MINNESOTA'S WILDLIFE ACTION PLAN 2025-2035

CONSERVING HABITATS AND BIODIVERSITY

CLIFF, TALUS, AND ROCK OUTCROP

DEPARTMENT OF NATURAL RESOURCES

NONGAME WILDLIFE PROGRAM

Acknowledgments

We would like to thank more than 300 people who contributed to the development of this State Wildlife Action Plan (SWAP) throughout our revision process over the past two years (see List of Plan Contributors). Everyone's varied perspectives and expertise has improved the plan and will carry on into the next ten years of conservation action for Minnesota's biodiversity and vulnerable wildlife. A specific thank-you to members of the Nongame Wildlife Program core team who facilitated teams, developed content, and pulled together this huge resource: Alison Cariveau (lead), TJ Boettcher, Daren Carlson, Mags Edwards, Julia Geschke, Benjamin Gieseke, Kristin Hall, Chris Jennelle, Tim Mitchell, Elizabeth Nault-Mauer, Jessica Ruthenberg, and Jim Wanstall. Special appreciation also to Lee Pfannmuller, Bridget Henning-Randa, Bob Dunlap, and April Rust who contributed so much to this revision. We thank numerous taxonomic experts and all the volunteers who participated in eleven revision teams; please see the full List of Plan Contributors.

Funding

The SWAP revision was funded through U.S. Fish and Wildlife Service State Wildlife Grants as well as matching funds from private donations to the Nongame Wildlife Fund and Reinvest in Minnesota funds. We also received funding from the Minnesota Environmental and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).

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Cover Photos: Leedy's roseroot, Welby Smith; Rock outcrop, Swedes Forest Scientific and Natural Area, Deb Rose

How to cite this document: Minnesota Department of Natural Resources. (2026). Minnesota's Wildlife Action Plan 2025-2035: Conserving Habitats and Biodiversity. Ecological and Water Resources Division.

Cliff, Talus, and Rock Outcrop

Habitat Description

This chapter features several types of habitat that are composed of sparsely vegetated native plant community types. These habitats, which include cliffs, talus slopes and rock outcrops, all have extensive areas of exposed substrate. They occur as small patches or long linear strips throughout the state (see Figure 3.19).

Cliff and Talus

Cliff and talus communities are present on cliffs or talus slopes on steep-sided bluffs, along lakes and streams, on margins of bedrock ridges and in other settings with sheer bedrock exposures. Cliffs and talus slopes are often associated with one another because talus slopes are composed of rock fractured either from cliffs or smaller areas of exposed bedrock on steep hillsides. The vegetation of these communities is generally open. Lichens and mosses are often the dominant life forms, and vascular plants are sparse or patchy because of scarcity of soil.

In the Laurentian Mixed Forest Province, cliffs and talus communities are mostly restricted to the North Shore Highlands and Border Lakes subsections, where the Precambrian bedrock is frequently at or just below the surface and rugged topography is common. In the Eastern Broadleaf Forest Province, these communities are abundant in the Blufflands Subsection of southeastern Minnesota, where sedimentary bedrock is typically at or near the surface and topography is rugged. Scattered cliffs are present on bedrock formations elsewhere in the state.

Rock Outcrop

Rock outcrop communities are open plant communities on horizontal or sloping bedrock exposures. Some outcrops are relatively level whereas others are very rugged. They are common in landscapes with thin soils over bedrock and are typically, although not always, small in size (i.e., less than 25 acres (10 hectares). Crustose and foliose lichens

Photo: Northern Dry Mafic Cliff and Northern Dry Open Talus, Brule Lake, Michael Lee

typically cover exposed rock surfaces, and fruticose lichens are also common. Vascular plant cover is sparse to patchy, depending on the amount of fracturing of the bedrock surface and accumulation of soil in cracks, crevices, and shallow depressions. Outcrops that have minimal fracturing and little accumulation of soil are dominated by lichens, with scattered shrubs and herbaceous plants. Outcrops with deep crevices provide vital year-round habitat, including for overwintering below the frostline, for some SGCN reptiles, like the common five-lined skink (*Plestiodon fasciatus*).

