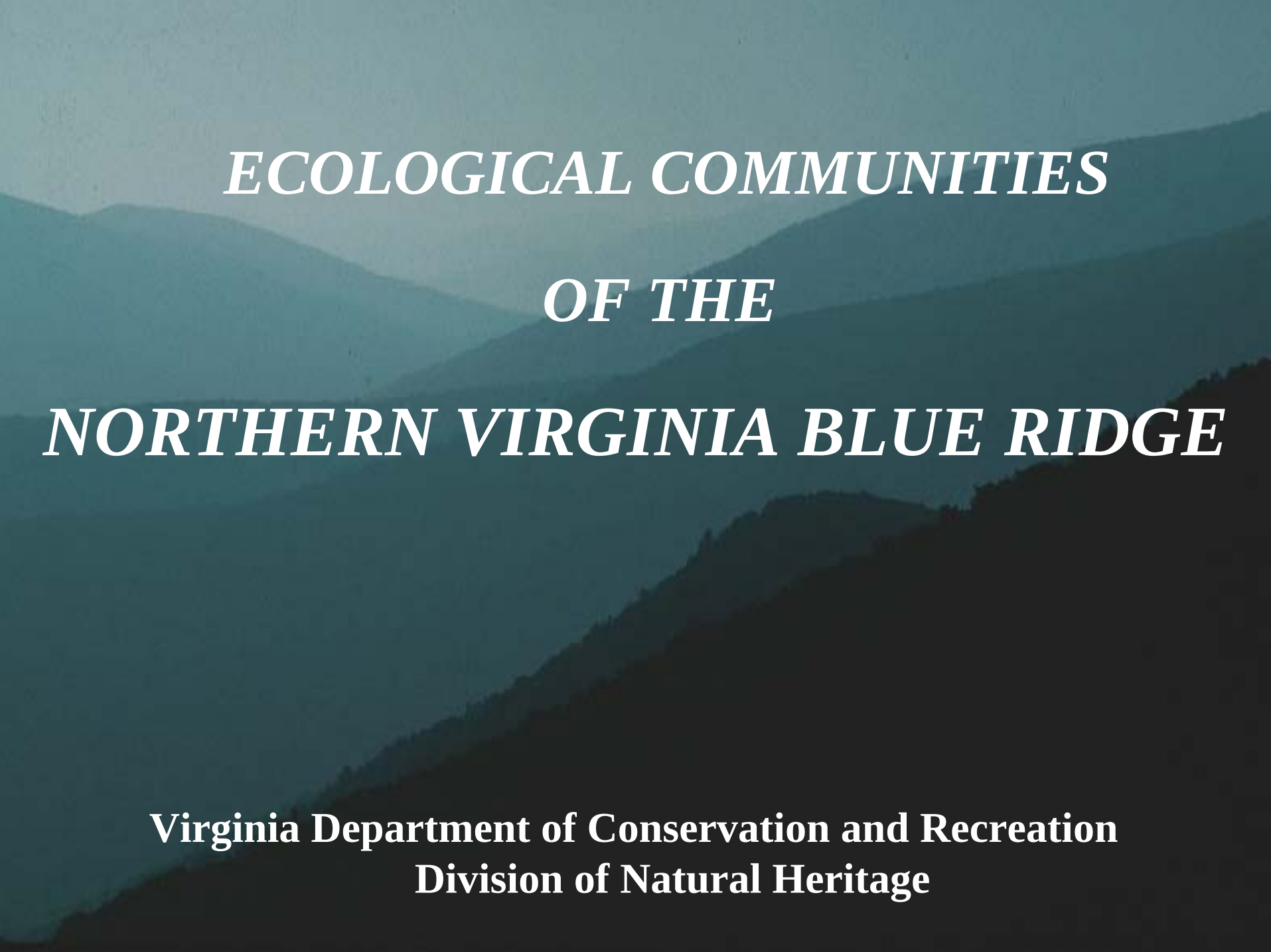


ECOLOGICAL COMMUNITIES OF THE NORTHERN VIRGINIA BLUE RIDGE

Virginia Department of Conservation and Recreation
Division of Natural Heritage

WHAT IS AN ECOLOGICAL COMMUNITY?

an Ecological Community is an assemblage of co-existing, interacting species, considered together with the physical environment and associated ecological processes, that usually recurs on the landscape

HOW DO COMMUNITY INVENTORY AND CLASSIFICATION CONTRIBUTE TO CONSERVATION?

- They provide a “coarse filter” approach that ensures the protection of ecological systems and diverse organisms

- By identifying and protecting excellent examples of all natural community types, the majority of native biota can receive some protection

WHY ARE ECOLOGICAL COMMUNITIES DEFINED USING VEGETATION?

- **Vegetation typically reflects biological and ecological patterns across a landscape**
- **Plants are often faithful indicators of specific site conditions**
- **Vegetation is more easily and completely measurable than other biota or environmental conditions**
- **Vegetation types are the *standard* of the Natural Heritage / NatureServe / TNC network and Federal government for classification, element ranking, mapping, and conservation planning**

WHAT METHODS ARE USED TO CLASSIFY COMMUNITIES?

- **Four full-time vegetation ecologists working toward a state-wide community classification**
- **Plot-based quantitative data collection and analysis**
- **Standard methodology to compare vegetation from different sites**
- **Classification based on full floristic composition, not just dominant species**
- **Method consistent with national standards under development**

WHAT TAXONOMY IS USED TO CLASSIFY COMMUNITIES?

A hierarchical taxonomy with higher levels based on multiple factors and lower levels based primarily on floristics:

***System*: based on gross hydrologic regime**

***Ecological Class*: ecological groups with gross climatic, geographic, and edaphic similarities**

***Ecological Community Group*: community types with topographic, edaphic, physiognomic, and gross floristic similarities**

***Community Type*: stands sharing definite floristic, structural, and environmental similarities.**

EXAMPLE OF CLASSIFICATION HIERARCHY:

***SYSTEM*: TERRESTRIAL**

***ECOLOGICAL CLASS*: HIGH-ELEVATION MOUNTAIN COMMUNITIES**

***ECOLOGICAL GROUP*: HIGH-ELEVATION OUTCROP BARRENS**

***COMMUNITY TYPES*:**

***Diervilla lonicera / Solidago randii – Deschampsia flexuosa – Sedum telephioides – Saxifraga michauxii* Herbaceous Vegetation** (High-Elevation Metabasalt Barren, G1S1)

***Kalmia latifolia – Vaccinium pallidum* Shrubland** (High-Elevation Acidic Heath Barren/Pavement, G2G3?S2?)

***Minuartia groenlandica – Paronychia argyrocoma – Saxifraga michauxii* Herbaceous Vegetation** (Greenland Stitchwort Igneous/Metamorphic Barren, G1S1)

STATUS OF NATURAL COMMUNITY INVENTORY AND DOCUMENTATION ON THE NORTHERN BLUE RIDGE

TOTAL VEGETATION PLOT SAMPLES IN VIRGINIA: **3,284**

***PLOT SAMPLES ON THE NORTHERN BLUE RIDGE*:** **605 (18% of total)**

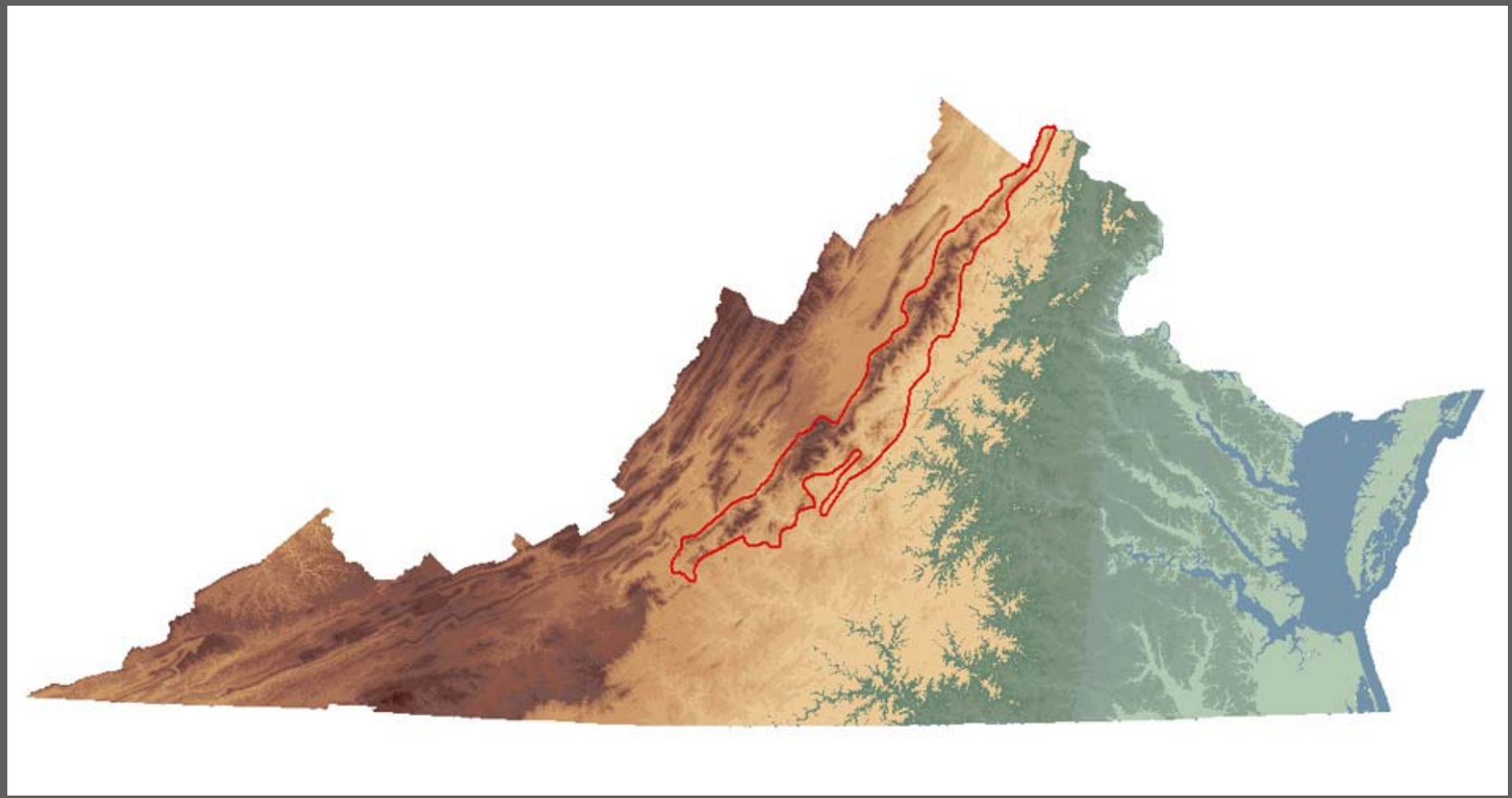
PLOT SAMPLES ON WESTERN PIEDMONT MONADNOCKS: **142 (4% of total)**

