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**ECOLOGICAL SYSTEM: NORTH-CENTRAL APPALACHIAN ACIDIC CLIFF AND TALUS**

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**Summary:** This system comprises sparsely vegetated to partially wooded cliffs and talus slopes in the central Appalachians occurring on rocks of acidic lithology and lacking any indicators of enriched conditions. This cliff system occurs at low to mid elevations from central New England south to Virginia. It consists of vertical or near-vertical cliffs and the talus slopes below, formed on hills of granitic, sandstone, or otherwise acidic bedrock. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. Vegetation in seepage areas tends to be more well-developed and floristically different from the surrounding dry cliffs. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places. *Juniperus virginiana* (eastern red-cedar) is a characteristic tree species, *Toxicodendron radicans* (eastern poison-ivy) a characteristic woody vine, and *Polypodium virginianum* (rock polypody) a characteristic fern.

**High-ranked Species:** *Acrobolbus ciliatus* (G3?), *Aneides aeneus* (G3G4, green salamander), *Bryum riparium* (G2G4), *Canis rufus* (G1Q, red wolf), *Carex biltmoreana* (G3, biltmore sedge), *Carex misera* (G3, wretched sedge), *Gymnoderma lineare* (G2, rock gnome lichen), *Heuchera alba* (G2Q, white alumroot), *Hymenophyllum tayloriae* (G2, taylor's filmy fern), *Hypericum buckleyi* (G3, buckley's St. John's-wort), *Krigia montana* (G3, mountain cynthia), *Leptohymenium sharpii* (G1, mount leconte moss), *Liatris helleri* (G2, heller's blazingstar), *Liatris microcephala* (G3G4, small-head blazingstar), *Lophocolea appalachiana* (G1G2Q), *Mannia californica* (G3?), *Marsupella emarginata* var. *latiloba* (G5T1T2), *Metzgeria fruticulosa* (G2Q), *Metzgeria furcata* var. *setigera* (G5T1), *Microtus chrotorrhinus carolinensis* (G4T3, southern rock vole), *Nardia lescurii* (G3?), *Neotoma magister* (G3G4, Allegheny woodrat), *Plagiochila austinii* (G3), *Plagiochila caduciloba* (G2, gorge leafy liverwort), *Plagiochila eurphyllon* ssp. *echinata* (GNRT2), *Plagiochila sullivantii* var. *spinigera* (G2T1), *Plagiochila sullivantii* var. *sullivantii* (G2T2), *Plagiochila virginica* var. *caroliniana* (G3T2), *Plagiomnium carolinianum* (G3, mountain wavy-leaf moss), *Platyhypnidium pringlei* (G2G3), *Porella japonica* ssp. *appalachiana* (G5?T1), *Radula sullivantii* (G3), *Rhododendron vaseyi* (G3, pink-shell azalea), *Saxifraga careyana* (G3, golden-eye saxifrage), *Saxifraga caroliniana* (G2, Carolina saxifrage), *Scutellaria arguta* (G2?Q, hairy skullcap), *Sedum nevirii* (G3, nevirii stonecrop), *Tetradontium brownianum* (G3G4, little georgia), *Thelypteris pilosa* var. *alabamensis* (G4T1, streak-sorus fern), *Tsuga caroliniana* (G3, Carolina hemlock)

**Range:** This system is found from central New England and New York south to Virginia. United States: CT, MA, MD?, NY, OH, PA, VA, VT, WV

**Delaware Estuary Associations:**

- Chestnut Oak - Black Birch Wooded Talus Slope
- Kittatinny Ridge Sparsely Vegetated Sandstone Cliff

**CLASSIFIERS FOR NORTH-CENTRAL APPALACHIAN ACIDIC CLIFF AND TALUS**

**Primary Division:** 202

**Land Cover Class:** Barren

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Unvegetated (<10% vasc.); Upland

