Threats/Issues and Conservation Actions
Grassland Community Group

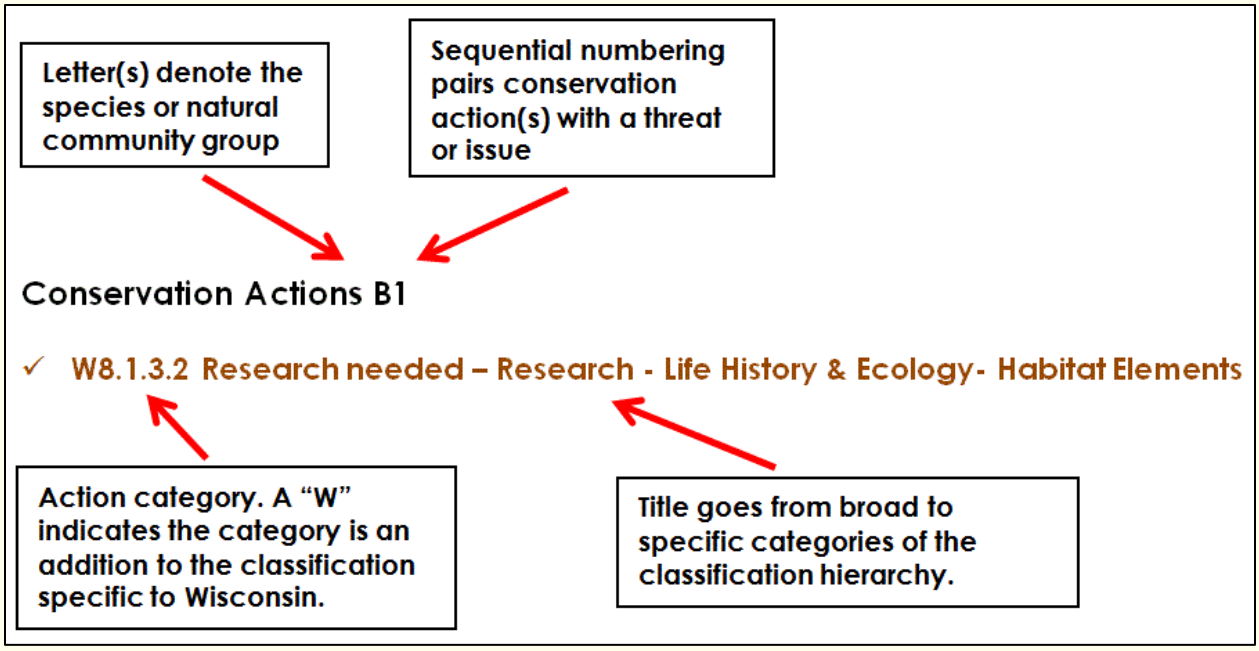
This Section describes issues and conservation actions that are common to all or most of the community types[1] in the grassland community group. As much as possible, the source of the threat is described as well as the stresses or effects that occur directly or indirectly as a result of the threat. 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 grassland group includes eight natural community types.

- Dry Prairie
- Dry-Mesic Prairie
- Mesic Prairie
- Wet-Mesic Prairie
- Wet Prairie
- Sand prairie
- Bracken Grassland
- Surrogate Grassland

Conservation actions for most or all grassland 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 4.4.3 of the Wisconsin Wildlife Action Plan.

Threat/Issue Gr1

Cropping, development, and transportation projects can result in outright destruction of native grasslands. A large portion of native grassland loss is due to conversion of mesic prairie to farmland during the late 19th and 20th centuries; only about 100 acres of mesic prairie are known to exist today in Wisconsin. Most of the surviving remnants occur on sites that were too wet or too dry and rocky to plow, and are typically small and isolated. While grazing can be constructive or destructive to native prairies depending on the species of grazer, stocking rate, and length of grazing rotations, they are threatened by grazing when plants are consumed or trampled to such an extent that they can no longer survive. Grazers can also compact soil, especially along consistently used 'cowpaths,' resulting in erosion and loss of grassland sod. Developers often favor sites with beautiful views such as on bluff tops, which frequently coincide with occurrences of remnant bluff prairies. Lastly, Off-Road Vehicles pose a threat to Sand Prairie. These vehicles destroy fragile vegetation, lichens, and biological soil crusts, as well as promote wind erosion of the sandy soils that those species were securing.