MAJOR PROJECT AREAS FOR VEGETATION CLASSIFICATION & MAPPING:

- ***Shenandoah National Park* (*with USGS-BRD*)**
- ***Piney River & Mount Pleasant area, Pedlar Ranger District, George Washington National Forest***
- ***James River Face Wilderness Area, Jefferson National Forest***
- ***Glenwood Ranger District* (*excluding James River Face*), *Jefferson National Forest***
- ***Blue Ridge Parkway***
- ***Bull Run Mountains* (w. Piedmont monadnock)**
- ***Watery Mountains* (w. Piedmont monadnock)**

General Characteristics of the Northern Virginia Blue Ridge

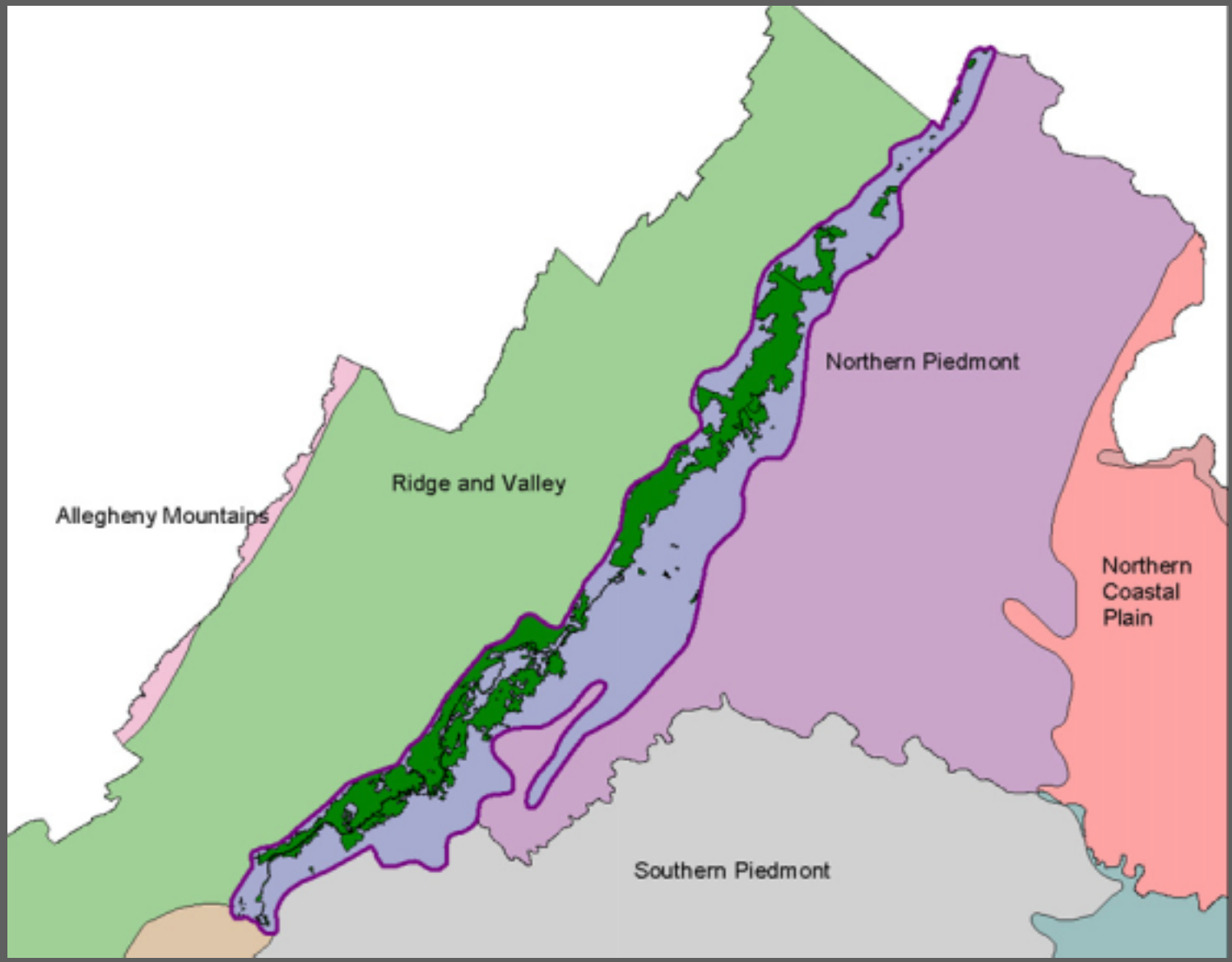
STUDY AREA AND REGIONAL RELIEF



General Characteristics of the Northern Virginia Blue Ridge

PUBLIC LANDS

30% of province consists of National Park, National Forest, and other park lands



General Characteristics of the Northern Virginia Blue Ridge

ELEVATION

Range: 240 ft to 4225 ft

12 individual summits > 4000 ft

General Characteristics of the Northern Virginia Blue Ridge

HYDROLOGY and WATERSHEDS

General Characteristics of the Northern Virginia Blue Ridge

WATER GAPS: Harpers Ferry, James River Gorge, Roanoke Gap

General Characteristics of the Northern Virginia Blue Ridge

GEOLOGY

CATOCTIN FORMATION: METABASALT (“GREENSTONE”), METABASALT BRECCIA, MINOR METASEDIMENTARY INTERBEDS

GRANITIC COMPLEX: OLD RAG GRANITE, CHARNOCKITE, LAYERED PYROXENE GRANULITE, LEUCOCHARNOCKITE, CHARNOCKITE GNEISS, ETC.

METASEDIMENTARY COMPLEX:
QUARTZITE, METASANDSTONE, METASILTSTONE, PHYLLITE

General Characteristics of the Northern Virginia Blue Ridge

VEGETATION

OVERVIEW OF ECOLOGICAL COMMUNITIES

Matrix Communities

OAK / HEATH FORESTS

- **subxeric to xeric slopes and crests**
- **low and middle elevations (< 3200 ft)**
- **most extensive on metasedimentary substrates**
- **soils infertile (low pH, Ca, Mg; high Fe, Al), usually rocky**
- **habitats fire-prone**
- **low species richness (mean ~ 25 taxa / plot)**

***Kalmia latifolia* (mountain-laurel)**

old-growth *Quercus prinus* (chestnut oak)

Cypripedium acaule **(pink ladyslipper)**

Iris verna **(dwarf iris)**

***Castanea dentata* (American chestnut)**

Fire-killed chestnut oak forest and regeneration

Gypsy moth-related chestnut oak mortality

Matrix Communities

BASIC OAK-HICKORY FORESTS

- **submesic to subxeric slopes and crests**
- **lower elevations (< 2500 ft)**
- **most extensive on metabasalt substrates**
- **soils with moderately high base status**
- **moderate to high species richness (mean ~ 68 taxa / plot)**

***Cercis canadensis* (eastern redbud)**

***Carya ovalis* (red hickory)**

Thalictrum thalictroides **(rue-anemone)**

Stellaria pubera **(star chickweed)**

Cardamine concatenata **(cut-leaved toothwort)**

***Dichanthelium boscii* (Bosc's panic grass)**

***Elymus hystrix* (bottlebrush grass)**

Matrix Communities

MONTANE OAK-HICKORY FORESTS

- **submesic to mesic slopes and crests**
- **middle and high elevations (~ 2500 to 4000 ft)**
- **confined (in NBR) to metabasalt and granitic substrates**
- **soils with moderate to high base status**
- **moderate species richness (mean ~ 57 taxa / plot)**

