Threats/Issues and Conservation Actions
Savanna Community Group

This Section describes issues and conservation actions that are common to all or most of the community types[1] in the savanna community group. As much as possible, the source of the threat is described as well as the stresses or effects that occur directly or indirectly as a result of the threat. Stresses are generally thought of as loss, conversion and/or degradation of the natural community. Distinguishing the source of the impact from the effects or the changes that occur to the community is important because the two typically need a different approach and set of conservation actions. Multiple sources of impact may have the same or similar effects on a community. Similar effects may be addressed collectively by a single action or suite of actions.

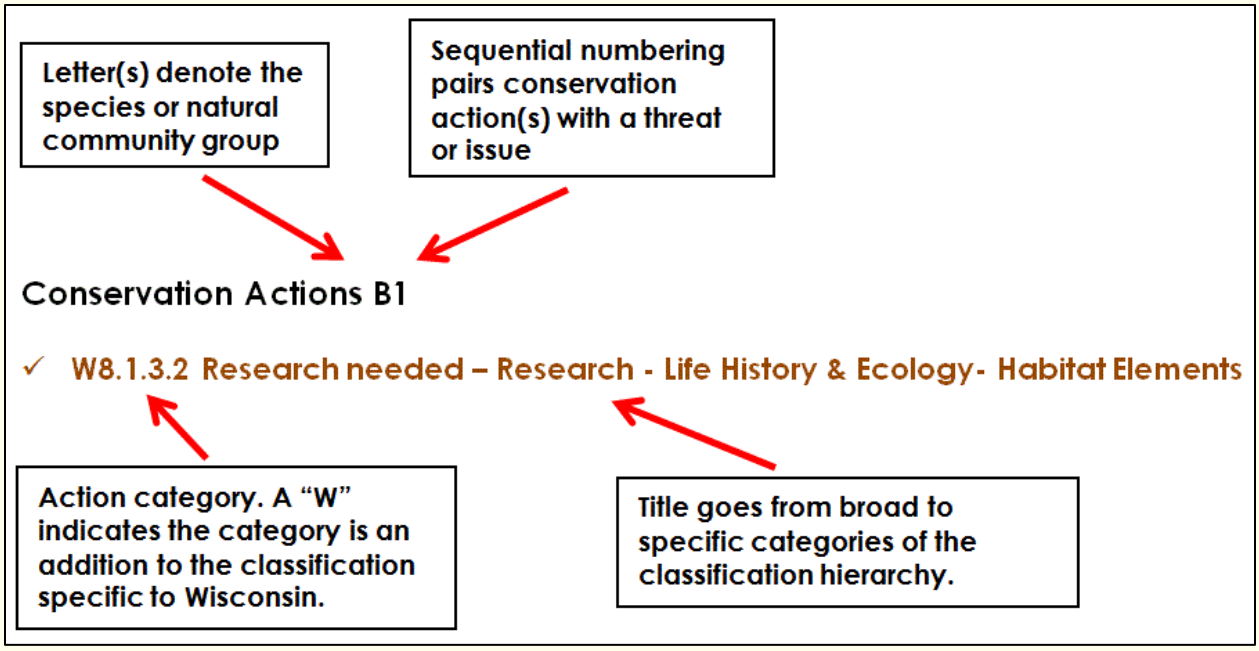
The savanna group includes the following three community types:

- Oak Opening
- Oak Woodland
- Cedar Glade

Hereafter, we will use "savanna" to refer to oak opening, oak woodland, and cedar glade," and "oak savanna" to refer to just oak opening and oak woodland.

Conservation actions for most or all savanna community types are organized according to categories in the Conservation Actions Classification based on the Open Standards threats and actions classification[2]. If the threat/issue and its associated conservation action(s) apply to one or a few species they are identified as such. Conservation actions overlapping in content or scope may be grouped under a single code. Coding and identification for each action category are explained further below.

[1] Community or natural community is used in the WWAP as a proxy for habitat.
[2] See the following website for the classifications. http://cmp-openstandards.org/tools/threats-and-actions-taxonomies/ (Search Terms: open standards conservation threats actions). The conservation actions classification is provided in Appendix 2.1.