Many plants on bedrock outcrops are adapted to frequent desiccation because of the low moisture-holding capacities of substrates, and exposure to direct sunlight and strong winds. Plants must also withstand rapid fluctuations in substrate temperatures, which are significantly colder at night than in surrounding forests and much warmer during midafternoon on sunny days. Limited availability of nutrients in outcrop communities strongly influences community composition and limits growth rates of plants. Fire, as well as frequent drought and scarce soils, play a role in maintaining the open vegetation characteristic of these communities. Rock outcrop communities are most common in the Border Lakes and North Shore Highlands subsections and in the upper Minnesota River valley.

Habitat Map

To depict Cliff, Talus, and Rock Outcrop habitat (see Figure 3.19), we compiled spatial data from several sources: DNR's Natural Plant Community layer and the Minnesota Geological Survey. (For more information, see Habitat Map Methods in Chapter 3: Habitats). We note included sub-types below; underlined items have links to online descriptions.

Associated Native Plant Community Classes by Ecological Systems

Cliff/Talus

CTn11 Northern Dry Cliff (PDF)

CTn12 Northern Open Talus (PDF)

CTn24 Northern Scrub Talus (PDF)

CTn32 Northern Mesic Cliff (PDF)

CTn42 Northern Wet Cliff (PDF)

CTu22 Lake Superior Cliff (PDF)

CTs12 Southern Dry Cliff (PDF)

CTs23 Southern Open Talus (PDF)

CTs33 Southern Mesic Cliff (PDF)

CTs43 Southern Maderate Cliff (PDF)

CTs46 Southern Algific Talus (PDF)

CTs53 Southern Wet Cliff (PDF)

Rock Outcrop (RO)

ROn12 Northern Bedrock Outcrop (PDF)

ROn23 Northern Bedrock Shrubland (PDF)

ROs12 Southern Bedrock Outcrop (PDF)

Minnesota Geological Survey

From the Minnesota Geological Survey we used the Minnesota Bedrock Outcrop polygons.