Ageratina altissima **(white snakeroot)**

Collinsonia canadensis **(horse-balm)**

***Thalictrum coriaceum* (leatherleaf meadowrue)**

photo: W.H. Moorhead III

***Cimicifuga racemosa* (black bugbane)**

Matrix Communities

NORTHERN RED OAK FORESTS

- **submesic upper slopes and crests**
- **higher elevations (~ 3000 to 4200 ft)**
- **confined (in NBR) to metabasalt and granitic substrates**
- **soils infertile**
- **low winter temperatures, high winds, and ice storms are frequent natural disturbances**
- **variable species richness (range = 23 to 61 taxa / plot)**

***Dennstaedtia punctilobula* (hayscented fern)**

Ilex montana **(mountain holly)**

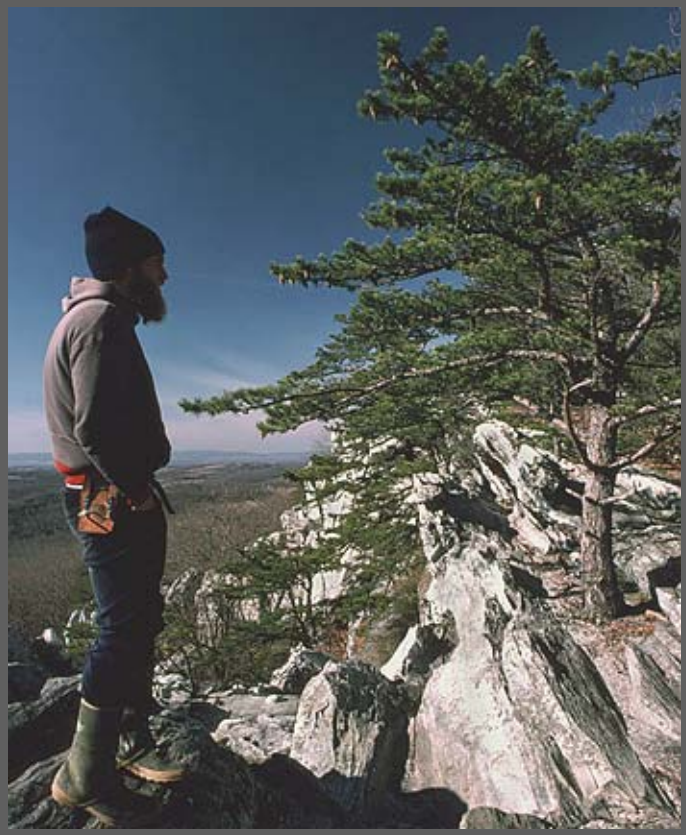
Rhododendron prinophyllum **(early azalea)**

Amianthium muscitoxicum **(fly-poison)**

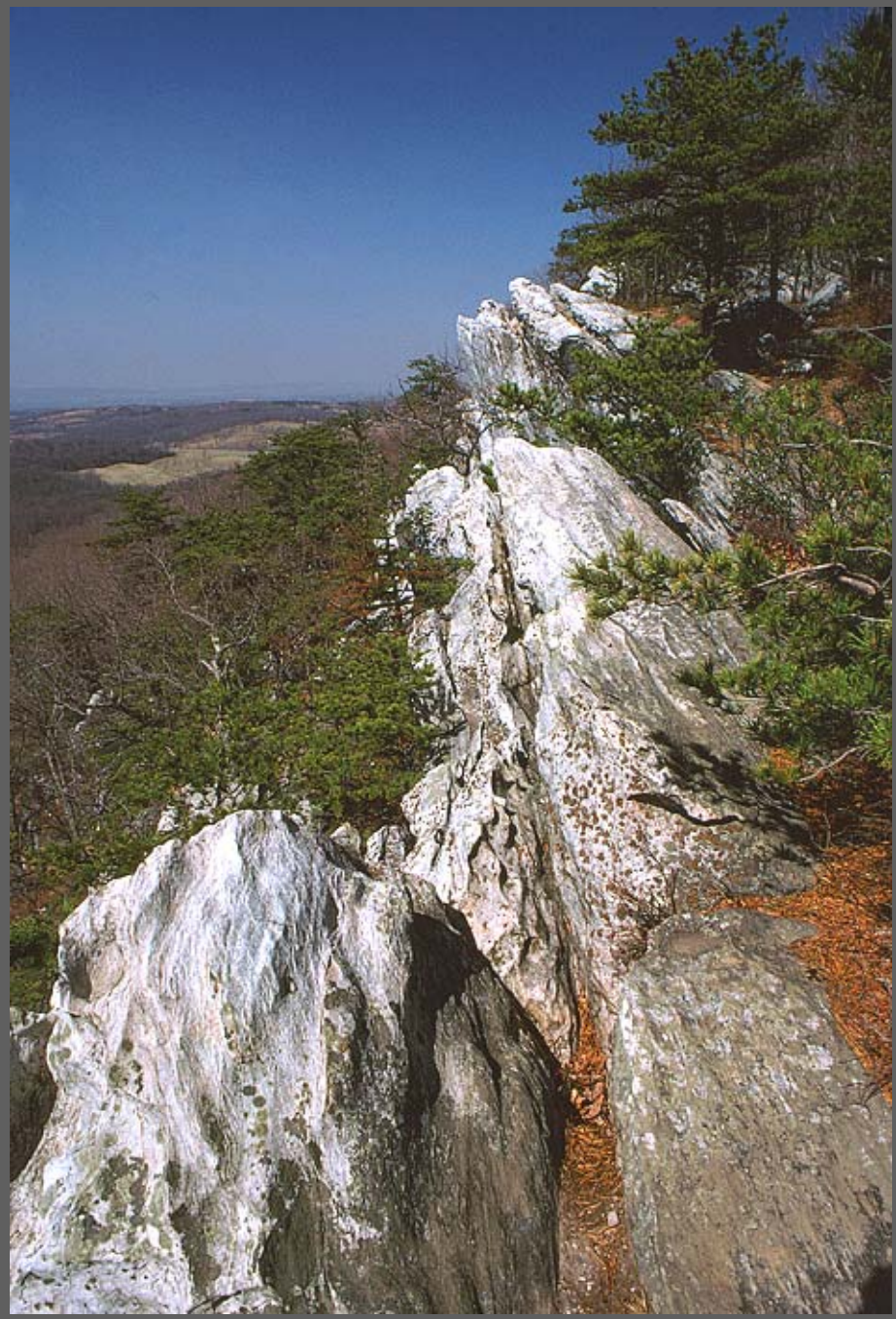
Large-Patch Communities

PINE-OAK / HEATH WOODLANDS

- **xeric, exposed slopes, crests, and cliffs**
- **low and middle elevations (< 3200 ft)**
- **most extensive on metasedimentary substrates**
- **soils extremely infertile (very low pH, Ca, Mg; high Fe, Al), often sparse**
- **very low species richness (< 20 taxa / plot)**
- **maintained by drought stress and periodic burning**



***Pinus pungens* (table-mountain pine)**



***Quercus ilicifolia* (bear oak)**

Xerophyllum asphodeloides
(eastern turkeybeard)

Large-Patch Communities

RICH COVE AND SLOPE FORESTS

- **sheltered to open, mesic slopes and ravines**
- **low and middle elevations (< 3400 ft)**
- **most extensive on metabasalt and granitic substrates**
- **soils fertile (high Ca, Mg, total base saturation)**
- **moderate species richness (mean ~ 48 taxa / plot)**

Acer saccharum (sugar maple)

Liriodendron tulipifera (tulip-poplar)

Tilia americana (American basswood)

***Trillium grandiflorum* (large-flowered trillium)**

Laportea canadensis **(wood nettle)**

Caulophyllum thalictroides **(blue cohosh)**

Large-Patch Communities

BASIC MESIC FORESTS

- **sheltered to open, mesic slopes and ravines**
- **low elevations and foothills (< 1500 ft)**
- **most extensive on metabasalt substrates and rich colluvium or alluvium**
- **soils very fertile (high pH, Ca, total base saturation)**
- **moderate species richness (mean ~ 53 taxa / plot)**

***Adiantum pedatum* (maidenhair fern)**

***Asimina triloba* (paw-paw)**

Jeffersonia diphylla **(twinleaf)**

Trillium sessile **(toadshade)**

Large-Patch Communities

ACIDIC COVE FORESTS

- **sheltered to open, mesic slopes and ravines**
- **low and middle elevations (< 2500 ft)**
- **confined to metasedimentary substrates**
- **soils infertile**
- **moderate species richness (mean ~ 44 taxa / plot)**

***Rhododendron maximum* (great rhododendron)**

***Rhododendron catawbiense*(Catawba rhododendron)**

Pinus strobus **(eastern white pine)**

Fagus grandifolia **(American beech)**

Galax urceolata **(galax)**

Polystichum acrostichoides **(Christmas fern)**

Large-Patch Communities

EASTERN HEMLOCK FORESTS

- **sheltered, typically N-facing, mesic slopes and ravines**
- **distributed at all elevations**
- **occurs on all geological substrates**
- **soils very infertile (very low pH, base cation levels, and base saturation)**
- **low species richness (mean ~ 25 taxa / plot)**
- **threatened with extirpation by outbreaks of hemlock woolly adelgid (*Adelges tsugae*)**

