4.4.2 Barrens Group

4.4.2.1 Overview

Barrens are plant communities that occur on sandy soils and are dominated by grasses, low shrubs, small trees, and scattered large trees. Curtis (1959) described these communities as pine barrens in northern and central Wisconsin and as oak barrens in southern and west-central Wisconsin. Because of their dynamic nature and the variability in structural types and species composition, they are difficult to describe and classify. Prior to Euro-American settlement, the vegetative structure of large barrens landscapes was quite variable and dynamic. Inclusions of variously sized and aged forest stands such as mature red pine, mature oak (bur, red, Hill's, or black), aspen groves, and numerous wetlands were typical of most pine and oak barrens. Table 4.4.2.1 provides the number of SGCNs estimated to have a high or moderate association with this community group.

Historically, Wisconsin's most extensive barrens were in large areas of sandy glacial deposits, including outwash plains, lakebeds, and outwash terraces along rivers. Geographically, areas of extensive barrens were concentrated in the Northeast Sands, Northern Highlands, Northwest Sands, and Central Sands Ecological Landscapes. They were also found on outwash terraces along the Lower Wisconsin, Lower Chippewa and Mississippi Rivers.

The Barrens Group includes the following community types:

- Oak Barrens
- Pine Barrens
- Sand Barrens

Descriptions for these community types can be found online.[1]

Table 4.4.2.2 provides the Natural Community – Ecological Landscape (NC-EL) Opportunity scores for the Barrens Community Group. The key to these scores is provided below.

Key to NC-EL Opportunity Scores

Level of Opportunity	Score	Description
High	3	A major opportunity for sustaining the natural community in the Ecological Landscape exists, either because many significant occurrences of the natural community have been recorded in the landscape or restoration activities in areas of historical occurrence are likely to be successful maintaining the community's composition, structure, and ecological function over a long period of time.
Moderate	2	Although the natural community does not occur extensively or commonly in the Ecological Landscape, one to several significant

[1] http://dnr.wi.gov/topic/EndangeredResources/Communities.asp?mode=group&Type=Barrens (Search Terms: Barrens Communities Wisconsin DNR)

Level of Opportunity	Score	Description
		occurrences do occur and are important in sustaining the community in the state. In some cases, important opportunities may exist because the natural community may be restricted to just one or a few Ecological Landscapes within the state and should be considered for management there because of limited geographic distribution and a lack of better opportunities elsewhere.
Low	1	The natural community occurs in the Ecological Landscape, but better management opportunities appear to exist in other parts of the state.
None	0	The natural community is not known to occur in this Ecological Landscape.

4.4.2.2 Issues and Associated Conservation Actions for the Barrens Community Group

This Section describes issues and conservation actions that are common to all or most of the community types in this 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.

Issue. One consistent element of all barrens is their dependence on fire and the major role that fire plays in their dynamics. Fires have burned on Wisconsin barrens for thousands of years. Prior to Euro-American settlement, some fires were caused by lightning. Others were set by Native Americans to maintain game habitat, drive game, and enhance fruit and berry crops. Historically, behavior of fire was greatly influenced by topography and soil factors. Natural wildfires usually produce a complex mosaic of burned and unburned patches depending on fire intensity, topography, soil moisture, and local weather. However, since the early part of the 20th century, fires have been actively suppressed to limit damage to timber, crops, and property. In addition, farms and networks of roads have fragmented the landscape, and fires that do occur are smaller in extent than in historical times. Overall, fire suppression greatly alters fire-dependent barrens.

Lack of fire leads to overall ecological simplification through changes such as:

- the encroachment of shrubs and trees,
- higher canopy coverage from trees and shrubs,
- decreased light availability to the ground layer and resulting decreases in flowering, fruiting, and survival of light-loving ground layer plants, and
- buildup of dense thatch (including Pennsylvania sedge in some sites).
- In addition, some recent research suggests lack of fire reduces the resiliency of fire-dependent systems to climate change by reducing drought tolerant species and drought-tolerant traits.

Conservation Actions: Depending on your overall objectives, the following conservation actions can be considered to address fire suppression and the effects that it has on barrens natural communities:

- Restore oak and conifer barrens and shrub habitats through fire, brushing, ground layer enhancement, and timber management.
- Manage the full range of barrens successional stages and diverse habitats in a landscape context by techniques such as using large burn units to allow for variable fire intensity, using variable density thinning (if conducting timber harvests as part of restoration), etc.
- 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.

Issue. Barrens have been fragmented by a wide variety of landuse changes, including conversion of former barrens to pine plantations, agricultural fields and pasture. In addition, forest management goals that do not take barrens or early successional habitat into account can cause fragmentation over many generations for SGCN by allowing barrens to grow up into forest.