Photo: Rock outcrop, Swedes Forest Scientific and Natural Area, Deb Rose

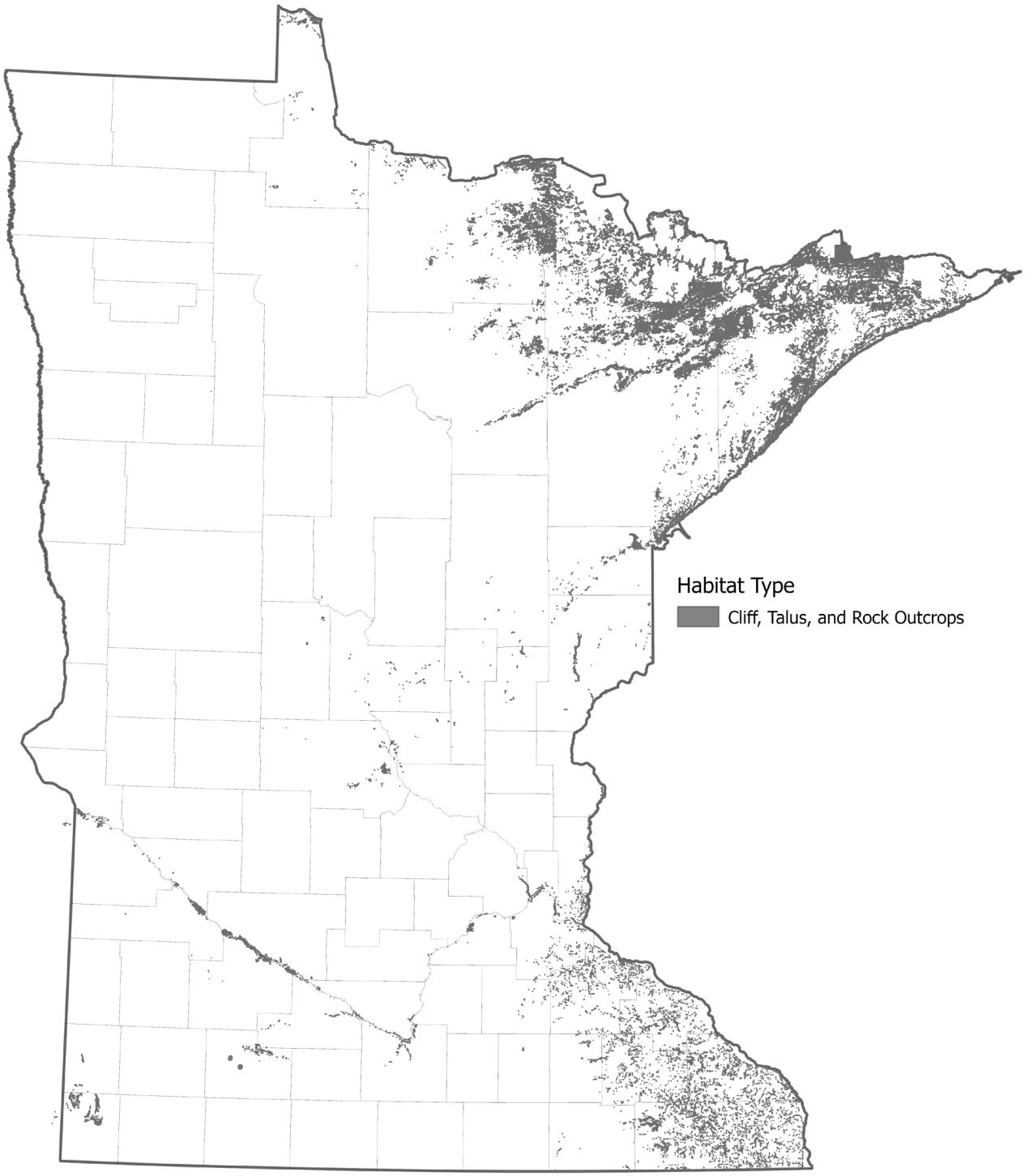

Figure 3.19. A map depicting Cliff, Talus, and Rock Outcrop habitat in Minnesota including DNR Native Plant Community Classes in the Ecological System of Rock Outcrop as well as rock outcrop data from the Minnesota Geological Survey.

Conservation Overview

Maderate cliffs (and associated algific talus slopes) are globally rare, distributed only in Minnesota, Wisconsin, Iowa, and Illinois. Found in deep, narrow valleys in the Blufflands Subsection of southeastern Minnesota, they have a unique cold microclimate that is created by ridgetop sinkholes and subterranean ice caves. Temperatures can remain cool throughout the summer, even on the warmest days. These cliff and talus communities provide a cool, moist, equable climate required for several rare SGCN land snails, some of which only occur a couple of locations. A variety of human activities, either within these communities (such as rock climbing) or affecting the sinkholes on lands above these cliffs, may threaten these communities.

Rocky outcrops are critically important for protecting specialized flora and fauna and for maintaining biodiversity at multiple spatial scales (Fitzsimons & Michael, 2017). Their locations as dispersed across the landscape make designing conservation strategies challenging. Rock outcrop communities along the Minnesota River are threatened by woody encroachment (e.g eastern red cedar (*Juniperus virginiana*) and common buckthorn (*Rhamnus cathartica*), mineral extraction and residential and recreational development.

Species in Greatest Conservation Need

Despite taking up a small proportion of the land in terms of acres, cliffs, talus and rock outcrops provide habitat for 74 animal and 71 plant SGCN as primary or secondary habitat (see Table 3.19).