Conservation Actions Gr1

✓1.2 Land/water protection – Resource and habitat protection
✓W2.4 Land/water management – Comprehensive management

✓W4.2.1Education and awareness – Training - Management and conservation training
Work with private landowners to help them recognize, protect, and restore their remnant prairies

✓6.4 Livelihood, economic and other incentives – Conservation payments
W7.3.2 – External capacity building – Conservation finance – Management and protection
Develop and offer cost-share incentives for private landowners to restore and maintain remnant prairies

✓W7.2.3 Alliance and partnership development – Management and protection
Pursue the above actions through partnerships with federal, state and local groups and professional restoration contractors

✓1.2 Land/water protection – Resource and habitat protection
Protect Sand Prairies and associated SGCNs from off-road vehicle usage

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Threat/Issue Gr2

Cropping, development, and transportation projects can result in fragmentation of native grasslands. 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. 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.

Conservation Actions Gr2

✓1.2 Land/water protection – Resource and habitat protection
✓W4.3.1Education and awareness – Awareness and communications – General ecology, biology, habitat related to conservation needs
✓W5.2.3.1 Law and policy – Policies and regulations – Local – County
✓W5.2.3.2 Law and policy – Policies and regulations – Local – Municipal
✓8.2.2 Research needed – Conservation planning – Area-based management plan
Protect and preserve remnant prairies by limiting development on or immediately adjacent to them through education, zoning initiatives, and local/regional land-use planning.

✓1.2 Land/water protection – Resource and habitat protection
✓8.2.2 Research needed – Conservation planning – Area-based management plan
Connect remnant prairie sites via open grassy corridors, or use a stepping stone approach to designing conservation sites where it is not possible to enlarge or connect disjunct prairie patches.

✓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 prairie remnants. The best buffer types include surrogate grassland, open oak savanna, and open/brushy wetland.

Threat/Issue Gr3

Historically, native grasslands 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 native grassland communities for a variety of reasons: 1) It limits woody encroachment; 2) It stimulates early and robust growth of native grassland plants; 3) It can deter growth of some non-native invasive and other problematic species; 4) It stimulates flowering and fruit production of native grassland plants; and 5) It increases plant species diversity. On most soil types and moisture regimes in Wisconsin's climate, grasslands 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 prescribed burning opportunities may change due to extreme drought and heat, earlier spring green-up, and frequent and intense storms (see Climate and Weather section below for more details).

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 Gr3

✓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 Gr4

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 grasslands include herbs such as smooth brome (*Bromus inermis*), wild parsnip (*Pastinaca sativa*) and sweet clovers (*Melilotus alba, M. officinalis*), 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. With grasslands in lower landscape positions, agricultural runoff can also enhance growth of non-native invasives. Some native woody species are also 'problematic' in grasslands, 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 Gr4

✓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 by limiting their dominance (e.g., via mowing or weed-whacking).

✓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 Gr5

Ecological simplification is a legacy of past fire suppression, grazing, and non-native invasive plants. (Grazing can actually be constructive or destructive to native grasslands depending on the species of grazer, stocking rate, and length of grazing rotations.) As a result, most of Wisconsin's native grasslands lack the species and structural diversity needed to support a flourishing community of plant and wildlife species. In addition, ecological simplification renders grasslands more vulnerable to non-native invasive species. In Wet and Wet-mesic Prairies, agricultural and residential runoff can also lead to ecological simplification by enhancing growth of generalist

native grassland plants, resulting in a loss of conservative plants and lowering of floral diversity.

Conservation Actions Gr5

✓W2.4 Land/water management – Comprehensive management
Restore native grassland structure and function by applying techniques such as 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.

