrial and aquatic habitat cores and corridors to support biological diversity and ecosystem resilience with a focus on SGCN. To begin development of this network, the Wildlife Action Plan's management team convened groups of taxonomic experts to analyze the distribution of SGCN. This analysis was combined with expert opinion and GIS data to map habitats containing viable or persistent populations and "richness hotspots" of SGCN (Figure 1.2). Added to this information are other data on the relative condition of habitat. Sites with quality habitat or ecosystem function such as spatially prioritized Sites of Biodiversity Significance, Lakes of Biological Significance, and Stream Indices of Biological Integrity combined with the information on species viability and richness form the base of the Wildlife Action Network (Figure 1.3). The network, largely based on ground-truthed, mapped habitats, represents a diversity of quality habitats that contain populations of SGCN. See Appendix E for detailed methodology.

Purposes of the Wildlife Action Network

The Wildlife Action Network serves three purposes:

1) addresses large-scale habitat stressors such as climate change, fragmentation, and invasive species;

2) increases the effectiveness and efficiency of actions by the conservation community; and

3) prioritizes and focuses conservation work over the next ten years by identifying Conservation Focus Areas (CFAs).

Addressing Large-Scale Stressors

As climate change becomes more pronounced, its effects will be both direct and indirect. Impacts from climate change in addition to those from other large-scale drivers will be synergistic; that is, multiple stressors will have an effect that is greater than what may be considered simply additive. Species are already moving in response to climate change, and it is expected that the ranges of many more plant and animal species will shift and habitats will change. The Wildlife Action Network will facilitate adaptation to these changes by identifying core areas large enough to contain a diversity of ecotones and habitats to allow for local shifts (e.g., dry to mesic prairie), and connections to allow for species movements and the flow of energy and materials. These conditions will support the biological diversity already present in the Wildlife Action Network and make it more likely that ecosystem resilience can be

maintained in response to climate change and other stressors, such as invasive species and other forms of habitat degradation. Current research finds little evidence of the potential negative consequences of connections, such as the spread of predators and pathogens (Haddad et al. 2014), and strong evidence of positive effects, such as increased biological diversity (Gilbert-Norton et al. 2010). Connectivity of habitats is not appropriate, however, for naturally unconnected systems such as certain wetlands. Increased native biological diversity has generally been found to decrease the invasability of invasive plants (Levine and D'Antonio 1999; Hooper et al. 2005; Fridley et al. 2007; Yan et al. 2015).

Increasing the Effectiveness and Efficiency of Conservation Actions

Focusing habitat management, restoration, and protection within the Wildlife Action Network will enhance core areas of habitat and connections between habitats. Existing habitat within the network will provide source populations of plants and animals to colonize newly protected and restored areas. A network focus will increase efficiency by facilitating coordination of management, prioritizing outreach efforts, and targeting technical assistance. Coordination of management will also increase its effectiveness. For example, coordinating activities across multiple ownerships within the network can benefit species that require large areas of habitat in a certain successional stage (i.e., time since disturbance). Limited resources for monitoring activities can be targeted within the Wildlife Action Network. Long-term status and trend monitoring will likely target areas both inside and outside of the network to evaluate the effectiveness of the network and adapt management over time (see "Wildlife Action Network Monitoring," in chapter 5).

Prioritizing the Work of the Wildlife Action Plan: Conservation Focus Areas

Given the extent of the Wildlife Action Network and limited resources, the Wildlife Action Plan further prioritizes work by identifying Conservation Focus Areas (CFAs) within the network. While the Wildlife Action Network is a broad system to guide conservation efforts, the Conservation Focus Areas are where on-the-ground action will be focused to directly benefit SGCN and their habitat. These are priority areas for working with partners to identify, design, and implement conservation actions and report on the effectiveness toward achieving the goals and objectives defined in Wildlife Action Plan. (See Appendix E for information on how the network and CFAs were identified and for information on the CFAs.) Identifying Conservation Focus Areas is intended to focus conservation efforts over the next 10 years to maintain and enhance the resiliency of the Wildlife Action Network.