Primary habitats are those that species rely on and use most consistently; if these habitats were degraded or lost, it would have the greatest effect on the species. Secondary habitats are those in which a species can be found some of the time, but less frequently than a primary habitat. Animals with more general habitat requirements are associated with multiple habitat types, while specialists are associated with one or few. Habitat associations for insects were not differentiated into primary and secondary habitats and are shown in the total column. For plants, only a single primary habitat was identified per species. Tables associating each SGCN with the 15 habitats identified in this SWAP can be found in Appendix D (animals) and Appendix E (plants). Examples of SGCN are described below; state-listed species are linked to their account in the Rare Species Guide.

Table 3.19. Numbers of SGCN with Cliff, Talus, and Rock Outcrops as primary or secondary habitat.

Species Group	Primary Habitat	Secondary Habitat	Total
Birds	2	0	2
Mammals	2	12	14
Reptiles	8	0	8
Bees	-	-	15
Beetles (terrestrial)	-	-	4
Butterflies	-	-	8
Moths	-	-	14
Snails (terrestrial)	8	0	8
Spiders	0	1	1
Plants	71	-	71
Total	**91**	**13**	**145**

Birds

Common nighthawks (*Chordeiles minor*) associate with rock outcrops as a primary habitat. They nest on sparsely vegetated sites, especially rock outcrops in the upper Minnesota River valley and the Border Lakes Subsection, as well as sites in prairies and oak savannas, and in recently burned or logged areas. The peregrine falcon (*Falco peregrinus*) is an SGCN whose primary habitat association is with cliffs. This species had been extirpated in Minnesota due to DDT poisoning by the 1960's, and after the ban of DDT and active reintroduction efforts, a breeding population has been re-established in Minnesota and their range in the United States continues to expand (see Rare Species Guide profile for more details). Both of these species also nest on buildings and are associated therefore with urban and other developed spaces.

Mammals

Although found in a variety of habitats in northeastern Minnesota, rock voles (*Microtus chrotorrhinus*) are most often associated with frost-fractured rock outcrops and rocky streambeds. Moist conditions and boulders or crevices seem to be important habitat features. The smoky shrew (*Sorex fumeus*) is also found in a variety of northern forest habitats, but its preferred microhabitat includes cool, damp forests with mossy covered rocks and decaying debris. They also have been documented in glacial boulder streams and within talus slopes. Although these two SGCN closely associated with talus slopes, rock outcrops and boulder piles, many other mammal SGCN may be observed using these habitats, including the Eastern heather vole (*Phenacomys ungava*), Western harvest mouse (*Reithrodontomys megalotis*), and American badger (*Taxidea taxus*).

Reptiles

In Minnesota, the common five-lined skink is found in or near granite or gneiss outcrops (PDF) in the Minnesota River Valley (Lang,1982), and in exposed limestone and sandstone outcrops and bluff prairies (PDF) in the eastern part of the state (Oldfield and Moriarty 1994). The areas inhabited by skinks generally have abundant cover and basking areas. The presence of rocks or bedrock outcrops is a very important habitat component for this species (Lang,1982; Howes & Lougheed, 2004; Gelvin-Innvaer et al., 2025).

The timber rattlesnake (*Crotalus horridus*) occurs in the eastern and central United States. Minnesota is on the northwestern periphery of its range, which extends north along the Mississippi River from Illinois to Minnesota. Timber rattlesnake specimens have been collected from 8 counties in southeastern Minnesota, but survey efforts in the late 1990s and early 2000s found that populations were substantially reduced or extirpated from several areas where they occurred historically (Keyler & Oldfield, 2003). In Minnesota, the ideal habitat for timber rattlesnakes includes forested bluffs, south-facing rock outcrops (rock outcrops PDF), and bluff prairies (bluff prairies (PDF), particularly in the Mississippi River valley. Bluff prairies located on steep, south or west-facing hillsides, with rock outcroppings and ledges, are essential habitat components because over-wintering dens are often located in these areas. Surrounding forests, prairies, and agricultural lands are used as summer feeding grounds. Two necessary habitat components for this species are open areas for thermoregulation and dens for over-wintering.