**Diagnostic Classifiers:** Cliff (Substrate); Talus (Substrate); Temperate; Acidic Soil

**Non-diagnostic Classifiers:** Lowland; Sideslope; Very Shallow Soil; Ustic; Landslide

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## CHESTNUT OAK - BLACK BIRCH WOODED TALUS SLOPE

*Quercus prinus* - *Betula lenta* / *Parthenocissus quinquefolia* Talus Woodland

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**Range:** This community occurs locally throughout the Blue Ridge and Ridge and Valley sections of Pennsylvania, Virginia, West Virginia, and Maryland. In Virginia, it reaches optimal development on sideslopes of linear sandstone and quartzite strike ridges in the Ridge and Valley, and on the western, metasedimentary flank of the northern Blue Ridge.

**Environmental Description:** Sites include the edges of very large, unvegetated (except for lichens), scarcely weathered block fields, as well as a variety of more weathered boulderfields and slopes covered by coarse to fine, bouldery colluvium. Much of the bouldery rubble is weathered from resistant quartzite or sandstone caprock. Slope position and aspect



Photo by Pennsylvania Natural Heritage Program

are variable, while associated landforms include landslide scarps, slide masses, concave hollow heads, and incised hollow bottoms. Mean cover of exposed boulders at Virginia sampling sites is 72%. Soils are largely organic and usually extremely acidic and infertile. There is often some heterogeneity of boulder depth and weathering, as well as of microclimate and soil moisture, within boulderfields. In general, sites are somewhat xeric and show little evidence of subsurface drainage. However, this regime is ameliorated by higher elevations and north aspects, which probably slow evaporation and increase the moisture-holding capacity of the bouldery substrate.

**Vegetation Description:** The canopy is dominated by more-or-less gnarled specimens of *Betula lenta* (sweet birch) and *Quercus prinus* (chestnut oak) generally <20 m tall. *Betula lenta* (sweet birch) is usually the sole dominant of less weathered, steeper, more unstable boulderfield habitats, while a greater variety of trees is often codominant with *Betula lenta* (sweet birch) on more weathered and stable habitats. Other overstory associates that may be important on some sites are *Quercus rubra* (northern red oak), *Nyssa sylvatica* (blackgum), *Betula populifolia* (gray birch), *Carya glabra* (pignut hickory), *Tsuga canadensis* (eastern hemlock), and *Betula alleghaniensis* (yellow birch). The presence of well-preserved, fallen boles indicates that *Castanea dentata* (American chestnut) was important on some boulderfields prior to the arrival of chestnut blight (Fleming and Moorhead 2000). *Acer rubrum* (red maple) and *Nyssa sylvatica* (blackgum) are scattered canopy associates and frequent understory species. The typically open shrub layer contains *Acer pensylvanicum* (striped maple), *Acer spicatum* (mountain maple), *Amelanchier arborea* (common serviceberry), *Castanea dentata* (American chestnut) sprouts, *Hamamelis virginiana* (American witch-hazel), *Ilex montana* (mountain holly), *Kalmia latifolia* (mountain laurel), *Menziesia pilosa* (minniebush), and *Ribes rotundifolium* (Appalachian gooseberry). The herb layer consists almost entirely of low-statured shrubs, particularly *Vaccinium* (blueberry) spp., and/or scattered to abundant vines of *Parthenocissus quinquefolia* (Virginia creeper), *Vitis* (grape) spp., *Toxicodendron radicans* (eastern poison-ivy), and *Smilax rotundifolia* (roundleaf greenbrier). Flat, mossy boulders provide rooting habitats for a few specially adapted herbaceous plants such as *Polypodium appalachianum* (Appalachian rockcap fern), *Dryopteris marginalis* (marginal woodfern), *Heuchera* (alumroot) spp., and *Aralia nudicaulis* (wild sarsaparilla). Bryophyte cover ranges up to 65% in some microhabitats. The rocktripes *Lasallia papulosa* (toadskin lichen) and *Umbilicaria mammulata* (common rocktripe) are generally the most conspicuous lichens. The combination of surficial boulder cover and nutrient-poor substrate results in a notably low mean species richness (n = 22 taxa per 400 square meters) in Virginia plot samples of this type.