Conservation Focus Areas do not represent all of the important areas in the Wildlife Action Network for SGCN. Conservation Focus Areas are areas with conservation value for which there are resources, such as organized and willing partners or funding, to address conservation needs, making it more likely that results are achievable within the next 10 years. Some important areas have received a great deal of attention in the past so that relatively little additional conservation work needs to be done; for other important areas, there may be limited opportunity to address their needs over the next 10 years.

To identify Conservation Focus Areas, the Wildlife Action Network was first scored using the following scalable metrics: SGCN population viability scores, SGCN richness, spatially prioritized Sites of Biodiversity Significance, ranks of Lakes of Biological Significance, and Stream Indices of Biological Integrity (Figure 1.4; see Appendix E for more information on scoring methods). The scored network was then used as a guide for regional DNR Nongame Wildlife staff and others to identify a set of potential Conservation Focus Areas, concentrating on areas with conservation needs and opportunities.

Additional input on the draft focus areas was then solicited in day-long workshops with regional staff from several DNR divisions. Following these meetings, staff from the Wildlife Action Plan management team further prioritized the draft proposed Conservation Focus Areas by evaluating them primarily based on conservation needs and opportunities, as well as investment required to address the needs, and return on investment in terms of species or habitats benefited. This evaluation resulted in 36 Conservation Focus Areas, of which at least 6 will be targeted for specific projects over the next 10 years (Figures 1.5 and 1.6).

The boundaries of some Conservation Focus Areas extend outside the Wildlife Action Network. In general, the boundary was extended if the target of the Conservation Focus Area was an aquatic habitat that necessitates a watershed approach. In these cases, actions may be necessary in highly degraded areas in order to maintain or enhance the quality of downstream areas. In other cases Conservation Focus Areas include areas outside the Wildlife Action Network that can enhance connectivity.

Please see Conservation Focus Area overviews (starting at page 73) for descriptions of individual Conservation Focus Areas. Successful implementation of projects within Conservation Focus Areas will require broad partnerships. During implementation of the Wildlife Action Plan, teams of partners will be established to develop specific objectives, actions, effectiveness measures, and monitoring plans for Conservation Focus Areas. See chapter 6 for more details on implementation.

Caveats about the Wildlife Action Network

Identification of the Wildlife Action Network is based on a rich set of species occurrence data and biodiversity rankings from several decades of intensive survey efforts by Minnesota Biological Survey staff; surveys and public reports collected by Nongame Wildlife Program, Scientific and Natural Areas, and Parks and Trails staff; intensive sampling efforts by the Minnesota Pollution Control Agency for stream Indices of Biological Integrity; and other sources of information (habitat modeling data were used for some species). The Wildlife Action Network does not capture potentially important areas lacking survey information. Over the next 10 years, the network should be further refined to include new information on rare species occurrences and Sites of Biodiversity Significance.

In addition, while some spatial prioritization and landscape connectivity data were incorporated from existing planning efforts (the Scientific and Natural Areas Strategic Plan and the Minnesota Prairie Conservation Plan), the current Wildlife Action Network should be considered as the initial building blocks to define a network of cores and corridors across the state. Using spatial tools to facilitate decision making, the network should be further refined over the next 10 years to better define the size and configuration of the network. Also, knowledge of the appropriate amount and size of core area and connections needed for ecosystem resiliency is still evolving, and the Wildlife Action Network should evolve with that understanding.

Finally, the development of the Wildlife Action Network is largely based on populations of SGCN and habitat. Working with others to broaden the network to include consideration of other features, such as rare plant populations and recreation opportunities, will increase the effectiveness and utility of the network. We envision an ultimate goal of a “Conservation” Action Network of which wildlife is a component.