Photo: Timber rattlesnake on a rock outcrop, Julia Geschke

Case Study: Common Five-Lined Skink Microhabitat Research

Gelvin-Innvaer et al. (2025) describes an initiative by the DNR Nongame Wildlife Program and the Minnesota Biological Survey, in cooperation with other partners, to assess microhabitat use of and response by the common five-lined skink, a SGCN, to outcrop management along the Upper Minnesota River Valley. This resulted in recommendations for management thresholds for this population. These recommendations will help to update the DNR's Rare Species Guide Account for this species.

See the Case Study at the end of this chapter, which includes companion initiatives for protection, restoration and management of rock outcrops in the Upper Minnesota River Valley. Collectively, these constitute multi-faceted, integrated initiatives that involved many, diverse partners and funding sources.

Photo: Juvenile five-lined skink, Deb Rose

See also Gelvin-Innvaer, 2018; Reptile Renaissance: July–August 2018, Minnesota Conservation Volunteer

Invertebrates

Several species and subspecies of rare tiger beetles of the genus *Cicindela* are found in the shoreline-dunes-cliff/talus habitat. The laurentian tiger beetle (*Cicindela denikei*) is limited to rock outcrops and sandy openings in hardwood forests in the Border Lakes Subsection.

The bluff vertigo (*Vertigo meramecensis*) and other species of Pleistocene land snails are found on steep, moist, shaded, cool north-facing slopes and cliff faces in the Blufflands Subsection. This small land snail also occurs on algific slopes and maderate cliffs but generally avoids areas with continuous cooling from cold air or water discharge. Although researchers have raised questions recently about the taxonomic distinctness of some of the SGCN land snails, all are rare and associated with the same habitats.

Plants

In western Minnesota, waterhyssop (*Bacopa rotundifolia*) is found primarily in small rainwater pools on bedrock outcrops (PDF) and occasionally along the margins of shallow prairie ponds (PDF). The water is rarely more than inches deep and typically evaporates by July, leaving the sediments at the bottom of the pool moist or sometimes dry and cracked. *Bacopa rotundifolia* is generally able to persist for a couple more weeks after the pools dry up and then completely disappears from view.

The known habitats of wolf's spikerush (*Eleocharis wolfii*) in Minnesota are primarily associated with level outcrops in the southern part of the state (Minnesota River Prairie and Inner Coteau subsections) of bedrock (PDF). Specifically, they grow in the margins of shallow rain water pools that form in depressions on the bedrock or in thin sediments over the bedrock within a prairie or savanna (PDF) setting.

While associated primarily with the muddy margins of prairie ponds in non-forested wetlands, short pointed umbrella-sedge (*Cyperus acuminatus*) also occurs at the edge of shallow rock pools (PDF). The shallow rock pools where *C. acuminatus* has been found are mostly level with shallow depressions where rainwater accumulates. The pools are typically only a few meters across and 5-7 cm (2-3 in.) deep. Plants are typically rooted in a thin layer

of organic sediment that accumulates at the bottom. This is a sparsely vegetated, ephemeral habitat that may support only a few scattered plants or several hundred, depending on habitat conditions.

Another extremely rare plant in Minnesota is the ball cactus (*Coryphantha vivipara*), which occurs in crevices on granite outcrops. New occurrences of these and several other SGCN plant species were documented in a systematic survey of ephemeral rock pools by Harris (2010) during the summers of 2006-2008.