To limit agricultural runoff to lowland grasslands, employ standard soil and water conservation measures (e.g., install grass waterways and buffer strips, or create buffers [e.g., install perennial vegetation between cropland edge and remnant prairie, or retain crop residue in winter]).

✓8.1.6 Research needed – Research - Actions
Research the impacts of grazing on grassland and herbaceous wetland communities, including control of invasive species and impacts to SGCNs.

Threat/Issue Gr6 WET AND WET-MESIC PRAIRIE

Water, and the hydrologic regime that characterizes each site, is the life blood of wetlands, including those that are dominated by graminoids. Direct hydrologic alteration of wetlands through dams, ditching, draining, or filling causes severe habitat alteration that changes the function and value of a site, often lowering habitat quality for many species. Water levels that are artificially raised can flood out wetlands, causing native plants to be replaced by monotypic stands of cattails and reed canary grass or simply open water. Ditches and drain tiles lower the water table, facilitating tree and shrub invasion and loss of open wetland habitat, while filling simply eliminated wetlands altogether. Indirect alteration can occur from things such as the construction of new roads can disrupt hydrology, impounding water on one side of a road while causing drying on the other. Finally, overuse of groundwater resources for agriculture, municipal, or industrial use can cause a lowering of the water table, starving groundwater fed-wetlands of the source of their existence.

Conservation Actions Gr6 – Hydrologic alteration WET AND WET-MESIC PRAIRIE

✓W4.3.1 Education and awareness – Awareness and communications – general ecology, biology, habitat related to conservation needs

✓5.3 Law and policy – Private sector standards and codes
Follow Forestry BMPs for water quality in forested lands adjacent to Wet and Wet-mesic Prairie, and consider adding additional buffers around sensitive wetland habitats.

Limit hydrological alteration to wetlands as an unintentional consequence of development/road building.

✓W8.1.8 Research needed – Research – Natural Community Threats and Actions
✓W8.3.4.2 Research needed – Monitoring – Habitat trends – Composition, quality and function
Identify priority groundwater recharge areas that supply (even indirectly) water to wet and wet-mesic prairies, and conduct groundwater quality and quantity monitoring in regions with high demand on groundwater resources.

Threat/Issue Gr7

Nutrient enrichment and sedimentation are one of the leading causes of wetland degradation, including for wet and wet-mesic prairie. Excess nutrients, usually in the form of nitrogen and/or phosphorus, favor non-native invasive species (e.g., reed canary grass) and aggressive native species (e.g., cat-tails) which displace native plants. Nutrients can come from a variety of sources, ranging from agricultural fields to lawns. In addition, nitrogen accumulates through atmospheric deposition, mainly due to the burning of fossil fuels. Sedimentation is also problematic, and can arise from unsustainable agricultural practices on steep slopes or near waterways, land-clearing activities, unsustainable timber harvest operation, and poorly designed road crossings at streams or wetlands. Overall, sedimentation increases water turbidity and can cover low-lying plants in silt. Following water quality BMPs greatly reduces the risk from these activities; however, climate change may add complexity to this issue as severe precipitation events are projected to increase and the season of frozen ground conditions grows shorter.

Conservation Actions Gr7

✓W5.2.3.2 Law and policy – Policies and regulations – Local – Municipal
Work with municipal planners, developers, businesses, and local zoning boards to increase groundwater infiltration practices and decrease stormwater input and nutrient enrichment of water from impervious surfaces (parking lots, etc.) through techniques such as the installation of bioswales, etc.

✓W5.2.1 Law and policy – Policies and regulations – National (federal)
✓W5.2.2.1Law and policy – Policies and regulations – State and Tribal - State
Implement Wisconsin's Nonpoint Source Program Management Plan FFY 2011-2015 and subsequent updates, which addresses impacts from non-point source pollution and provides direct and indirect benefits to SGCNs and their habitats. Work with NRCS Conservationist or follow NRCS guidelines to develop a 'cropland conservation management system' for water quality and water quantity that holistically considers the

effects of planting design, crop selection, discontinuous vegetative cover, tillage practices, nutrient management, pest management, and irrigation.