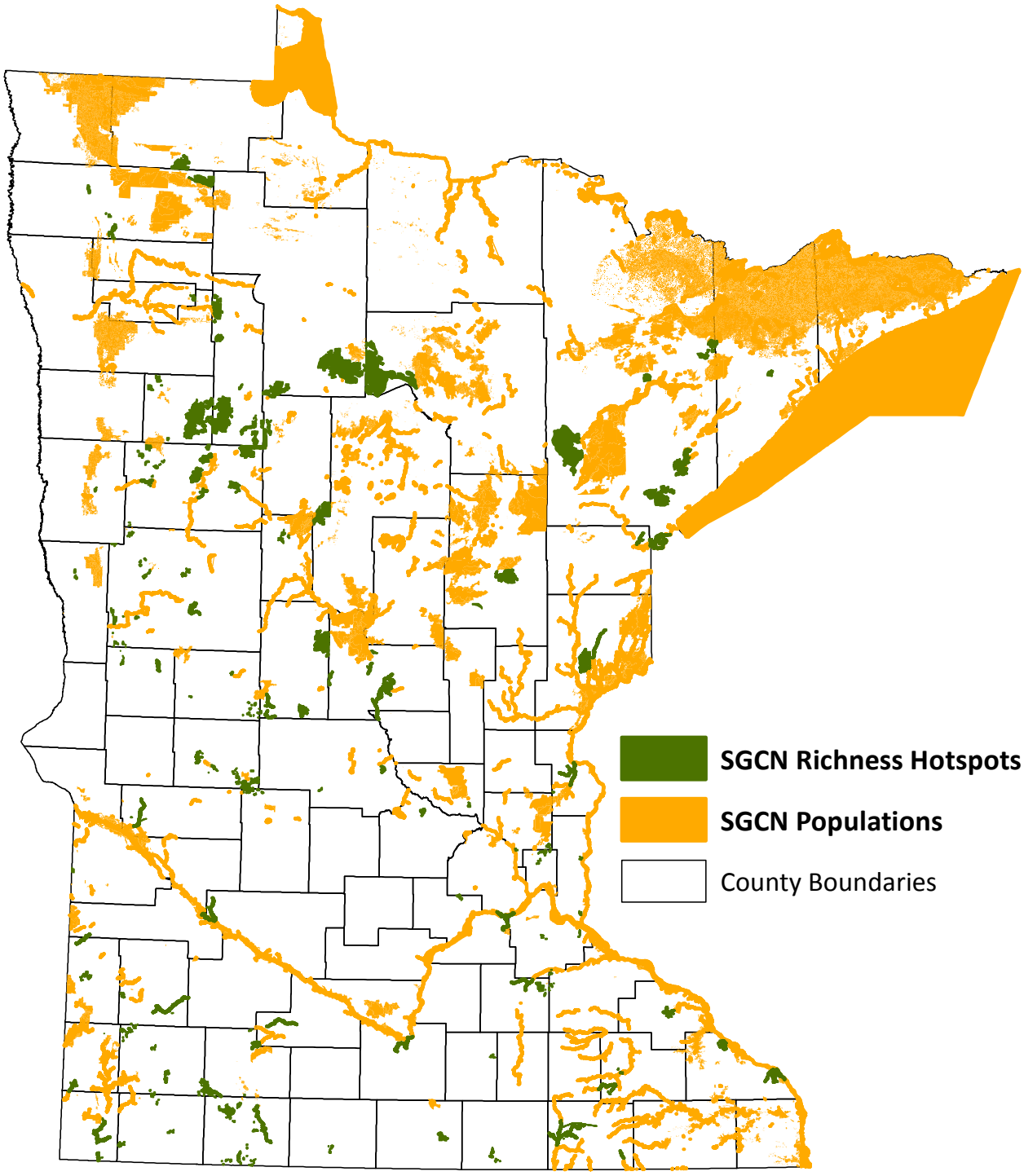

Figure 1.2. Mapped populations (orange) and richness hotspots (dark green) of Species in Greatest Conservation Need (SGCN). The SGCN populations here are the same top 95% score of mapped SGCN that was included in the Wildlife Action Network (see Appendix E). The SGCN richness hotspots represent areas of high SGCN richness that were not mapped as SGCN populations and do not represent all SGCN richness hotspot areas in Minnesota. The area in northeastern Minnesota delineating a portion of Lake Superior represents Minnesota's managed area of the lake.