More about how threats and issues or conservation actions were developed, opportunities to provide input and how this information can be used to make conservation decisions can be found on the Conservation Actions and Effectiveness Monitoring page and in Sections 2 and 4.4.4 of the Wisconsin Wildlife Action Plan.

Threat/Issue Sa1

Historically, savannas were maintained primarily by frequent fires, either started by lightning strikes or by Native Americans who burned large areas to produce food for game or to aid in hunting and gathering activities. Fire is essential to Wisconsin's savanna communities for a variety of reasons: 1) It limits woody encroachment; 2) It stimulates early and robust growth of native plants; 3) It can deter growth of some non-native invasive and other problematic species; 4) It stimulates flowering and fruit production of native plants; and 5) It increases plant species diversity. Savannas in the absence of regular fire will succeed to woody species and will become less diverse over time. Climate change projections for Wisconsin suggest that the windows of opportunity for prescribed burning may be constrained due to changing conditions (e.g., extreme drought and heat, earlier spring green-up, frequent and intense storms).

Invasive and other problematic species can also limit the ability of managers to apply fire by reducing the amount of fuel available to carry fire and by creating a moister ground level microclimate. This is particularly true of brushy species.

Conservation Actions Sa1

✓W2.3.3 Land/water management – Habitat and natural process restoration – Terrestrial
✓5.3 Law and policy – Private sector standards and codes

Maintain blocks of related fire-dependent communities that capture a complete gradient from grassland/open wetland to savanna to oak forest.

✓W4.3.3 Education and awareness – Awareness and communications – Negative perceptions
Work with Wisconsin's Prescribed Fire Council (prescribedfire.org) to make the use of prescribed fire safe, effective, and more broadly accepted as a management tool.

✓2.1 Land/water management – Site/area management
Take actions to facilitate rapid mobilization of prescribed burn crews (e.g., prepare units in advance of burn season).

Maximize impacts of limited burn seasons by burning larger units.

✓8.1.6 Research needed – Research –Actions
✓8.3.1 Research needed – Monitoring – Population trends
✓W8.3.5 – Research needed – Monitoring – Effectiveness monitoring
Evaluating the potential effects to invertebrates should be routinely considered in plans to use fire for restoration or management of this community type. The frequency, intensity and area burned should be planned considering the life history, habitat needs and distribution of fire-sensitive invertebrate species both on the subject property and adjacent habitat. In cases where burning is the preferred community management tool, but invertebrate species impacts are undetermined or potentially significant, the feasibility of creating refugia should be examined as should alternative methods for invasive, shrub and canopy management.

Quantify and monitor the positive and negative impacts that prescribed burning and other management activities undertaken in grassland, barrens and savanna communities have on SCGN invertebrates to improve management decisions and techniques and improve intended outcomes.

Threat/Issue Sa1

Non-native invasive plants are prolific reproducers in the absence of their homeland's natural checks and balances, and outcompete native plants by monopolizing light, water and nutrient resources. The most common non-native invasives of savannas include herbs such as garlic mustard (*Alliaria petiolata*) and shrubs such as common buckthorn (*Rhamnus cathartica*) and Eurasian bush honeysuckles (*Lonicera* spp.). Climate change scientists suggest that non-native invasive species may increase in productivity with increasing CO_2, warmer temperatures, earlier springs, and reduced snowpack, and may invade new areas during extreme flood events. Some native woody species are also 'problematic' in savannas, especially in the absence of fire, and can outcompete native vegetation similarly to non-native invasives; climate change may exacerbate this threat as increased CO_2 and nitrogen deposition further stimulate growth of woody species.

Conservation Actions Sa1

✓W2.4 Land/water management – Comprehensive management
✓8.2.2 Research needed – Conservation planning – Area-based management plan
At the site level, employ an eight-part approach to non-native invasive species: 1) careful planning; 2) prevention; 3) early detection and rapid response; 4) control; 5) slowing the spread; 6) reducing impacts; 7) monitoring; 8) restoration.

Restore sites to confer resistance to infestation by non-native invasives. This may involve restoring system functions (e.g., fire), restoring natural community structure (canopy, mid-story, shrub layer), and ameliorating ground layer species.

