DRAFT – Mafic Glades and Barrens

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Ecosystem Description

This group includes communities in both the Piedmont and Mountain regions. Piedmont examples are less rare, but a couple of the community type occur only in the Mountains. Glades located in the Mountains are adapted to a cooler, moister climate. Though still drought tolerant, they may be more susceptible to alteration than Piedmont glades. There are three types of barrens in the state: ultramafic outcrop barren, diabase glade, and high elevation mafic glade.

Ultramafic outcrop barrens occur on dunite, peridotite, or serpentinite. These rocks are associated with unusual vegetation and endemic species throughout the world because of their unusual chemistry. North Carolina's only well-developed ultramafic outcrop barrens is tied to specialized soils and is an open savanna-like community with a scattered pitch pine canopy and grassy ground cover.

Diabase glades occur in the Piedmont over outcrops of diabase and potentially over other mafic rocks. As with other glade communities, the soil and vegetation are patchy and range from nearly bare rock to patches deep enough to support trees. The vegetation includes many species shared with other high pH soil communities and some species found on granitic flatrocks.

The high elevation mafic glade community is an extremely rare community type, with only three examples known globally. A single known location in North Carolina occurs on a flat exposure of amphibolite in Ashe County. Lichens, including a species found nowhere else (*Cladonia psoromica*), dominate much of the area. Herbs on thin soil mats and in crevices include both lowland species and northern disjunct species. Woody species occur in deeper soils and crevices.

Table 1 at the end of this report provides of summary of expected climate change impacts to these natural communities.

Predicted Effects to Wildlife Species

Table 2 at the end of this report identifies the species of conservation concern and priority species that use habitats in this ecosystem.

It is uncertain how many priority species are associated with this habitat. Bog turtles (*Glyptemys muhlenbergii*) are known from a bog wetland at a mafic glade in Ashe County. For animal species, mafic glades and barrens are probably best regarded as a minor component.

Climate Change Compared to Other Threats

Climate change is not expected to be a major threat for these communities. Development, logging, habitat fragmentation, and changes caused by fire suppression are the most severe threats. In some areas, excessive deer browse is also a major threat. Climate change appears less of a threat.

Table 3 compares climate change with other existing threats.

Table 3. Comparison Of Climate Change With Other Threats

Threat	Rank Order	Comments
Development	1	Warmer winters and more hot spells may fuel increasing desire for housing development at the higher elevations where these communities occur. Development may not directly impact these communities, but may increase access and therefore trampling. Development of adjacent landscapes is likely to introduce pollution and sediment through stormwater runoff. There may also be increased opportunity for invasive species to disperse into this habitat.
Logging/Exploitation	2	Land ownership patterns, proximity to markets, accessibility, and other factors influence short term habitat alterations like forestry operations. Full scale high grading and poor logging practices will have very negative impacts on the structure and composition of adjacent forests.
Fire	3	Fire suppression has shifted these communities toward denser vegetation and more mesophytic plant composition than would naturally occur, making them more susceptible to climate change. Burning would increase their resilience to warmer climate and drought, as well as make them less prone to destruction by wild fire. Prescribed burning will have to account for younger canopies whose trees may be more susceptible to fire than in the past.
Climate Change	4	Mafic glades and barrens may actually benefit from a changed climate, at least among the Piedmont examples This benefit will only be realized if sites are protected from other forms of destruction, and for most, if fire is restored to them.

Summary and Recommendations

These communities are naturally rare in North Carolina, due to limited availability of suitable habitat. All of these communities are tied to specialized sites, and are unable to migrate. Examples need to be protected and managed appropriately.

Recommended Actions

Surveys	• Obtain baseline data on species utilizing mafic glades and barrens. • Determine the effects of current drought conditions on vegetated communities. • Mapping of these sites in a GIS format would facilitate tracking changes over time in both the habitat, as well as the associated species and facilitate landscape scale management of this rare habitat.
Monitoring	• Monitor drought conditions and potential for catastrophic wild fire.
Research	• Study population responses to a prescribed fire regime. • Study the impact of various management scenarios on the habitat and associated species.
Management Practices	• Initiate a prescribed fire regime to prevent invasive plants and prevent habitat conversion. • Protection may require active management to remove invasive species.
Land Protection	• Easements and land acquisition to protect from long term impacts such as housing development (NCWRC 2005). • Close sites to stop direct (trampling, loss of habitat to recreation developments (trails, vistas, etc.) and indirect (disturbance) human impacts (NCWRC 2005).

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References

DeWan, A., N. Dubois, K. Theoharides, and J. Boshoven. 2010. Understanding the impacts of climate change on fish and wildlife in North Carolina. Defenders of Wildlife, Washington, DC.

Gaff, H., DeAngelis, D.L., Gross, L.J., Salinas, R., and M. Shorrash. 2000. Ecological Modeling 127:3352.

Maurer, E.P, L.Brekke, T.Pruitt, and P.B. Duffy. 2007. Fine-resolution climate projections enhance regional climate change impact studies. Eos Trans. AGU, 88(47), 504.

NC Natural Heritage Program (NCNHP). 2001. Descriptions of the biological themes of North Carolina, 2nd edition. N.C. Department of Environment and Natural Resources, Natural Heritage Program, Raleigh, NC.

NC Wildlife Resources Commission. 2005. North Carolina Wildlife Action Plan. Raleigh, NC

Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, third approximation. N.C. Department of Environment and Natural Resources, Natural Heritage Program, Raleigh, NC.

Table 1. Predicted Impacts of Climate Change	
Climate Change Factor	**Comments**
Fire	Fire is believed to be a natural part of these communities. Low intensity fires may benefit these communities, but climate change may bring higher potential for wildfires to be severe.
Wind Damage	An increase in hurricanes or other severe storms may increase wind damage in forests. Wind damage that creates canopy openings will create more open conditions that may favor herbaceous growth.
Drought	Drought appears to be an important factor keeping these communities from become dense forests. However, these are among the driest sites in the Piedmont region. If droughts become much more extreme, they may be beyond the tolerance of some of the species. Drought may also allow them to expand into adjacent forests, though this expansion is likely to be limited by soil conditions.
Increased Temperature	Species adapted to mafic glade habitats are tolerant of drought and heat. Higher average temperatures, coupled with drought conditions, will likely increase occurrence of fire.
Structural Change	More open canopy is likely.
Compositional Change	These communities have been substantially altered by fire suppression, and some of these changes may shift them toward more natural composition.
Acreage Change	Some of the changes associated with climate change may shift them more toward more natural composition, and may even allow these communities to expand into adjacent forests.

Table 2. Reptile Species Utilizing							
Species	**Common Name**	**Element Rank**	**Endemic**	**Major Disjunct**	**Extinction/ Extirpation Prone**	**US/ NC/ WAP***	**Comments**
REPTILES							
Glyptemys muhlenbergii	Bog Turtle	G3/S2				T(S/A) /T/P	Bluff Mountain area of Ashe County.

*** US/ NC/ WAP Abbreviations (species are subject to reclassification by USFWS, NHP, or WRC).**

E	Endangered	SC	Special Concern	P	WAP Priority Species
T	Threatened	SR	Significantly Rare		
FSC	Federal Species of Concern	W	Watch Category		
T(S/A)	Threatened due to Similarity of Appearance				

NatureServe Element Rank: http://www.natureserve.org/explorer/ranking.htm

USFWS Endangered Species Listing Status: http://www.fws.gov/raleigh/es_tes.html

NC Natural Heritage Program Status:
http://www.ncnhp.org/Images/2010%20Rare%20Animal%20List.pdf

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