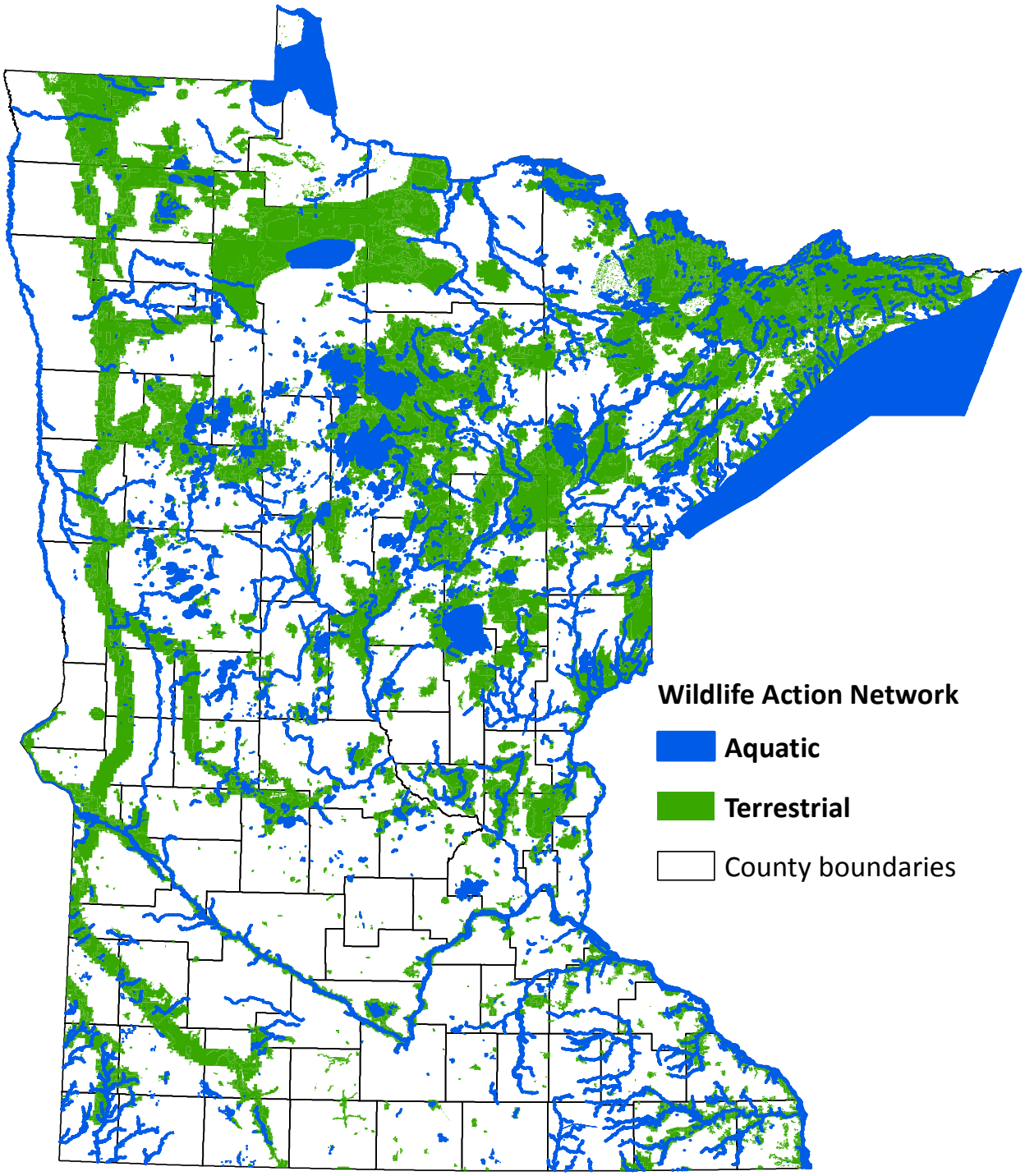

Figure 1.3. The Wildlife Action Network with differentiation of aquatic (lakes and rivers, blue) and terrestrial (including wetlands, green) habitats. The area in northeastern Minnesota delineating a portion of Lake Superior represents Minnesota's managed area of the lake.