Eastern hemlock / Catawba rhododendron forest

Eastern hemlock / yellow birch forest

Dryopteris intermedia
(intermediate woodfern)

Maianthemum canadense
(Canada mayflower)

1980 view of Hemlock Springs area, Shenandoah National Park

2003 view of Hemlock Springs area, Shenandoah National Park

Large-Patch Communities

LOW-ELEVATION ACIDIC BOULDERFIELD FORESTS AND WOODLANDS

- **weathering block fields and bouldery colluvium**
- **low and middle elevations (< 3300 ft)**
- **mostly on metasedimentary substrates, especially quartzite**
- **soils, if any, interstitial, organic-rich, and very infertile**
- **low species richness (mean ~ 25 taxa / plot)**

Gnarled *Betula lenta* (sweet birch)

***Parthenocissus quinquefolia* (Virginia creeper)**

***Betula papyrifera* var. *cordifolia* (paper birch)**

***Lasallia papulosa* (common toadskin lichen)**

Large-Patch Communities

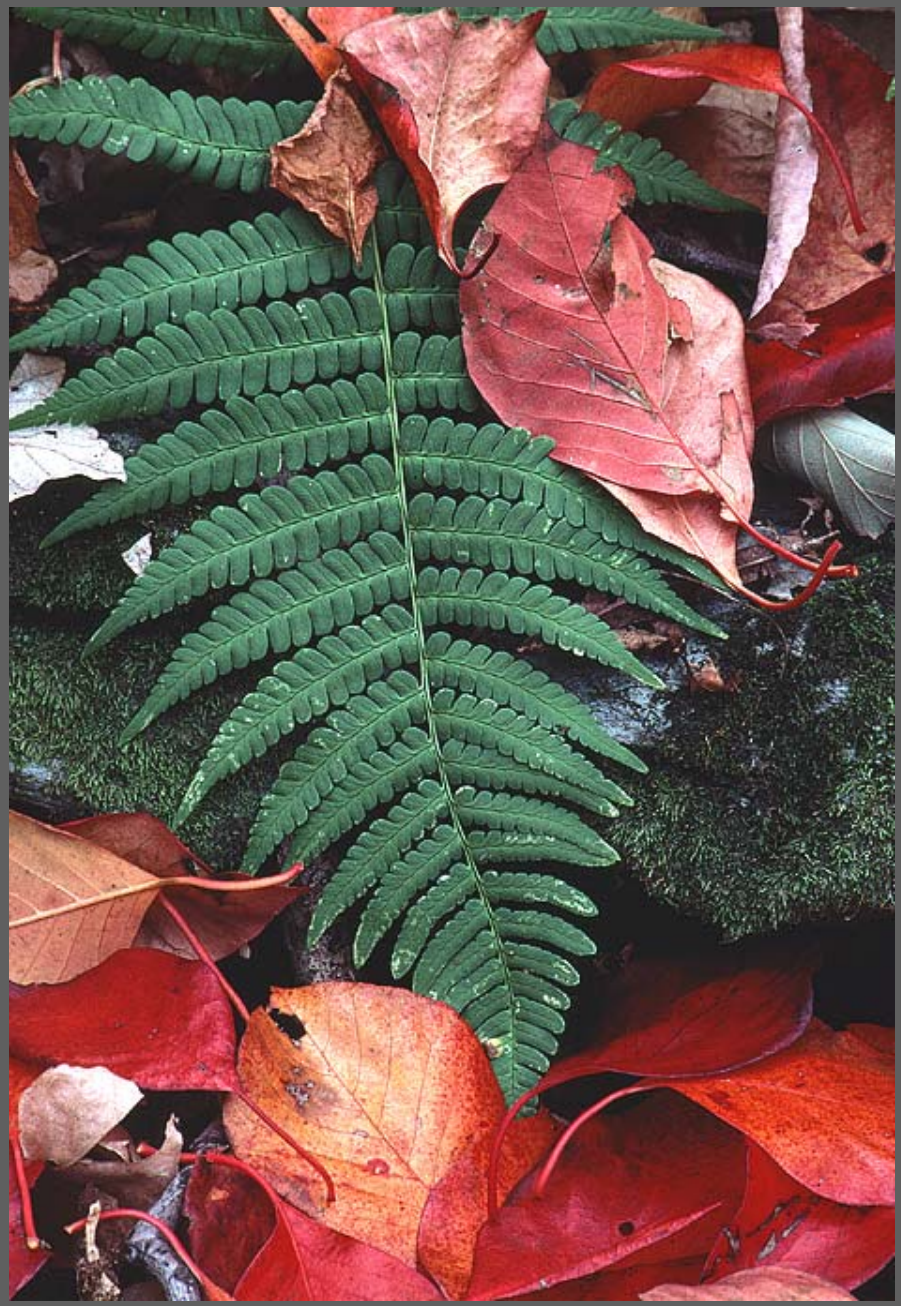
LOW-ELEVATION BASIC BOULDERFIELD FORESTS AND WOODLANDS

- **weathering block fields and bouldery colluvium**
- **low and middle elevations (< 3400 ft)**
- **most common on metabasalt and granitic substrates, but also occurs on metasedimentary substrates**
- **soils, if any, interstitial and moderately fertile (moderately high Ca, Mg, Mn)**
- **moderate species richness (mean ~ 40 taxa / plot)**

Impatiens pallida **(yellow jewelweed)**

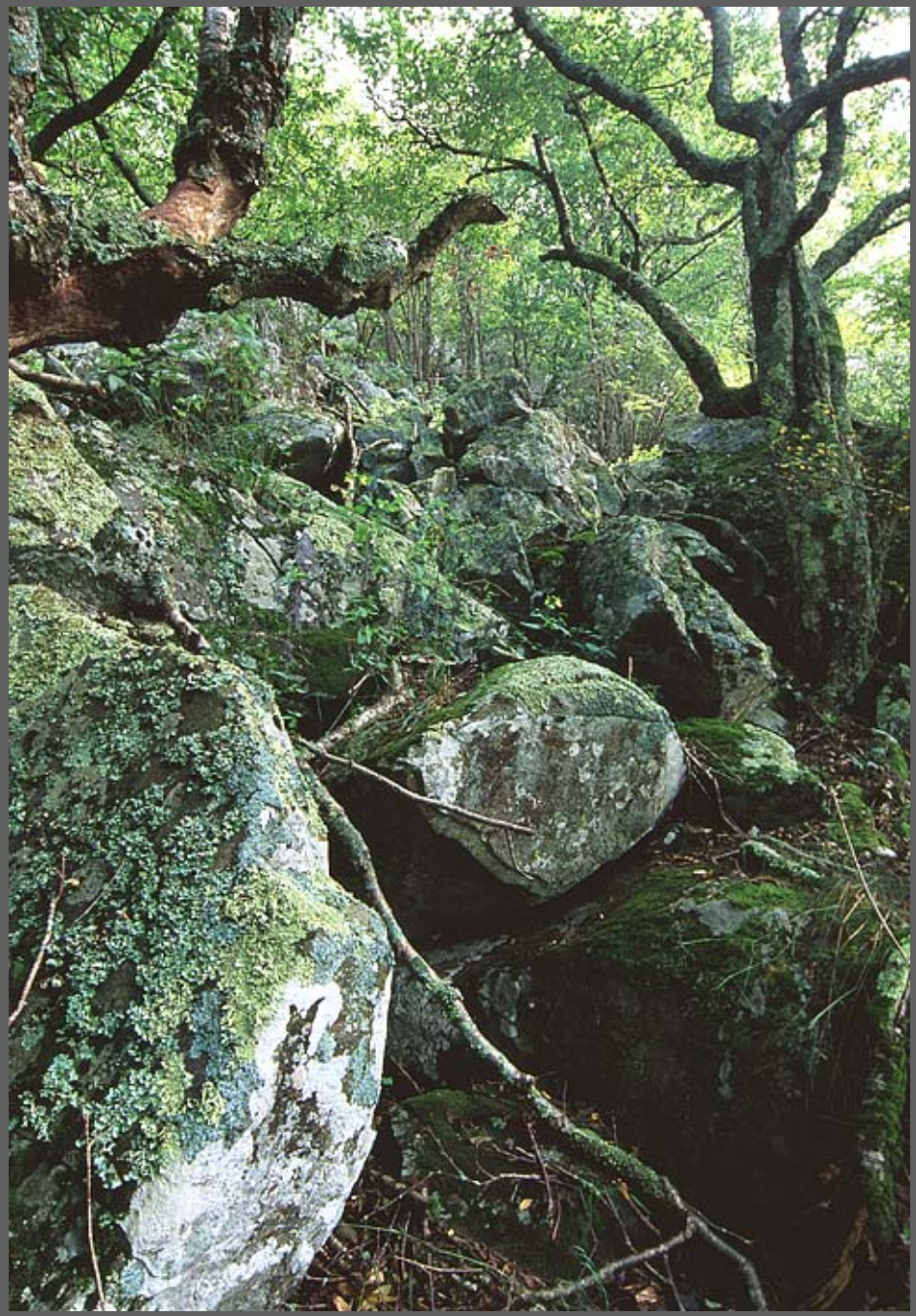
Polymnia canadensis **(leafcup)**

Sambucus pubens **(red elderberry)**



Dryopteris marginalis **(marginal woodfern)**

Aralia nudicaulis **(wild sarsaparilla)**



Large-Patch Communities

HIGH-ELEVATION BOULDERFIELD FORESTS AND WOODLANDS

- **weathering block fields and bouldery colluvium**
- **high elevations (3300 to 4100 ft)**
- **confined (in NBR) to metabasalt and granitic substrates**
- **mineral soil absent; interstitial duff and moss/lichen mats usually present**
- **microclimatic influences more important than bedrock chemistry**
- **very low species richness (mean = 19 taxa / plot)**