In southeastern Minnesota Leedy's roseroot (*Rhodiola integrifolia* ssp. *leedyi*), a SGCN that is also federally threatened, is restricted to shallow ledges on north-facing dolomite cliffs that can be nearly 100 feet high. It is further limited to sites where groundwater seeps through the sinkholes and openings amidst the region's karst landscape, releasing cool air through subsurface vents along the cliff face. Dependent on these cool, moist conditions, the species is considered a glacial relic, "a plant that was more widespread at the end of the last glaciation, but which has since become isolated because of the loss of appropriate habitat in intervening areas as the climate has warmed" (Sather, 1993). The four populations known in Minnesota are among just six that exist; the remaining two sites are in New York, one of which supports only a single plant. As the climate continues to warm, the unique habitat where this species is found faces another threat. Increased precipitation, especially several storm events, can disturb the cliff environment, dislodging vegetation and substrate materials. Indeed, in recent years plants were found in the talus at the base of cliffs at three sites and, at another site, the entire cliff face had been dislodged.

Lichens

Rock outcrops are home to many unique lichen species. Lichen 'species' are a complex that consists of two or more, typically obligate, symbionts. The dominant partner is a fungus, which creates the main body of the organism. The endosymbiont is either a green alga or a cyanobacteria that lives within the fungal tissue. Usnea mutabilis (Bloody Beard Lichen) is a Minnesota State Threatened species that occurs primarily on sandstone outcrops near cool rivers associated with a variety of other lichen and moss species. It has been documented living on wood in other parts of its global range, but we know very little about why it is restricted to outcrops in Minnesota.

Photo: Leedy's roseroot, Welby Smith

Primary Stressors in this Habitat

Throughout Minnesota, habitats have been lost and degraded due to pressures associated with human settlement, subsistence, livelihoods and recreation. Indeed, habitat loss or alteration remains the primary threat to most, if not all, SGCN. In this section, we identify key "stressors" that may continue to contribute to habitat degradation and loss. The list is adapted from a globally recognized threats lexicon developed by the International Union for the Conservation of Nature (Salafsky et al., 2024). For additional details, see the "Stressors" section in Chapter 1: Species in Greatest Conservation Need.

It is important to note that some of the factors listed as "stressors" can also be used to advance conservation goals. Broad terms such as "fire management" reflect the dual nature of these factors as they may function as stressors in some contexts while serving as valuable conservation tools in others. For example, an intense wildfire following prolonged fire suppression may cause significant stress for the habitat and species affected, while prescribed fire, when planned appropriately, can enhance ecosystem health and resilience.

Information about a subset of primary stressors specifically affecting this habitat is included below, followed by a set of conservation actions addressing those stressors.

Mining and Quarrying

Pit quarries and dimensional stone quarries occur on mapped bedrock sources with visible rock outcrops in the Minnesota River Valley. Some of these are adjacent to protected conservation lands with documented or potential for rare features associated with rock outcrops. Some of these conservation lands exhibit evidence of quarrying prior to protection. It is unclear from available GIS data layers how many of these quarries are still active, although some appear to be. Sustained quarrying would result in habitat loss and fragmentation for species dependent on rock outcrops which can exacerbate geographic isolation and limit gene flow. Active quarrying also increases the potential for direct injury or mortality.

Arguably one of the rarest plant species in Minnesota, ball cactus (*Coryphantha vivipara*), occurs in cervices on granite outcrops. Historically, it also occurred in thin-soiled prairies which were largely converted to agriculture; much of its potential habitat in the state has already been removed. Its remaining populations could be affected by granite quarrying.

Timber Harvest

Timber harvest is a forest management tool that can affect wildlife habitat by changing forest and woodland structural and compositional diversity. Forest management decisions, including inaction, typically have positive effects for some species and negative effects for others. SGCN like rock vole and smoky shrew require rocky outcrops with moist, cool conditions. If too much canopy is lost around these outcrops, they become exposed to the sun and dry out.

Recreation

Rocky habitats are often not considered fragile when in fact they can be very sensitive to disturbance. Surface rocks that are even slightly displaced (e.g rock collecting, moved for trails, etc.) can change thermal conditions considerably and affect their value as refuges for reptiles (Pike et al., 2010). Foot traffic, mountain bikes, OHVs (off-highway vehicles) and horses can damage fragile and endemic plants. Increased recreational trails and human presence are often associated with the spread of invasive species and increases in commensal predators (domestic and wild). Rock climbing may affect sensitive vegetation (Clark & Hessl 2015; March-Salas et al., 2023; Johanson et al., 2024).