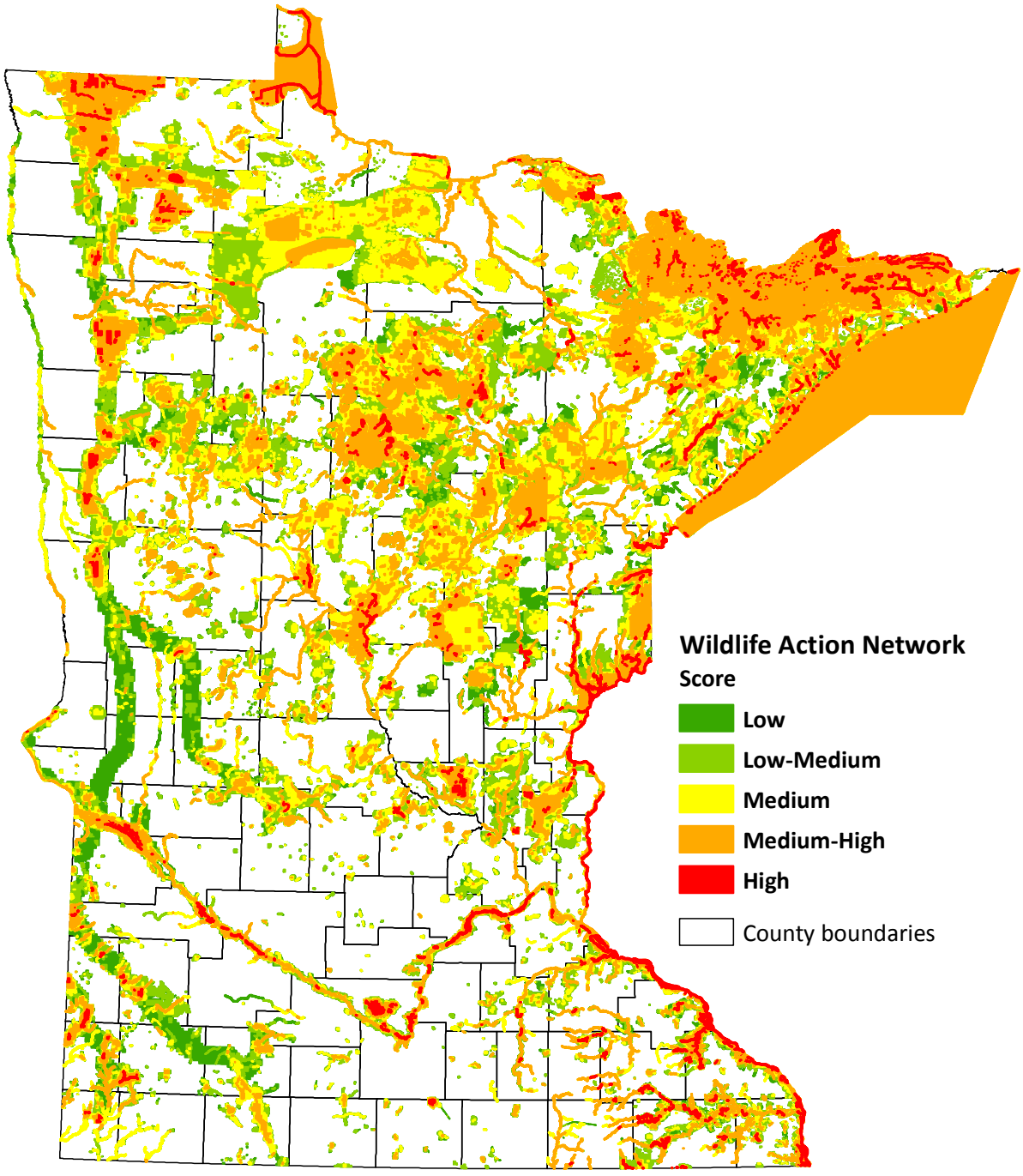

Figure 1.4. The Wildlife Action Network scored. Scores are based on five scalable metrics: SGCN population viability scores, SGCN richness, spatially prioritized Sites of Biodiversity Significance, ranks of Lakes of Biological Significance, and Stream Indices of Biological Integrity (IBI). Lower scores (green) in a given area indicate the metric scores for any of these five components were either relatively low or zero, while high scores (red) indicate that multiple metrics of high scores overlap. For example, a red area could indicate several good or outstanding SGCN populations and/or high SGCN richness (including species that did not have population maps available) along with a high score from another prioritization layer. See Appendix E for more details. The area in northeastern Minnesota delineating a portion of Lake Superior represents Minnesota's managed area of the lake.