Plot-sampling on Hawksbill boulderfield, Shenandoah National Park

Sorbus americana
(American mountain-ash)

Betula alleghaniensis
(yellow birch)

Stereocaulon tennesseensis **(bony foam lichen), a narrow Appalachian endemic**

Hylocomium splendens **(stairstep moss), a circumboreal moss**

Polypodium appalachianum
(Appalachian rock-cap fern)

Clintonia borealis **(bluebead lily)**

***Plethodon shenandoah* (Shenandoah salamander)**

Small-Patch Communities

MOUNTAIN / PIEDMONT BASIC WOODLANDS

- **exposed, xeric, typically S- or W-facing, rocky slopes**
- **low and middle elevations (< 3200 ft)**
- **most characteristic of metabasalt substrates (rarely on pyroxene-bearing granitic rocks and phyllite / metasiltstone of Harpers Formation)**
- **soils fertile (high Ca, Mg, Mn)**
- **high species richness (mean ~ 75 taxa / plot)**

***Fraxinus americana* (white ash) and *Carya glabra* (pignut hickory) woodland, Big Devils Stairs, Rappahannock Co., Shenandoah National Park**

Muhlenbergia sobolifera **(cliff muhly)**

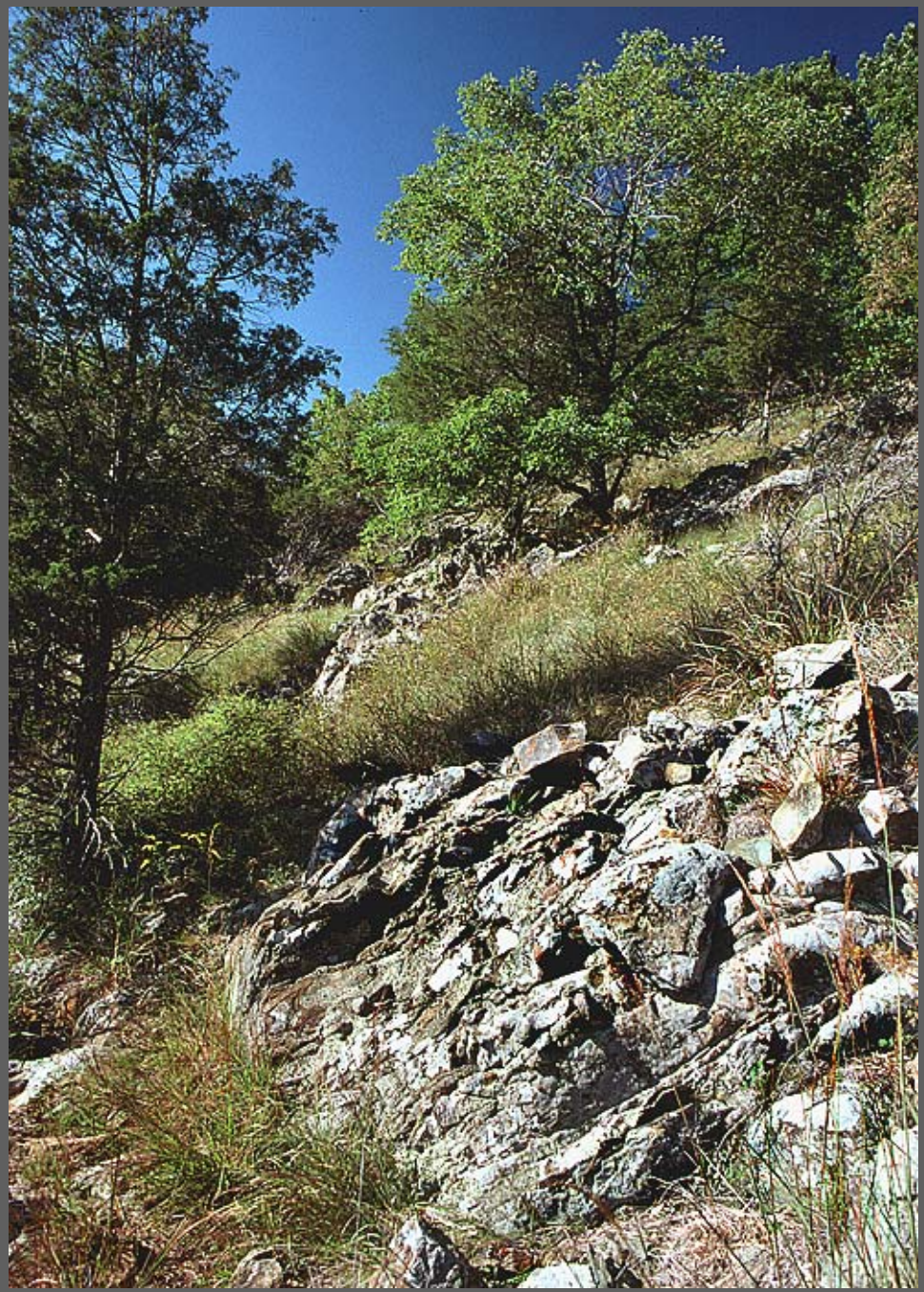
Pycnanthemum incanum **(hoary mountain-mint)**

Phacelia dubia **(small-flowered phacelia)**

Helianthus divaricatus **(woodland sunflower)**

Metabasalt woodland dominated by *Chasmanthium latifolium*, Sawmil Ridge, Albemarle Co. (SNP)

***Chasmanthium latifolium* (river oats)**

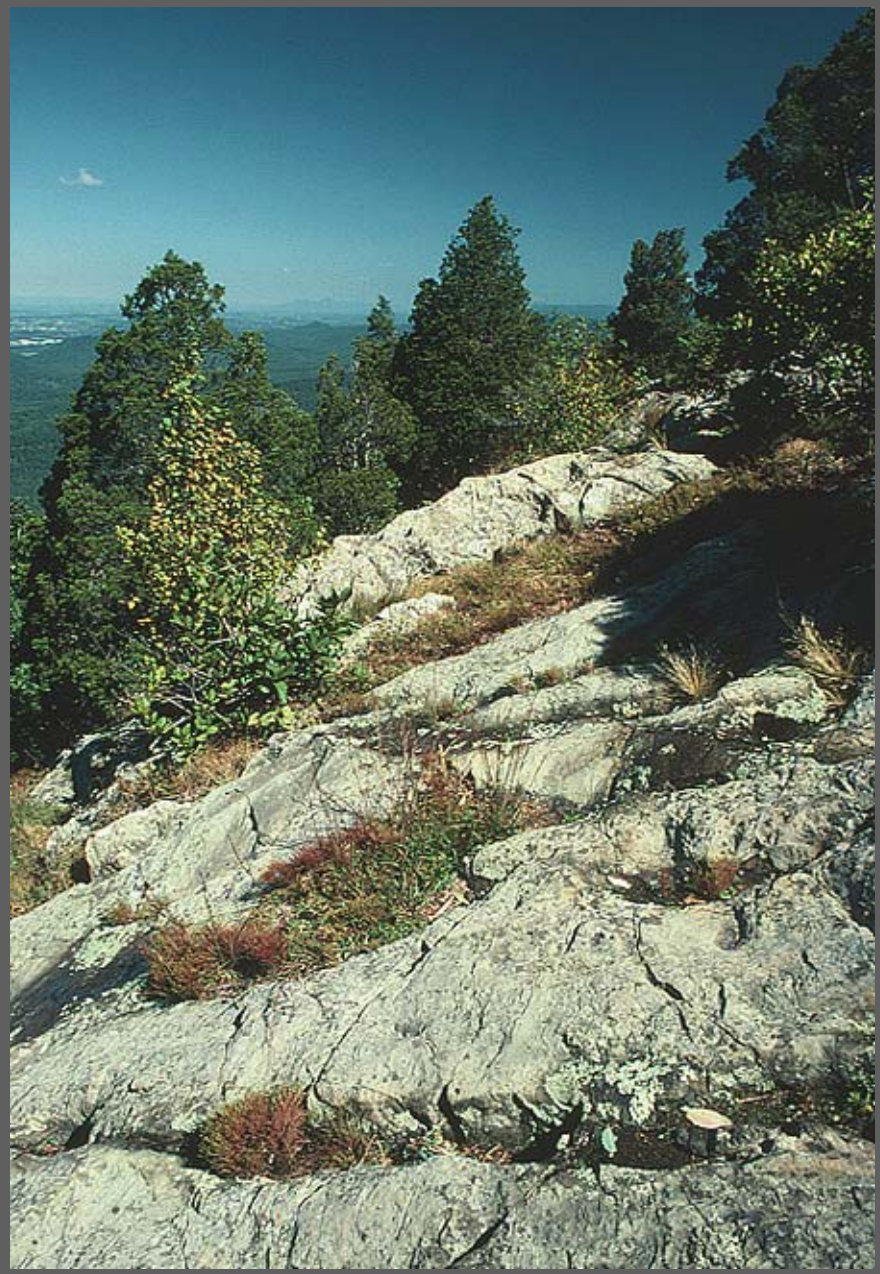


Small-Patch Communities

LOW-ELEVATION BASIC OUTCROP BARRENS

- **exposed, typically S- or W-facing, bedrock outcrops**
- **low and middle elevations (< 3000 ft)**
- **confined to metabasalt and granitic substrates**
- **mineral soil w/high Ca and Mg present locally in crevices and on ledges**
- **low to moderate species richness (mean ~ 37 taxa / plot)**