Fire Management

With fire suppression since Euro-American settlement, woody plant cover is increasing in many rock outcrop communities. Prescribed fire is a valuable tool for managing woody encroachment on outcrops (Johanson et al., 2024). However, often fires do not "carry" well on outcrops when there are limited natural fuels. In fact, large rock outcrops can act as natural fire breaks. High intensity fires on open rock outcrops typically are naturally rare (Fitzsimons et al., 2017). Further, burning large piles of down woody debris atop outcrops (such as those that remain from large woody removal projects) can result in intense flames that can sterilize thin soils hosting rare endemic plants.

Invasive Species (Problematic Non-native Species)

European and glossy buckthorn affect rock outcrop ecosystems in a variety of ways. These include reducing the availability of open habitats (sunlight and thermal effects) and altering soil and litter properties which in turn can affect native vegetation and invertebrates which may have broader trophic effects (Gelvin-Innvaer et al., 2025).

Problematic Native Species

Eastern red cedar and sumacs encroaching on rock outcrops can reduce the suitability of the habitat for some SGCN, such as the five-lined skink and timber rattlesnake (Gelvin-Innvaer et al., 2025).

Changes in Precipitation and Hydrology related to Climate

From 1895 to 2020, Minnesota's average annual precipitation increased by 3.4 inches (Climate Trends). The state has also seen a notable rise in the frequency and intensity of heavy precipitation events. Since 2000, very heavy rains (6 inches or more in a single day) have occurred two to three times more frequently than during the 20th century (Williams-Sether & Sanocki, 2025; NOAA National Centers for Environmental Information State Climate Summaries 2022: Minnesota). These extreme events have led to a corresponding increase in flooding, which can disrupt ecosystems, human infrastructure and water quality (Williams-Sether & Sanocki, 2025).

Future projections indicate continued increases in annual precipitation, especially during the winter and spring months, which are likely to exacerbate flooding risks. The same climate models also forecast an increase in late summer drought events, underscoring the variability and unpredictability of hydrologic patterns under a changing climate (Climate Change in Minnesota). By mid-century (2040-2059), average annual precipitation is projected to increase by up to 1.2 inches, depending on emissions scenario (Liess et al. 2022; Climate Change in Minnesota). This seemingly counterintuitive pattern — wetter winters and springs, punctuated by hotter, drier late summers — has profound implications for water availability, wetland health, soil stability, and species dependent on seasonal hydrologic cycles (Runkle et al., 2022). For more information and resources for climate-adapted management strategies, see the Climate Adaptation Section in Chapter 6: Implementation.

Increases in precipitation, especially heavy rainfall events, may affect some of the more geologically unstable (i.e., friable) cliff features in the southeast, causing steep rock faces or cliffs to crumble more easily when disturbed. Some increases in cliff sloughing and crumbling at sites have been detected where the federally threatened Leedy's roseroot (*Rhodiola integrifolia subsp. leedyi*) is found.

Priority Habitat Conservation Strategies

To implement the Habitat Goal of this Plan, to protect and enhance the resilience, function, and ability of habitats to support biodiversity, especially for SGCN, five strategies were identified:

Strategy 1. Protect, buffer, and connect high quality habitats to optimize biodiversity, SGCN, and landscape benefits, particularly across the Conservation Action Network.