Fragmentation disrupts the movement of animals dependent on barrens habitats, and renders habitat unsuitable for species dependent on large areas of barrens. For example, sharp-tail grouse require large blocks of open barrens. Dwarf milkweed (*Asclepias ovalifolia*) is a rare clonal plant that requires genetically diverse clones spread across a local landscape accessible to pollinators. Pollinators also require sufficient diversity of other flowering plants for nectar. Fragmentation makes scattered habitat patches inaccessible to pollinators which in turn limits milkweed outcrossing, thus threatening the viability of the species. Finally, fragmentation also makes large-scale habitat management using prescribed fire difficult.

Conservation Actions. Depending on your overall objectives, the following conservation actions can be considered to address habitat fragmentation and the effects that it has on barrens natural communities:

- Prioritize identification of new barrens sites with moderate to high restoration potential.
- Restore barrens, pine-oak forest, and shrub-dominated habitats on sites such as old fields and pasture lands with the goal of expanding and connecting existing stands.
- Integrate management of dry forests and barrens on appropriate sites by aggregating harvest units to create larger open areas and to connect otherwise isolated forest patches. This can then accommodate both area-sensitive barrens species as well as forest species and conifer specialists.

- Restore oak and conifer barrens and shrub habitats through fire, ground layer enhancement, and timber management.
- Manage the full range of barrens succession stages and diverse habitats in a landscape context by techniques such as using large burn units to allow for variable fire intensity, using variable density thinning (if conducting timber harvests as part of restoration), etc.

Issue. Barrens occur on easily eroded sandy soils. Activity that directly disturbs soil is especially problematic, including motorized vehicle use or heavy foot traffic on sensitive soils on slopes (i.e., on current or old dune fields). Soil disturbance frequently creates openings for invasive species, especially along corridors. Soil disturbance destroys existing vegetation, increases erosion, and often leads to the spread of invasive plants, either directly through seeds spread on tires or boots, or indirectly by a corridor of mineral soil easily colonized by spotted knapweed, non-native hawkweeds, and invasive grasses. Once invasive have gained a foothold, they can easily spread across a site.

Conservation Actions. Depending on your overall objectives, the following conservation actions can be considered to address soil disturbance and invasive species and the effects that they have on barrens natural communities:

- Utilize comprehensive planning to concentrate areas of operation of motor vehicles and off-road vehicles in barrens and bracken grassland restorations that leads to invasive plant establishment, wind and storm erosion, or dominance of Pennsylvania sedge.
- Utilize comprehensive planning to concentrate areas of hiking and other causes of vegetation trampling in communities with fragile sandy soils.

Issue. Barrens communities are projected to have moderate to moderately low vulnerability to climate change, as they are already adapted to stressors such as drought and high temperatures (Climate Change Vulnerability Assessment Workshops 2014). Prescribed burning can help increase resiliency by promoting species and characteristics adapted to drought. However, repeated or extended droughts may adversely impact some forb species. Pests and diseases that are exacerbated by climate change (such as mountain pine beetle) may adversely impact certain species such jack pine, and, along with higher temperatures, could cause shifts away from pine and toward oak-dominated barrens. Overall, barrens are thought to be among the least vulnerable group of communities to climate change.

Conservation Actions. Depending on your overall objectives, the following conservation actions can be considered to encourage climate change adaptation for barrens natural communities:

- Conduct prescribed burns to promote fire and drought-adapted species
- Manage the full range of barrens successional stages and diverse habitats in a landscape context by techniques such as using large burn units to allow for variable fire intensity, using variable density thinning (if conducting timber harvests as part of restoration), etc.
- Identify methods to reduce risk of mountain pine beetle arrival, spread, and mortality rate on jack pine.

Estimated Vulnerability of Barrens 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
Pine Barrens	Moderate	Moderate
Sand Barrens	Moderately low	Moderate
Oak Barrens	Moderately low	Moderately low

Source: WDNR Climate Change Vulnerability Assessment Workshops 2014.

Table 4.4.2.1 Number of Species of Greatest Conservation Need Highly or Moderately Associated with Barrens Communities

SGCN Species Group	Barrens Community Group
Birds	16
Fish	
Herps	12
Mammals	6
Insects - Aquatic	
Insects - Terrestrial	49
Invertebrates - Crustacea	
Invertebrates - Mussels	
Invertebrates - Terrestrial Snails	
Total SGCN (High/Moderate Association)	**83**

Table 4.4.2.2 Natural Community – Ecological Landscape Opportunity Scores for the Barrens Community Group

Community	Central Lake Michigan Coastal	Central Sand Hills	Central Sand Plains	Forest Transition	North Central Forest	Northeast Sands	Northern Highland	Northern Lake Michigan Coastal	Northwest Lowlands	Northwest Sands	Southeast Glacial Plains	Southern Lake Michigan Coastal	Southwest Savanna	Superior Coastal Plain	Western Coulee and Ridges	Western Prairie
Oak Barrens		M	H							H			L		H	
Pine Barrens		M	H			H	L			H					M	
Sand Barrens		L	M							L					H	