

### **Ecosystem Description**

Granitic flatrock communities occur on flat to gently sloping exfoliated outcrops of granitic rocks and are scattered throughout the Piedmont region, from Virginia to Alabama. The rock outcrop is generally flush with the surrounding soil and has only minor irregularities. These communities are somewhat related to the granitic dome communities of the upper Piedmont and Mountains. Like them, vegetation is sparse and very patchy. On bare rock, soil mats that accumulate in moss clumps undergo a gradual development, deepening and being invaded by a succession of plants.

A number of characteristic plants, some found in no other communities, occur in flatrocks. They contain their own characteristic specialized flora, including Piedmont quillwort (*Isoetes piedmontana*), southern bladderwort (*Utricularia juncea*), and a peat moss. More permanently wet areas occur in seepage zones at the edge of adjacent soils. A number of species are also shared with eroded old fields, including broomsedge (*Andropogon* sp.), buttonweed (*Diodia* sp.), and ragwort. Deeper soils may support woody species such as eastern red cedar, Virginia pine, and fringe tree. Developing soil mats are apparently periodically pulled up by uprooted trees, recreating open bare rock surface and allowing the flatrock to maintain itself in the long term. Small depressions in the rock surface hold water in the winter but become dry in summer.

The 2005 Wildlife Action Plan describes a component of this community, the Low Elevation Cliffs/Rock Outcrop community as a priority habitat (see Chapter 5A). It is found primarily in the Southern Blue Ridge Mountain region but also occurs in some areas of the Piedmont. In many cases the rock outcrop communities are dispersed throughout various forested habitat types in patches and are too small to be considered discrete communities of their own.

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**

Tables 2 and 3 at the end of this report identify the species of conservation concern and priority species that use habitats in this ecosystem.

The extent of habitat that each rock outcrop provides is dependent upon the entire set of conditions in and surrounding the surface rock. Those conditions influence its use by plants and animals dependent upon the surface rock and may include significant amounts of adjacent ecological community types. Water seepage through rock crevices may provide moisture for

amphibians, mosses, lichens, and wetland vegetation. Reptile species may use rocky areas exposed to direct sunlight for basking or use openings amongst rocks for dens.

For most animal species, granitic flatrocks are probably best regarded as a minor component of a more general dry-xeric mixed forest or woodland habitat. Wildlife that may occur in both high and low elevation rock communities may reach higher densities or have wider distribution in low elevation rock outcrops such as the granitic flatrocks community (*e.g.*, timber rattlesnakes). The elevation limits for each species found in this community can be variable. Some wildlife species may use low elevation rock outcrop communities, but may not necessarily be restricted to them (*e.g.*, eastern woodrat).

**Climate Change Compared to Other Threats**

Granitic flatrocks are tied to specialized sites and cannot migrate. Communities will change in situ but it is uncertain how much. Table 4 summarizes the comparison of climate change with other existing threats.

<b>Threat</b>	<b>Rank Order</b>	<b>Comments</b>
Mining	1	Surface mining ( <i>e.g.</i> , gravel pits) would effectively eliminate this community.
Development	1	Development on granitic flatrock communities may involve blasting or other fracturing methods to remove rock. 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.
Invasive Species	2	There are significant problems with invasive plants, at least in edge zones. Climate change will probably not make invasion worse, but drought disturbance of surrounding woodlands and edges may make them more susceptible. It is possible that some of the invasive species, such as Japanese honeysuckle and <i>Murdannia keisak</i> , will be harmed by drought more than the native species.
Human Disturbance	2	Trampling from hiking and recreation activities, trash dumping, and other damage could occur from human disturbance. Where granitic Flatrocks occur within forested habitats, timber removal can disturb vegetation on flatrocks.
Climate Change	3	These species tolerate drought at present, or grow in the moist early growing season. It is unclear if they are at the margin of their tolerance, or whether they could withstand longer or more severe droughts. More southerly flatrock species could find their way to our flatrocks.

## **Summary and Recommendations**

Flatrocks are naturally isolated, so migration is presumably very limited. However, presence of characteristic species across a number of widely separated outcrops suggests some potential for dispersal. Planting of species to facilitate movement of species to new locations is probably not appropriate. Since this unique habitat type cannot be recreated, it is more important to protect good quality flatrocks with the goal of protecting the range of variability, as well as the locations for future colonization and dispersal.

### **Recommended Actions**

- |                      |   |
|----------------------|---|
| Surveys              | <ul style="list-style-type: none"><li>• Determine the effects of current drought conditions on vegetated communities.</li></ul>   |
| Management Practices | <ul style="list-style-type: none"><li>• Protection may require active management to remove invasive species.</li><li>• Maintain a buffer of sufficient width to minimize negative impacts from adjacent land use activities.</li></ul>  |
| Land Protection      | <ul style="list-style-type: none"><li>• Sites should be protected from human disturbance, including locations that are already protected through conservation measures. This may be through closure during particular times of the year or permanently prohibiting use of the site.</li></ul> |

**[CLICK HERE TO SUBMIT COMMENTS](#)**

A comment form will open in a new window

## **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.

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 (NCWRC). 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**

<b>Climate Change Factor</b>	<b>Comments</b>
Drought	Drought will kill trees on edges and soil islands. This already happens in current droughts, and is part of the mechanism keeping flatrocks open. Increased length or severity of droughts might cause flatrocks to expand at the expense of adjacent shallow-soil woodlands. Herb species associated with granitic Flatrocks tolerate drought at present, or grow in the moist early growing season. It is unclear if they are at the margin of their tolerance, or whether they could withstand longer or more severe droughts. Drought in spring would be detrimental, while drought in other seasons might not be.
Storm Events	A few additional flatrocks may be opened up by wind throw or drought mortality. Increased storms may blow down trees and pull up soil mats more frequently. Amount of bare outcrop and shallow soil mats may increase at the expense of deeper mats.
Fire	The central parts of Granitic Flatrocks are unlikely to burn even in droughts. Fire could affect the dry woodlands that form the edge zone of the flatrocks. However, most flatrocks occur in fragmented landscapes where fire is unlikely to spread. They are likely altered by lack of fire.

**Table 2. Mammal Species Utilizing Piedmont Granitic Flatrocks**

Species	Common Name	Element Rank:	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/NC/WAP*	Comments
<b>MAMMALS</b>							
<i>Neotoma floridana haematoresia</i>	Eastern Woodrat					/SC/P	
<i>Neotoma magister</i>	Alleghany woodrat						
<i>Spilogale putorius</i>	Eastern Spotted Skunk					/ /P	

**Table 3. Reptile Species Utilizing Piedmont Granitic Flatrocks**

Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/NC/WAP*	Comments
<b>REPTILES</b>							
<i>Crotalus horridus</i>	Timber Rattlesnake					/SC/P	
<i>Eumeces anthracinus</i>	Coal Skink					/ /P	

**Table 4. Amphibian Species Utilizing Piedmont Granitic Flatrocks**

Species	Common Name	Element Rank:	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/NC/WAP*	Comments
<b>AMPHIBIANS</b>							
<i>Aneides aeneus</i>	Green salamander	G3G4/S2				FSC/E/P	
<i>Plethodon longicrus</i>	Crevice salamander	G4T1Q/S2				/SC/P	Formerly <i>P. yonahlossee</i> pop.1
<i>Plethodon ventralis</i>	Southern zigzag salamander	G4/S1				/SC/P	

**\* 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](http://www.fws.gov/raleigh/es_tes.html)

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

**[CLICK HERE TO SUBMIT COMMENTS](#)**

A comment form will open in a new window