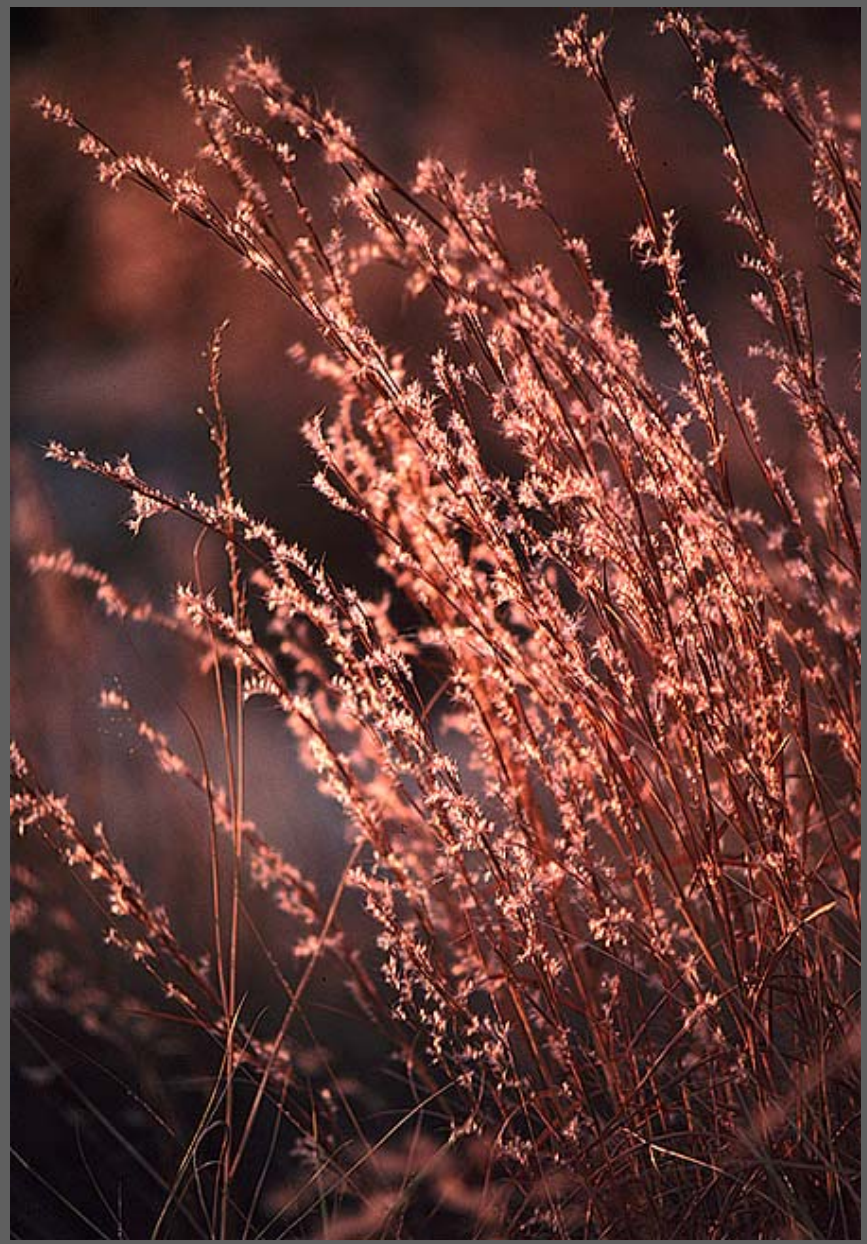
Little Devils Stairs barren, SNP



Laurel Springs Gap barren, GWNF

***Juniperus virginiana* (eastern red cedar)**

Eragrostis capillaris **(lacegrass)**



Schizachyrium scoparium **(little bluestem)**

Talinum teretifolium (fame-flower)

Allium cernuum (nodding onion)

Muhlenbergia capillaris **(hair-awn muhly)**

Muhlenbergia glomerata **(spiked muhly)**

Solidago rigida **(hard-leaved goldenrod)**

***Crotalus horridus horridus* (timber rattlesnake)**

Small-Patch Communities

CENTRAL APPALACHIAN SHALE BARRENS

- **exposed, very steep S- or W-facing rocky slopes**
- **low elevations (< 2000 ft)**
- **confined (in NBR) to metasiltstone and phyllite of Harpers Formation**
- **soils infertile**
- **moderate species richness (mean = 49 taxa / plot)**

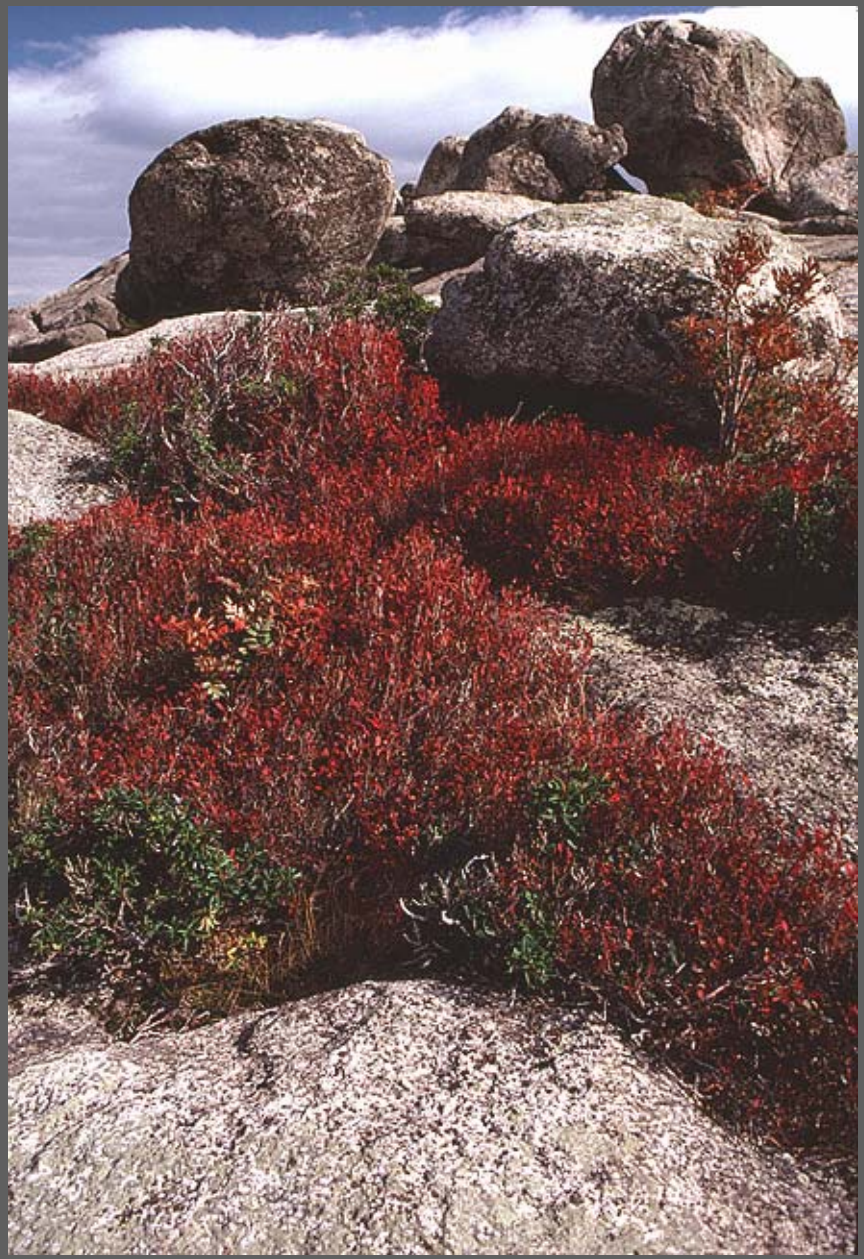
Furnace Mountain Shale Barren, Rockbridge County, JNF