Develop a plan by conducting surveys for invasives and creating maps showing their locations and densities. Set reasonable management objectives based on this information. Consider designating management zones based on degree of infestation and available resources (zero tolerance, acceptable threshold, slow the spread).

✓W2.2.1.3 Land/water management – Prevention – Terrestrial (upland)
Prevent invasions of non-native plants by limiting human vectors (e.g., install boot brushes at trail heads, clean out seeds from maintenance equipment), minimizing soil disturbance, maintaining healthy and diverse natural communities, conducting periodic inspections of high-risk areas (e.g., trails), and revegetating disturbed sites with native plants.

✓W2.2.3 Land/water management – Invasive/problematic species control – Inventory and early detection
Implement an Early Detection-Rapid Response approach by finding new populations of non-native invasives as early as possible when eradication and control are still feasible and less costly.

Conduct regular monitoring of sites to detect new invasions and to evaluate the success of pest management plans and control measures.

✓W2.2.2.3 Land/water management – Invasive/problematic species control – Control – Terrestrial (upland)
Control non-native invasive species and problematic woody species by manual, mechanical, and/or chemical means.

In areas where eradication and control are not feasible, slow the spread of non-native invasives into adjoining areas by restricting activities during certain seasons, minimizing travel through areas, and inspecting clothing and equipment.

If eradication, control, and containment methods fail to manage an infestation of non-native invasives, reduce their impact on elements of the natural community by focusing control efforts to allow for specific functions to occur (e.g., tree regeneration), translocating sensitive species, or accommodating unavoidable changes (e.g., if a

common buckthorn infestation limits the ability to burn, use mowing and brushing as a surrogate for fire).

✓5.3 Law and policy – Private sector standards and codes
✓5.4.3 Law and policy – Compliance and enforcement – Sub-national level (state, tribal, local)
At a landscape or statewide level, enforce and strengthen regulatory mechanisms and voluntary BMPs that address the introduction and spread of non-native invasives.

Threat/Issue Sa2

Ecological simplification is a legacy of past fire suppression, grazing, and non-native invasive plants; only a small number of hardy and common plants can survive grazing as well as intense competition from invading woody and non-native species. As a result, most of Wisconsin's savannas lack the species and structural diversity needed to support a flourishing community of plant and wildlife species. In addition, ecological simplification renders savannas more vulnerable to pests and diseases and less resilient to drought, wind storms, climate change, and other environmental stresses. Restoration of oak savanna diversity continues to pose challenges to managers and researchers. The actual sources and appropriate actions for some issues remain in question (e.g., limitations to oak regeneration and Pennsylvania sedge domination). Managers and researchers also struggle with developing the best methods for restoring the ground layer in highly degraded oak savannas. Research to address ecological simplification in savannas is thus a high priority.

Conservation Actions Sa2

✓W2.4 Land/water management – Comprehensive management
Restore savanna structure and function by applying techniques such as timber management, brushing, prescribed fire, herbicide application, and ground layer enhancement.

Maintain and restore savanna and related habitats by rotating management spatially and temporally and using a variety of management techniques, including (where appropriate) timber harvest, prescribed fire, mowing, grazing, and herbicide application to minimize negative impacts from any particular management technique.

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

Conduct research on oak regeneration methods in different regions, landscape settings, and on various soil types to ensure persistence of oak in oak-dominated natural communities.

Conduct research on restoration of oak savanna ecosystems, especially in terms of techniques that promote oak regeneration and establishment of ground layer species, and that limit overabundance of brush.

Research methods to restore native herbaceous ground layer species in forests, savannas, and barrens currently dominated by Pennsylvania sedge.

Threat/Issue Sa3

Cropping, development, and transportation projects can result in fragmentation of savannas. This fragmentation can sever connections that are important to both plants and animals, can limit opportunities for exchange of genetic material among plants, can render sites more susceptible to invasion by non-native invasive plants, and can inhibit the application of prescribed fire at a landscape scale.

Conservation Actions Sa3

✓1.1 Land/water protection – Site/area protection
✓1.2 Land/water protection – Resource and habitat protection
Fragmentation can be minimized by preserving larger blocks of habitat and/or by buffering them with compatible cover types that together create a matrix of related community types.