Strategy 2. Restore, enhance, and maintain lands and waters to benefit SGCN, biodiversity, and ecosystem resilience

Strategy 3. Collaborate with conservation partners and landowners to enhance conservation delivery, particularly in the Conservation Action Network and Conservation Opportunity Areas

Strategy 4. Monitor SGCN, native plant communities, habitats, and ecosystems for changes through time including responses to natural disturbances, conservation actions, and climatic conditions

Strategy 5. Connect to develop, innovate, incentivize, and disseminate evidence-based habitat management practices to benefit SGCN habitat management practices to benefit SGCN

Examples of conservation actions are grouped below under these five strategies and tagged with icons for the stressor(s) that they address. Some of these actions are widely in place as best practices while others may be more novel. Some actions will combine multiple strategies, in which case we present it under the one it fits best. Also note that some strategies, such as Strategy 3, collaborating with partners, could truly be applied to all actions to most broadly and effectively implement them. Other actions, such as those related to monitoring, might be difficult to relate to a specific stressor, in which case they are marked as not applicable (NA).

Potential Conservation Actions for Cliff, Talus, and Rock Outcrop

Strategy 1. Protect, buffer, and connect high quality habitats to optimize biodiversity, SGCN, and landscape benefits, particularly across the Conservation Action Network.

Stressor	Action
	Protect algific talus and maderate cliffs, as well as rock outcrops that are habitats for SGCN from mining and other development activities.
	Restrict recreational access to and use of cliffs, talus slopes and rock outcrops, including but not limited to hiking, rock climbing, rock collecting and mountain biking.

Strategy 2. Restore, enhance, and maintain lands and waters to benefit SGCN, biodiversity, and ecosystem resilience

Stressor	Action
	Maintain sufficient canopy closure to maintain rocky outcrops characterized by cool, moist conditions.
	Manage rock outcrops to prevent woody encroachment that may be advancing due to a history of fire suppression. This includes invasive species like European and glossy buckthorn, the presence of problematic native species like red cedar and sumac. Consider the application of grazing, especially by goats, to help reduce woody encroachment on rock outcrops.
	When using fire to manage invasive species or woody encroachment, consult habitat specialists to ensure that fires are not so intense as to negatively affect the habitat.

Photo: DNR staff conducting surveys for Leedy's roseroot, Derek Anderson

Case Study: Protecting Granite Rock Outcrops on the Minnesota River

Granite rock outcrops along the Upper Minnesota River are among the oldest exposed rock in North America, dating back approximately 3.6 billion years. These outcrops are also home to rare and specialized plant and animal communities rarely found elsewhere in Minnesota, including several types of cacti and one of Minnesota's only three lizard species, the five-lined skink. However, these rock outcrops are increasingly threatened by mining, overgrazing, and development. With funding from the Minnesota Environment & Natural Resources Trust Fund, the Renville County Soil and Water Conservation District worked with Minnesota's Board of Water and Soil Resources to acquire conservation easements that will permanently preserve portions of this endangered habitat.

Soil & Water Conservation District (SWCD) employees saw a need to protect the natural environment and to provide economically viable choices for the landowners. The Minnesota River Valley contains exposed ancient granite rock outcrops that provide unique landscape features and habitat for specialized plant and animal communities rarely found elsewhere in Minnesota. No programs existed that would give landowners a payment if they chose to protect the area from development by mining, overgrazing and other development interests. Rock outcrops are a component of the Minnesota River's riparian zone, and destruction of this unique habitat degrades water quality and wildlife habitat in the Minnesota River and its tributaries. Removal of the rock results in severe degradation and permanent loss of these unique landscape features. The Minnesota River Corridor is easily susceptible to fragmentation because it comprises such a small percentage of the Minnesota River Watershed. Past development activities and mining operations have already fragmented large areas of the fragile Minnesota River Corridor.

A total of 748.4 acres of rare and unique Minnesota River Valley landscape were permanently protected and sixteen landowners were paid $1,741,580 for voluntarily placing perpetual conservation easements on those acres. Five counties participated in the project including Lac qui Parle, Chippewa, Yellow Medicine, Redwood and Renville. Easement applications were scored by resource professional teams and funding was based on those scores. For more information, see: Protection of Granite Rock Outcrop Ecosystem.

Photo: Devil's Tongue (Opuntia macrorhiza), Blue Mounds State Park, Rachel Kranz

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