**Characteristic Species:** *Betula lenta* (sweet birch), *Lasallia papulosa* (toadskin lichen), *Quercus prinus* (chestnut oak), *Umbilicaria mammulata* (common rocktripe)

**Dynamics/Successional Trajectory:** In this very rocky environment, soil is limited to local, interstitial, root-rich duff deposits or to "pads" of moss and underlying, thin, organic / sandy material that have developed on wide, flat boulder surfaces. Interstitial air spaces between boulders may be prevalent for 1.0 m or more below the surface. Physiognomy varies from nearly closed forest to open woodland with widely spaced trees. Landsliding and debris avalanches, which generate and regenerate boulderfield environments, are dominant erosional processes in these landscapes (Hack and Goodlett 1960).

**Management Concerns:** Stands occupy rugged habitats that are not prone to anthropogenic disturbances. Landsliding and debris avalanches, which generate and regenerate boulderfield environments, are dominant erosional processes in these landscapes (Hack and Goodlett 1960).

**Reference Sites:** Dark Hollow County Park, Bucks County, PA; Hopewell Furnace National Historic Site, Berks County, PA

**Global and State Conservation Ranks and Reasons:** G3G4 (9-Aug-2004). PA: SNR. Although this community type occurs in small patches over a limited geographic range, there are probably >200 sites (if not many hundreds of sites) in Virginia and West Virginia alone.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.685271](http://vegbank.org/natureserve/element_global.2.685271)

**References:** Anderson et al. 1998, Eastern Ecology Working Group n.d., Fike 1999, Fleming and Coulling 2001, Fleming and Moorhead 2000, Fleming et al. 2001, Hack and Goodlett 1960, Harrison 2004, Hupp 1983, Lea 2003, Rawinski et al. 1996, Russell and Schuyler 1988, VDNH 2003

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Betula lenta</i> (sweet birch)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus prinus</i> (chestnut oak)
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	<i>Nyssa sylvatica</i> (blackgum)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	<i>Acer pensylvanicum</i> (striped maple)
Shrub/sapling (tall & short)	Vine/Liana	<i>Parthenocissus quinquefolia</i> (Virginia creeper)

## KITTATINNY RIDGE SPARSELY VEGETATED SANDSTONE CLIFF

Kittatinny Ridge Sandstone Cliff Sparse Vegetation

**Range:** This type is restricted to sandstone cliffs with south- and southeast-facing aspects on Kittatinny Ridge in Pennsylvania and northern New Jersey.

**Environmental Description:** This association occurs on south- to southeast-facing, acidic, sandstone bedrock outcrops (Devonian Shawangunk Formation) along the Kittatinny Ridge in Pennsylvania and in northern New Jersey. The outcrops are typically vertical to near vertical. Vegetation habitat is restricted to narrow ledges and crevices in the rock face. These cliffs often occur immediately below the hickory-eastern red-cedar rocky woodlands that persist at the top of the cliff.

**Vegetation Description:** This vegetation type is characterized by sparse vegetation growing on narrow ledges or from bedrock crevices. The vegetation can vary greatly in composition but is generally limited to drought-tolerant species. Trees are typically absent, or when present, they are usually stunted and less than 10 m in height. Occasional trees include *Juniperus virginiana* (eastern red-cedar), *Fraxinus americana* (white ash), *Carya ovalis* (red hickory), *Carya glabra* (pignut hickory), *Pinus rigida* (pitch pine), *Betula lenta* (sweet birch), and *Quercus prinus* (chestnut oak). The tall-shrub and tree-sapling layer (2-5 m in height) may include scattered individuals of *Quercus ilicifolia* (bear oak), *Prunus serotina* (black cherry), *Prunus pensylvanica* (pin cherry), and other tree saplings. The short-shrub layer (<2 m in height),