✓W2.3.3 Land/water management – Habitat and natural process restoration – Terrestrial
✓5.3 Law and policy – Private sector standards and codes
Maintain blocks of related fire-dependent communities that capture a complete gradient from grassland/open wetland to savanna to oak forest.

✓1.2 Land/water protection – Resource and habitat protection
Buffer the effects of anthropogenic land uses by maintaining compatible cover types in lands immediately surrounding savannas. The best buffer types include oak-dominated forest, shrublands, and grasslands.

Threat/Issue Sa4

Projections for vulnerability of savanna communities to climate change range from moderately low to moderately high (Climate Change Vulnerability Assessment Workshops 2014). Savannas may have natural resistance to climate change due to the fact that associated plant species are strongly adapted to extreme heat and drought. Resilience is also conferred by typically high diversity of species and species guilds (annuals, perennials, forbs, grasses, etc.). The vulnerability of savannas to climate change primarily stems from the exacerbation of threats that are already significant, especially non-native invasive species and woody invasion/mesophication. Lower winter snow depths may also render some savanna plants susceptible to frost and drought damage. The threat of tree pests and diseases may increase as trees become stressed with extreme heat, drought, and frost damage. Furthermore, prescribed burning opportunities may change due to extreme drought and heat, earlier spring green-up, and frequent and intense storms. The exact nature of these potential changes is currently unclear: windows of opportunity for burning may become narrower

or they may shift to different seasons, conditions may result in cooler and less effective burns, opportunities may actually increase with warmer drier conditions, or conditions may become more volatile and trigger more regulatory constraints. These changes may vary depending on site conditions, landscape variables, and ecoregion. Managers may wish to adopt a proactive approach that offers them the most flexibility in the face of changing and unpredictable conditions.

Differences in projected vulnerabilities among the three savanna types stem in part from the relative fates of the dominant tree species. Suitable habitat for bur oak, black oak and shagbark hickory is projected to remain the same or increase with climate change; habitat for white oak may remain the same with "low change" but decrease with "high change." Overall, this bodes well for the dominant trees of Oak Opening. In contrast, under a "high change" scenario, two other species that are important to Oak Woodland, red oak and black cherry, may incur large decreases in suitable habitat. Suitable habitat for eastern red cedar is projected to see large increases with climate change, a favorable factor relating to Cedar Glade communities.

While Wisconsin's savannas have characteristics that may confer resistance to climate change, and while they may benefit from some changes such as increased temperatures and drought, potential negatives may outweigh these positives; the uncertainty relating to the future of prescribed fire may represent the fulcrum in this balancing act. An additional and significant consideration is the fact that Wisconsin's remnant savannas are already highly degraded and in need of consistent intensive management (especially prescribed fire).

Conservation Actions Sa4

✓W2.3.3 Land/water management – Habitat and natural process restoration – Terrestrial
✓8.1.6 Research needed – Research –Actions
Promote drought- and frost-tolerant species and plant morphologies through regular prescribed burning (mainly pertains to Oak Opening and Oak Woodland; the fire regime of Cedar Glade remains poorly understood).

✓2.1 Land/water management – Site/area management
Take actions to facilitate rapid mobilization of prescribed burn crews (e.g., prepare units in advance of burn season).

Maximize impacts of limited burn seasons by burning larger units.

✓W2.4 Land/water management – Comprehensive management
✓8.2.2 Research needed – Conservation planning – Area-based management plan
At the site level, employ an eight-part approach to non-native invasive species: 1) careful planning; 2) prevention; 3) early detection and rapid response; 4) control; 5) slowing the spread; 6) reducing impacts; 7) monitoring; 8) restoration.

Note: Other conservation actions listed under the following threat/issues above and for other community groups can be adapted to consider the effects of changing

temperature and precipitation: fire suppression; non-native and native invasive and problematic plants.

Estimated Vulnerability of Savanna Communities to Climate Change under Low and High Change Scenarios

Community type	Vulnerability under Low degree of climate change	Vulnerability under High degree of climate change
Oak Opening	Moderately low	Moderately low
Oak Woodland	Moderate	Moderately high
Cedar Glade	Moderately low	Moderate

Source: WDNR Climate Change Vulnerability Assessment Workshops 2014.