Threat/Issue Gr8

Projections for vulnerability of grassland communities to climate change range from moderately low to high, with most at the moderate level (Climate Change Vulnerability Assessment Workshops 2014). Vulnerability is strongly influenced by soil type and landscape position. Native grasslands 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.). Adaptive capacity can be lower if sites are small and isolated, and if there are few opportunities for shifting of plants to microsites with more favorable conditions. Their vulnerability primarily stems from the exacerbation of threats that are already significant, especially non-native invasive species and woody invasion. Lower winter snow depths may also render some prairie plants more susceptible to frost and drought 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, they may actually increase with warmer drier conditions, or conditions may become more volatile and trigger more regulatory constraints. Managers may wish to adopt a proactive approach that offers them the most flexibility in the face of changing and unpredictable conditions.

Mesic Prairie is considered to have the highest vulnerability to climate change due to the amplified threats of non-native invasive species, woody invasion, and nutrient run-off from adjacent agricultural fields; the extreme rarity of Mesic Prairie and the small size and isolation of remnants further contribute to the vulnerability of this community type. Sand Prairies may fair the best in the face of climate change: associated plants are already exceptionally well-adapted to extreme heat, drought, and (in many cases) lower snow depths, while woody species and non-native invasive species may be less able to gain purchase in this relatively inhospitable environment.

Certain climate change-related factors currently remain unpredictable in grassland settings, and warrant further research and observation:

- Effects of changing precipitation patterns, extreme heat, seasons, and drought on opportunities to conduct prescribed burning.
- Impact of changing precipitation patterns on groundwater levels (Wet Prairie, Wet-mesic Prairie, Sand Prairie).
- Impact of lower snow depth on winter annuals (Sand Prairie) and other grassland species, particularly as it pertains to vulnerability to frost and drought. Related topic: Potential for prescribed burning to confer frost- and drought-resistance to plants.

- Potential for extreme hot and droughty conditions to cause mortality of plant species or shifting of competitive relationships, especially if these conditions immediately follow prescribed fire.
- Impact of elevated atmospheric CO_2, changing temperatures/precipitation, drought, and soil type/landscape position on plant species that use C3 (e.g., cool-season grasses and forbs) versus C4 (e.g., big bluestem, Indiangrass) photosynthetic pathways. Dramatic shifts in the competitive balance of these two suites of species may create a cascade of changes in grassland ecosystems.
- Impact of climate change on frost pockets, an important ecosystem driver for Bracken Grassland.

Conservation Actions Gr9

✓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.

✓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.

✓W2.4 Land/water management – Comprehensive management
✓W5.2.3.2 Law and policy – Policies and regulations – Local – Municipal
W4.3.1 Education and awareness – Awareness and communications – General ecology, biology, habitat related to conservation needs
Restore degraded open wetlands through the control of invasive species, shrubs, and restoration of ecological process such as hydrology and fire.

✓W5.2.3.2 Law and policy – Policies and regulations – Local – Municipal
W4.3.1 Education and awareness – Awareness and communications – General ecology, biology, habitat related to conservation needs
Increase groundwater infiltration practices and decrease stormwater input and nutrient enrichment of water from impervious surfaces (parking lots, etc.) through techniques such as the installation of bioswales, rain gardens, etc.

W4.2.1 Education and awareness – Training – Management and conservation training
6.2 Livelihood, economic and other incentives – Substitution
Work with agricultural stakeholders to balance water quality and water quantity with planting design, crop selection, discontinuous vegetative cover, tillage practices, nutrient management, pest management, and irrigation.

✓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.

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; ecological simplification; nutrient enrichment and sedimentation.

Estimated Vulnerability of Grassland 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
Dry Prairie	Moderate	Moderate
Dry-mesic Prairie	Moderate	Moderate
Mesic Prairie	High	High
Wet-mesic Prairie	Moderate	Moderate
Wet Prairie	Moderate	Moderate
Bracken Grassland	Moderately low	Moderate

Source: WDNR Climate Change Vulnerability Assessment Workshops 2014.