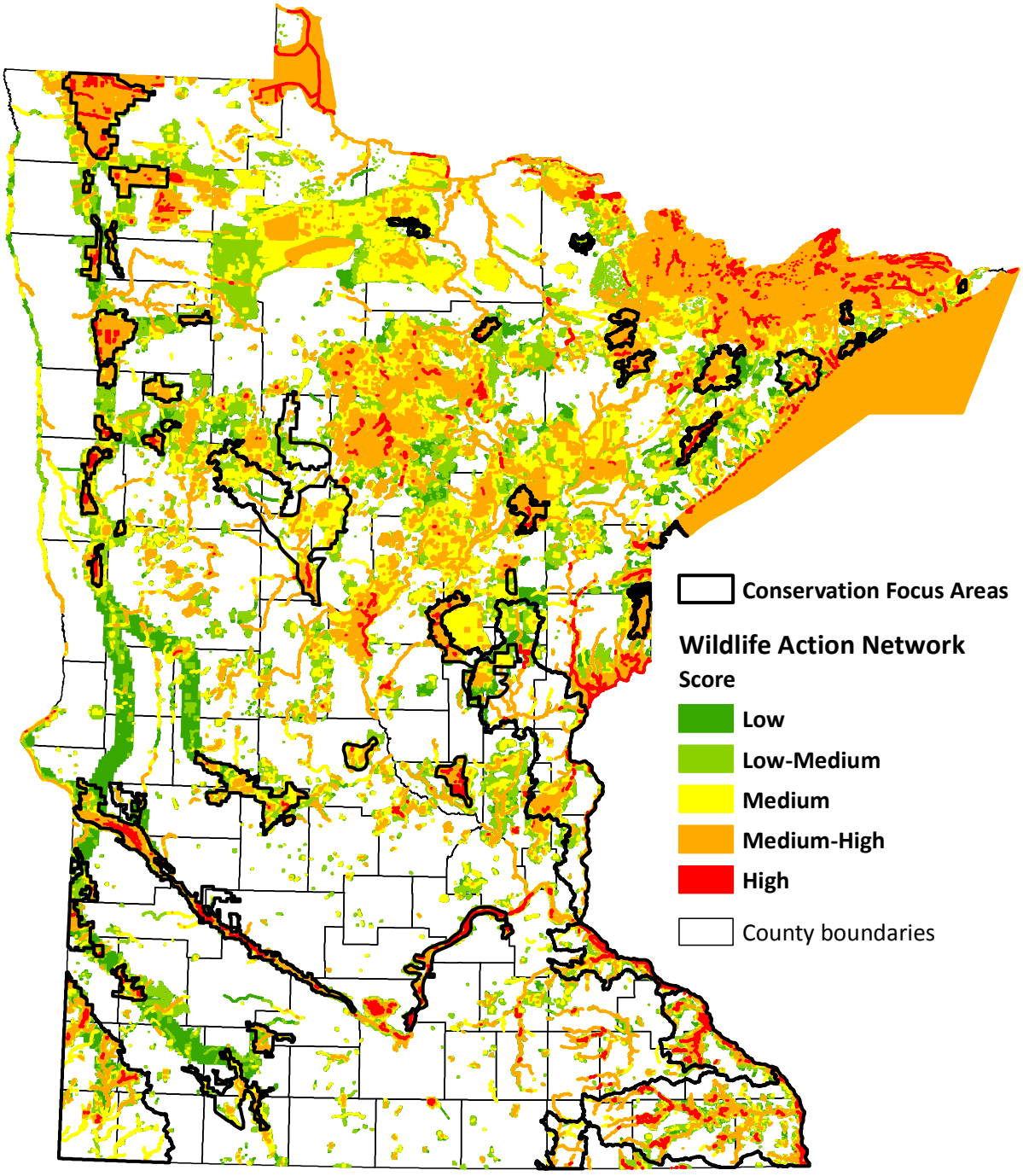

Figure 1.5. Conservation Focus Areas (outlined in black) in relation to the Wildlife Action Network (green to red shading). See Figure 1.4 and/or Appendix E for an explanation of the Wildlife Action Network scores. The area in northeastern Minnesota delineating a portion of Lake Superior represents Minnesota's managed area of the lake.