© Hal Horwitz

Clematis coactilis **(white-haired leather-flower)**

photo: Michael Lipford

Senecio antennariifolius **(shale-barren ragwort)**



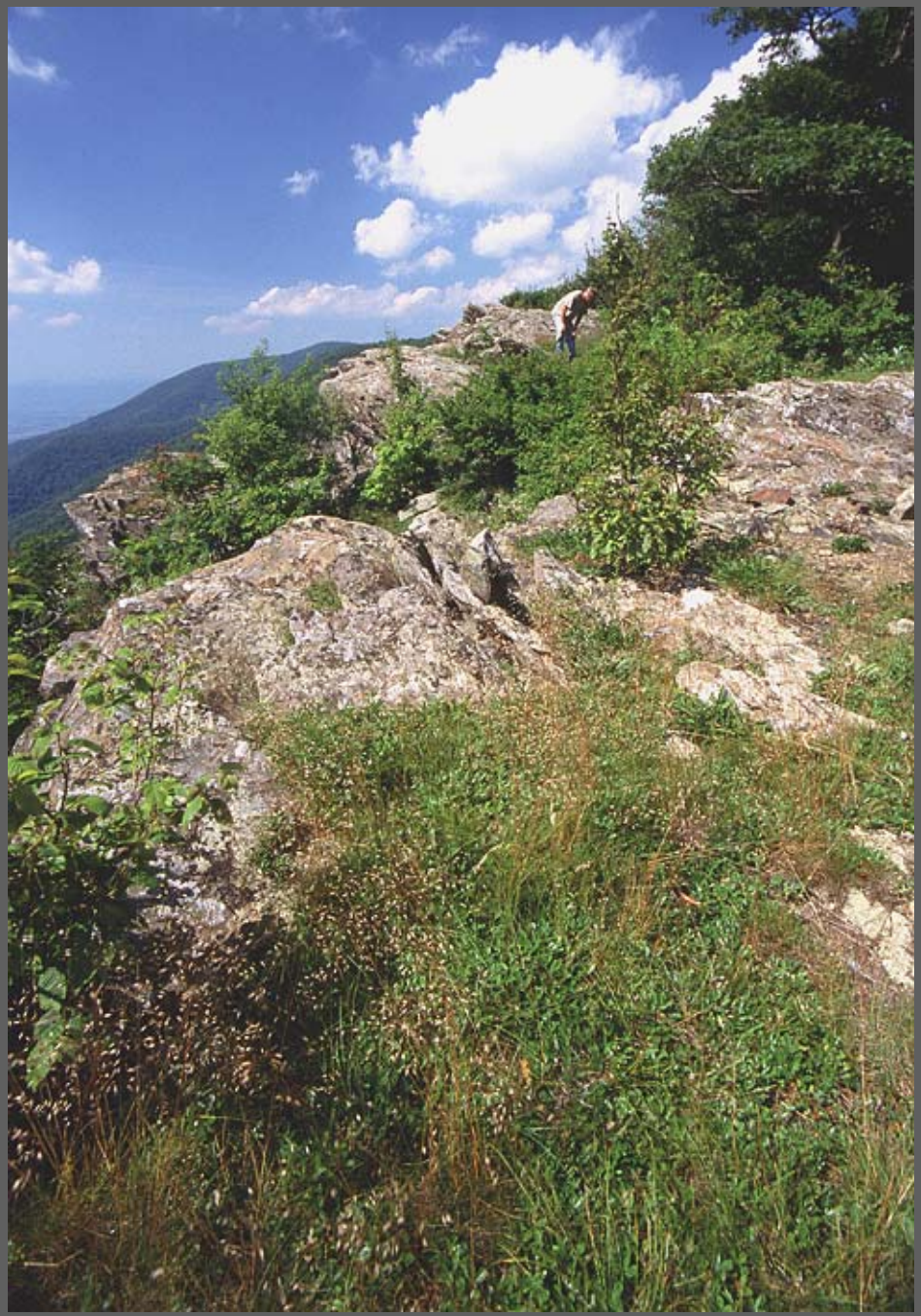
Small-Patch Communities

HIGH-ELEVATION OUTCROP BARRENS: GRANITIC

- **exposed outcrop pavements, clifftops, and rocky summits**
- **high elevations (~ 3200 to 4000 ft)**
- **confined (in NBR) to outcrops of the granitic complex**
- **mineral soils generally absent; moss/lichen and duff mats locally present**
- **very low species richness (< 20 taxa / plot)**

***Arctostaphylos uva-ursi* (bearberry) on Millers Head, Shenandoah National Park**

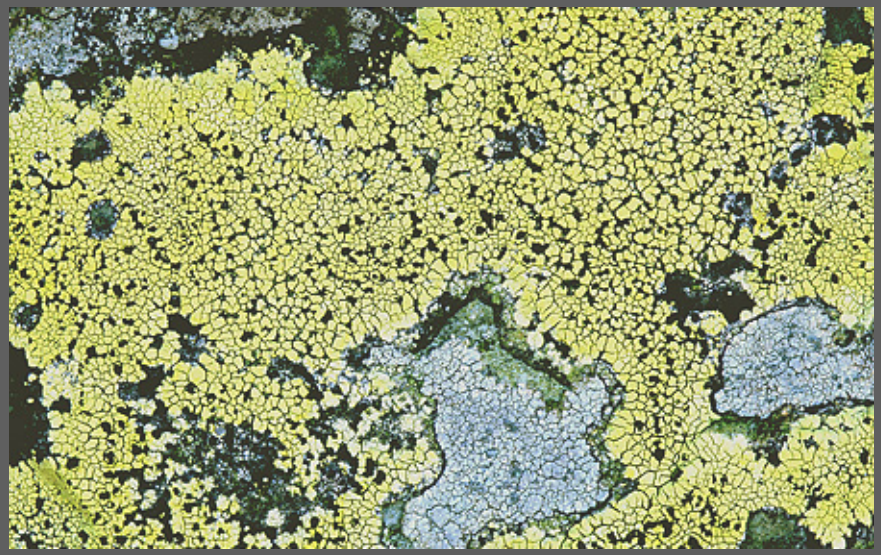
***Minuartia groenlandica* (Greenland stitchwort) on Spy Rock, Nelson County**



Small-Patch Communities

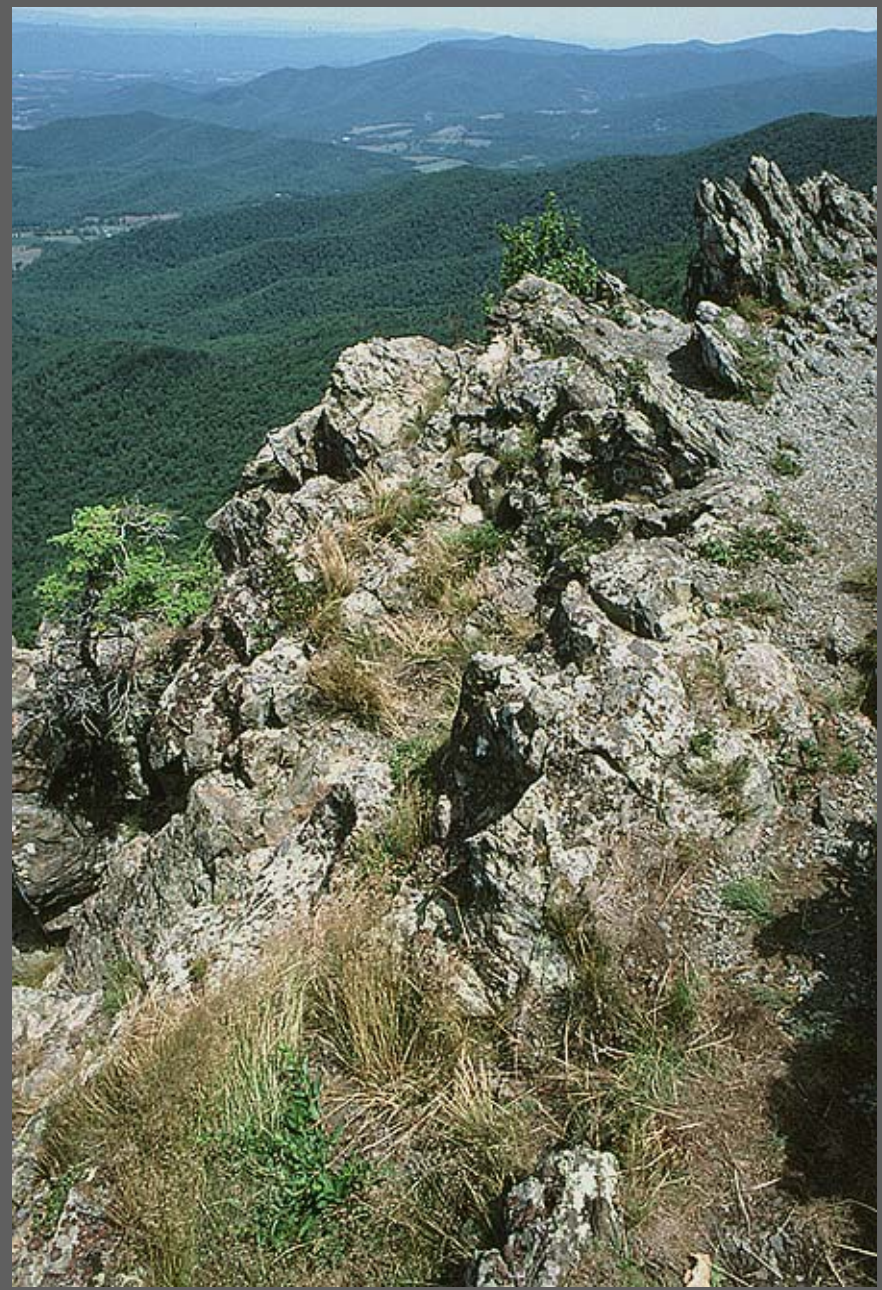
HIGH-ELEVATION OUTCROP BARRENS: METABASALT

- **exposed, N or NW-facing outcrop pavements, clifftops, and rocky summits**
- **high elevations (2900 ft to 4000 ft)**
- **confined to metabasalt outcrops**
- **mineral soils generally absent; moss/lichen and duff mats locally present**
- **low species richness (mean = 29 taxa / plot)**
- **endemic to ca. 25 discrete outcrops at 8 sites in Shen. Nat. Park**