when present, is variable and may include tree saplings, *Rhus* (sumac) spp., *Rubus allegheniensis* (Allegheny blackberry), *Rosa carolina* (Carolina rose), *Gaylussacia baccata* (black huckleberry), *Kalmia latifolia* (mountain laurel), *Kalmia angustifolia* (sheep laurel), *Vaccinium angustifolium* (northern lowbush blueberry), and *Vaccinium pallidum* (hillside blueberry). The herb layer can be very diverse, but the total cover is usually very low, ranging from <1% to as high as 40% total cover. Typical species are *Deschampsia flexuosa* (wavy hairgrass), *Schizachyrium scoparium* (little bluestem), *Digitaria ischaemum* (smooth crabgrass), *Danthonia spicata* (poverty oatgrass), *Carex pensylvanica* (Pennsylvania sedge), *Dichanthelium depauperatum* (starved witchgrass), *Dennstaedtia punctilobula* (eastern hay-scented fern), *Pteridium aquilinum* (bracken fern), and *Polypodium virginianum* (rock polypody). Occasional herbaceous species include *Opuntia humifusa* (eastern prickly-pear), *Woodsia ilvensis* (rusty cliff fern), *Cheilanthes lanosa* (hairy lipfern), *Aralia nudicaulis* (wild sarsaparilla), *Solidago odora* (anise-scented goldenrod), and *Phlox subulata* (moss phlox). Vines may be present, typically *Vitis aestivalis* (summer grape) and *Parthenocissus quinquefolia* (Virginia creeper). Lichens are usually present and often abundant on bare rock.

**Noteworthy Associated Plant and/or Animal Species:** *Opuntia humifusa* (eastern prickly-pear)

**Characteristic Species:** *Deschampsia flexuosa* (wavy hairgrass), *Schizachyrium scoparium* (little bluestem)

**Dynamics/Successional Trajectory:** This community consists of drought-tolerant species that take advantage of thin layers of soil that form on narrow ledges or in bedrock crevices (Podniesinski 2005). The successional stages of this type vary with resource availability from bare rock outcrops with no vegetation, to outcrops with lichen cover, to outcrops with lichen and moss cover, to outcrops with grass cover, and eventually to rock outcrops with stunted woodland or forest cover. These stages overlap in time and space, depending on resource availability (Collins and Anderson 1994). Species composition is variable given the limited habitat to support vegetation and the unpredictable nature of plant colonization and establishment. Trees are typically absent from this community, but when present, they are usually stunted and less than 10 m in height (Podniesinski 2005). Tree roots may straddle boulders or run horizontally over rock surfaces as they cannot penetrate the rock surface (Collins and Anderson 1994).

**Management Concerns:** Stands occupy rugged habitats that are not prone to anthropogenic disturbances. Landsliding and debris avalanches are typical erosional processes in these landscapes.

**Reference Sites:** Delaware Water Gap National Recreation Area (NJ & PA)

**Global and State Conservation Ranks and Reasons:** GNR (16-Nov-2005). NJ: SNR, PA: SNR.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.789230](http://vegbank.org/natureserve/element_global.2.789230)

**References:** Anderson 1996, Collins and Anderson 1994, Eastern Ecology Working Group n.d., Podniesinski 2005, Sneddon and Menard 2002

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Needle-leaved tree	<i>Juniperus virginiana</i> (eastern red-cedar)
Shrub/sapling (tall & short)	Vine/Liana	<i>Vitis aestivalis</i> (summer grape)
Short shrub/sapling	Broad-leaved deciduous shrub	<i>Gaylussacia baccata</i> (black huckleberry)
Herb (field)	Graminoid	<i>Deschampsia flexuosa</i> (wavy hairgrass)