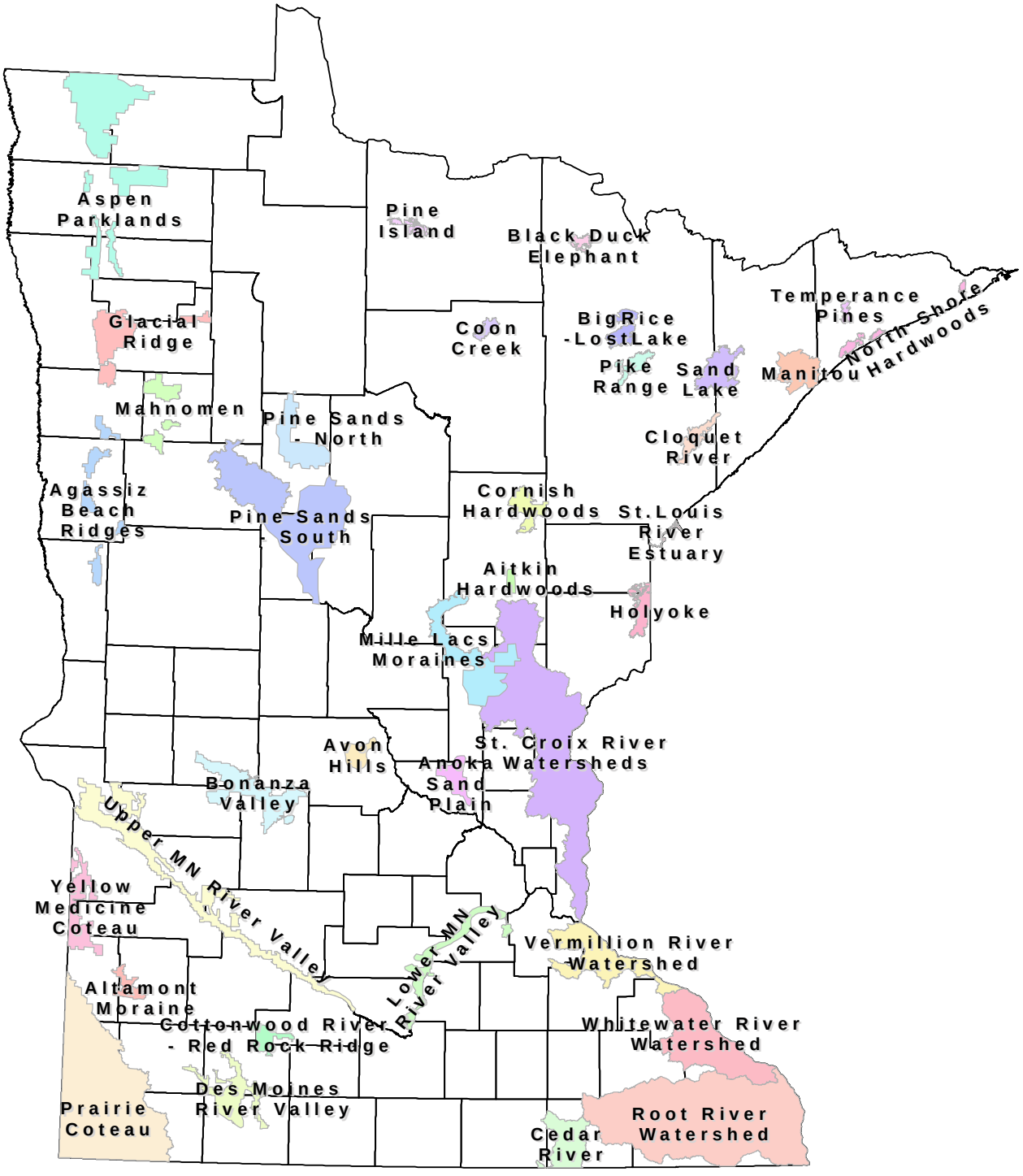

Figure 1.6. Conservation Focus Areas

The Species Approach

The Wildlife Action Plan recognizes that we cannot conserve Minnesota's 346 SGCN by managing on a species by species basis. The habitat approach described above used species occurrence data to map viable or persistent populations and richness "hotspots" of SGCN, and that approach serves as the foundation to conserve the majority of the state's SGCN. The species approach addresses the needs of species for which the habitat approach is not sufficient.

Addressing Non-Habitat-Related Issues Limiting SGCN Populations

The species approach in the Wildlife Action Plan identifies species or groups of species that are affected by specific threats or life-history traits that may contribute to their rarity or make them more vulnerable to decline. For these species, a habitat approach alone is not enough to maintain or increase the species' population, and specific conservation actions are required (chapter 4, Goal 1, Objective 2).

We evaluated the list of SGCN for populations that may be rare, have declined, or may decline within the next 10 years and identified four categories of issues to focus conservation actions around: (1) disease, (2) limited ability to recover, (3) stewardship species with a limited distribution, and (4) deliberate killing or overexploitation. The priority species that are targeted under these categories met the following criteria:

- a habitat approach alone is not sufficient for maintaining or increasing populations,
- specific conservation issues were identified,
- specific conservation actions (other than survey, research, or monitoring) can be implemented to address those issues,
- the conservation actions have a high likelihood of maintaining or increasing populations, and
- the populations can be monitored to report on the effectiveness of conservation actions.