Rhizocarpon geographicum **(yellow map lichen)**

Melanelia stygia **(alpine camouflage lichen)**



Little Stony Man barrens complex, SNP

***Diervilla lonicera* (northern bush-honysuckle)**

***Solidago randii* (Rand's goldenrod)**

***Solidago randii, Sibbaldiopsis tridentata* (three-toothed cinquefoil), and *Deschampsia flexuosa* (wavy hairgrass)**

***Sedum telephioides* (Allegheny stonecrop)**

***Saxifraga michauxii* (Michaux's saxifrage)**

Juncus trifidus **(highland rush)**

Huperzia appalachiana **(Appalachian fir clubmoss)**

Conioselinum chinense **(hemlock parsley)**

Small-Patch Wetlands

MOUNTAIN / PIEDMONT ACIDIC SEEPAGE SWAMPS

- **groundwater-saturated stream headwaters and ravine bottoms**
- **low elevations (< 2000 ft)**
- **confined to metasedimentary substrates**
- **soils infertile**
- **moderate species richness (mean ~ 45 taxa / plot)**

***Osmunda cinnamomea* (cinnamon fern), *Symplocarpus foetidus* (skunk-cabbage), and *Veratrum viride* (false hellebore)**

***Acer rubrum* (red maple)**

***Sphagnum* sp. and *Rubus hispidus* (bristly dewberry)**

Small-Patch Wetlands

MOUNTAIN / PIEDMONT BASIC SEEPAGE SWAMPS

- **groundwater-saturated stream headwaters and ravine bottoms**
- **low and middle elevations (< 3400 ft)**
- **confined to metabasalt and granitic substrates**
- **soils moderately fertile (moderately high Ca, Mg; high Fe)**
- **moderate to high species richness (mean ~ 68 taxa / plot)**

Caltha palustris **(marsh-marigold)**

Fraxinus nigra **(black ash)**

Trillium cernuum **(nodding trillium)**

Euphorbia purpurea **(glade spurge)**

Poa paludigena **(bog bluegrass)**

Small-Patch Wetlands

HIGH-ELEVATION SEEPAGE SWAMPS

- **groundwater-saturated stream headwaters and ravine bottoms**
- **high elevations (3300 to 3900 ft)**
- **confined (in NBR) to metabasalt and granitic substrates**
- **soils moderately infertile**
- **moderate species richness (mean ~ 45 taxa / plot)**

***Alnus incana* ssp. *rugosa* (speckled alder)**

***Chrysosplenium americanum* (American water-carpet)**

***Bazzania trilobata*, *Polytrichum* sp., and *Mitchella repens* (partridgeberry)**

Streptopus lanceolatus var. roseus
(rose twisted-stalk)

***Aster acuminatus* (whorled wood aster)**

Small-Patch Wetlands

MAFIC FENS AND SEEPS

- **groundwater-saturated stream headwaters and high basins**
- **elevation range = 3400 to 3560 ft**
- **confined to metabasalt substrates**
- **soils with high Mg levels**
- **low species richness (mean = 27 taxa / plot)**
- **extremely rare, endemic to Big Meadows area of SNP**

Calamagrostis canadensis (bluejoint reedgrass)

Sanguisorba canadensis **(Canadian burnet)**

Spiraea alba **var.** ***latifolia*** **(meadowsweet)**

Carex buxbaumii **and** *Carex scoparia*

photo: Steve Croy

Menyanthes trifoliata **(buckbean)**

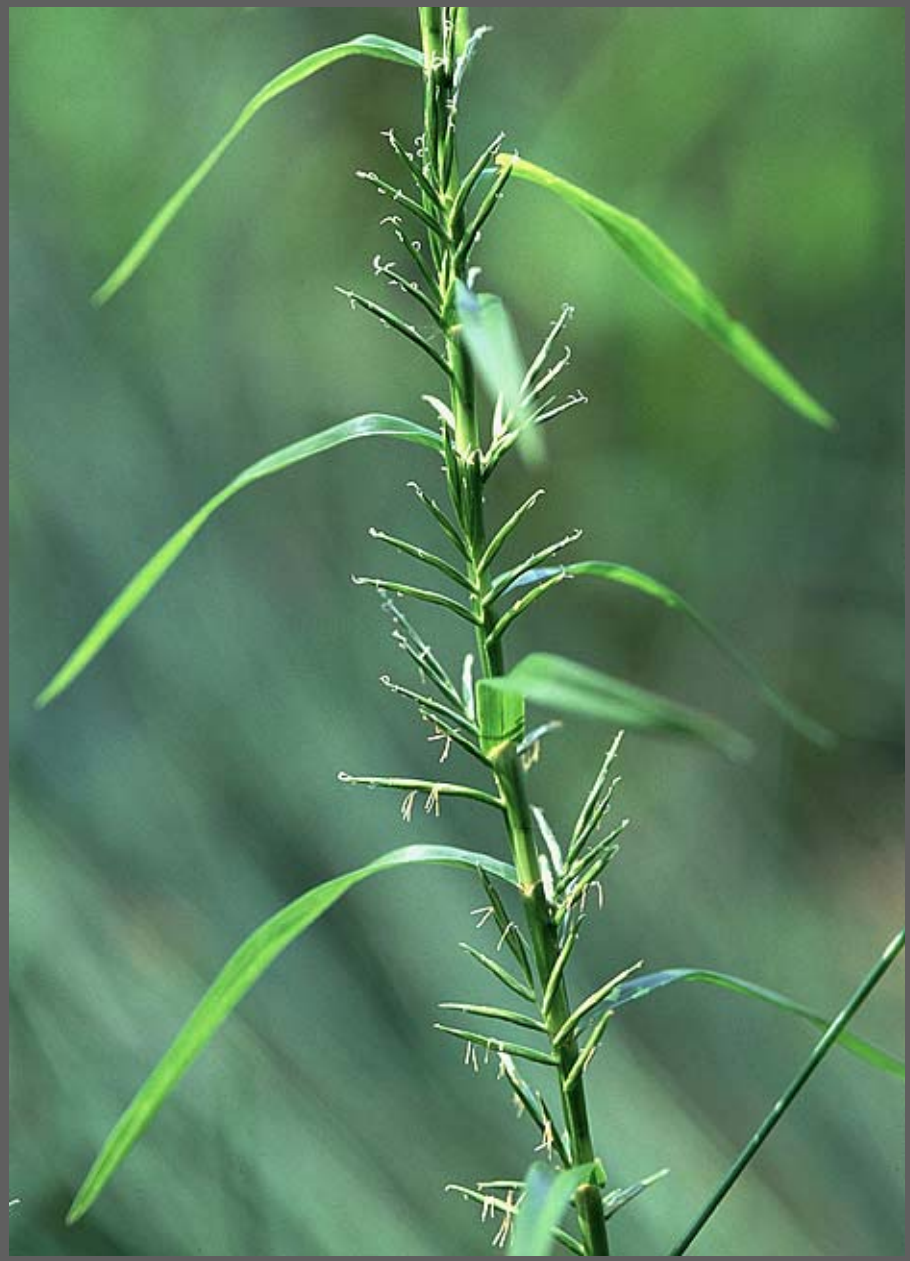
photo: T.J. Rawinski

Green Pond at Big Levels, Augusta Co.

Small-Patch Wetlands
MOUNTAIN PONDS

- **seasonally-flooded ridgecrest and slope-bench depressions**
- **low and middle elevations (< 3200 ft)**
- **confined to metasedimentary substrates**
- **soils organic, extremely acidic**
- **very low species richness (range = 7 to 10 taxa / plot)**
- **extremely rare, only a few examples known on NBR**

***Cephalanthus occidentalis* (buttonbush)**



***Dulichium arundinaceum* (three-way sedge)**

photo: T.J. Rawinski

Small-Patch Wetlands
RIVERSIDE PRAIRIES

- **frequently flood-scoured, channel-shelf bedrock outcrops along high-gradient rivers**
- **low elevations (< 1000 ft)**
- **occurs on various substrates**
- **shallow, rapidly drained alluvial soils**
- **low species richness (mean = 32 taxa / plot)**
- **extremely rare, known only from James River Gorge in Virginia NBR**

photo: T.J. Rawinski

James River Gorge, Amherst and Bedford Counties

***Panicum virgatum* (switchgrass)**

***Andropogon gerardii* (big bluestem)**

***Spartina pectinata* (freshwater cordgrass)**

Baptisia australis
(blue wild indigo)


Virginia Department of Conservation and Recreation, Division of Natural Heritage