Improving Knowledge

The species approach also targets species for which more information is needed to assess their conservation status or the factors contributing to population declines. To prioritize these species, we compiled information used in amending Minnesota's list of Endangered, Threatened, and Special Concern Species in 2013 (MN DNR 2012), notes from Species Technical Advisory Team meetings, and all feedback received on the teams' recommendations. The following three categories are the prioritized gaps in species information that were identified as a result of this evaluation:

1) State-listed SGCN for which more data are needed to assess their current conservation status (endangered, threatened, or special concern) (chapter 4, Goal 1, Objective 3.1). The list is provided in Appendix F, section 3a.

2) Species or groups of species for which Species Technical Advisory Teams lacked sufficient information to determine if the species met the criteria for SGCN (chapter 4, Goal 1, Objective 3.2). The list is provided in Appendix F, section 3b.

3) SGCN for which Species Technical Advisory Teams members were unable to identify a cause of population decline (chapter 4, Goal 1, Objective 3.3). The list is provided in Appendix F, section 3c.

The latter two categories were distributed to the Species Technical Advisory Team members for priority ranking based on criteria that included urgency, importance, feasibility, and likelihood of obtaining actionable results. The full list of species evaluated under each category and the selection process can be found in the methodology section in Appendix F.

Additionally, there are several species groups or areas of the state that are undersurveyed and areas of the state for which data on SGCN are quite old. The plan includes objectives to address these needs (chapter 4, Goal 1, Objectives 3.4–3.6).

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