Cliffs and Talus

Cliffs

Cliffs are open outcrops where the slope is greater than 60 degrees. Many examples are quite small and are shaded by surrounding forests. Others are large, open, sunny, and dramatic. The cliffs at Mount Pisgah and Mount Hor, opposing each other across Lake Willoughby in Westmore, are spectacular examples. The cliff communities of Vermont, like the outcrops and meadows, are divided on the basis of their climatic affinities and their bedrock, both of which have a strong influence on flora. We recognize boreal cliff communities, those with affinities to the north or cooler climates, and temperate cliff communities, those with affinities to more temperate climates. The boreal types are found in the cooler regions of the state, the Northeast Highlands and the Green Mountains, though a few are found in generally warmer regions, in especially cool situations such as at high elevations or in cold valleys. The temperate types are found either at middle to low elevations or in the warmer regions of the state. Looking at bedrock, we recognize acidic types, those where bedrock yields little or no calcium and is acidic in reaction, and calcareous types, those with high calcium content and generally higher ***pH***. Granites, some quartzites, and sandstones are typically acidic in reaction, whereas limestones, dolomites, calcareous schists, and some quartzites (Monkton Quartzite in particular) are calcareous, with higher pH values and greater concentrations and availability of important nutrients like calcium and magnesium.

Cliffs have made the news recently, at least in biological circles. A fascinating study of cliffs of the Niagra Escarpment in Ontario showed that the tiny, twisted northern white cedar trees growing there are surprisingly ancient: some of them are more than 1,000 years old. The cliffs that were studied were not remote or out of the way; they are surrounded by housing developments and are seen by people every day as they drive by on major highways. This news reminds us that fascinating, ancient, and intact natural communities are around us everywhere, if only we take the time to look closely at them.

Talus

Talus is a word derived from the Latin *talutium*, meaning a slope where gold is present. Modern geomorphology defines a talus slope as an accumulation of many talus blocks – rocks broken off a cliff face through physical forces including freezing and thawing. The presence of gold is lost from the modern meaning, but talus slopes do resemble mine tailings. Although talus slopes appear unstable from a distance, some are in fact quite stable, and quite old. In postglacial times, when Vermont's climate was much colder and freeze-thaw cycles were more severe, talus slopes probably formed at a more rapid rate than they do today. Our talus slopes may, then, be at least partially considered fossil features, relicts of a colder time. Large talus blocks that appear as a tipsy jumble may have actually had many millennia in which to settle and stabilize.

Talus varies greatly, though, in its stability, in the size of its rock fragments, and in its ability to hold moisture and soil. All these things depend on the type of rock that makes up the talus slope. Granite and quartzite are massive rocks that break off in large, angular blocks. They can therefore stabilize over time, and if conditions are right, soil can accumulate between them. Shales, slates, and schists, on the other hand, are rocks that naturally break into platy fragments and therefore may never stabilize; they may continue to slide on top of each other with any passing disturbance, such as a raccoon making its way across the slope.

Other things that influence talus are microclimate, the chemical nature of the bedrock and the availability of "outside" soil that can move into the talus from above through gravity. Microclimatic differences like cold air drainage and exposure to sun can have dramatic impacts on vegetation. The chemical nature of the rock will directly influence vegetation and will also indirectly influence how quickly soil can form in place.

Talus slopes are variable and fascinating communities about which we know very little. Where they are quite open, talus communities are classified as Open Upland communities. Where trees are prevalent, they are classified as Upland Forest and Woodland communities.

▸ How to Identify

Cliff and Talus Natural Communities

Read the short descriptions that follow and choose the community that fits best. Then go to the page indicated to confirm your decision.

Boreal Acidic Cliff: These are high elevation cliffs, generally above 2,000 feet, found on acidic bedrock such as granite, gneiss, quartzite, or non-calcareous schist. Characteristic plants are red spruce, balsam fir, American mountain-ash, bush-honeysuckle, three-toothed cinquefoil, and hairgrass. Eastern Hemlock is absent from these cliffs. Go to page 225.

Boreal Calcareous Cliff: These are high elevation cliffs, mostly above 2,000 feet, where calcareous bedrock (usually calcareous schist, but occasionally limestone or marble) combined with seepage creates a habitat that favors certain calciphilic plants, some of which are quite rare statewide. Characteristic species include northern white cedar, balsam fir, American mountain-ash, scirpus-like sedge, shrubby cinquefoil, Kalm's lobelia, purple mountain saxifrage, and tall wormwood. Go to page 227.

Temperate Acidic Cliff: These are lower elevation cliffs, generally below 2,000 feet, found on acidic bedrock. Characteristic plants are eastern hemlock, white pine, red maple, paper birch, harebell, and heart-leaved aster. Go to page 230.

Temperate Calcareous Cliff: These are low elevation cliffs in warmer areas on limestone, marble, dolomite, or calcareous quartzite. They may be moist or dry, depending on the situation, but usually do not have abundant seepage. Some characteristic species are northern white cedar, purple clematis, smooth cliff brake, purple-stemmed cliff brake, harebell, and herb Robert. Go to page 232.

Open Talus: This broadly defined community type includes all areas of open rockfall. These rockfall areas usually occur below cliffs and can be comprised of granite, quartzite, gneiss, shale, or less commonly limestone or marble. Go to page 234.

Boreal Acidic Cliff

Distribution/ Abundance

Boreal Acidic Cliffs are common in Vermont, though large examples are few. They are found most often in areas of granite bedrock, such as Groton State Forest.

Ecology and Physical Setting

Boreal Acidic Cliffs are found on very steep slopes or vertical faces in the colder parts of the state and region, either at high elevations (above 2,000 feet or so), or in cold valleys at lower elevations, where Spruce-Fir Forests dominate. The bedrock making up these cliffs yields little in the way of important plant nutrients, either because it is acidic, or because it does not weather easily, or a combination of these factors. Granite and quartzite are typical rock types for this community. Soil accumulates in crevices and on ledges, but soils are shallow and vulnerable to erosion.

Vegetation

Boreal Acidic Cliffs are often surrounded by Spruce-Fir Forests, and therefore have many of the species associated with that forest type. Cover is very sparse, though, generally under 25 percent, and overall vegetative diversity is quite low. Small red spruce, heart-leaved paper birch and American mountain-ash may be found in rock crevices, but rarely reach heights over 15 feet. Bush-honeysuckle is a low shrub that can be locally abundant in rock crevices where small amounts of soil have accumulated.

Animals

Ravens are a typical nesting bird on Boreal Acidic Cliffs. Peregrine falcons are rare breeders on cliffs throughout the state.

Related Communities

Boreal Calcareous Cliff: Well developed examples of this type are generally much more diverse in species than Boreal Acidic Cliffs. In addition, they have a number of unique and characteristic plants.

Temperate Acidic Cliff: These lack the typical boreal or high elevation species such as red spruce and heart-leaved paper birch and include warmer climate species such as eastern hemlock.

Boreal Outcrop: These are often found in association with Boreal Acidic Cliffs: the outcrop is at the top, or brow, of the cliff. The distinction between Boreal Outcrops and Boreal Acidic Cliffs is based mostly on slope: outcrops have slopes that are less than 60 degrees. In both communities, vegetation is sparse, though the reasons change with slope. Outcrops generally experience higher winds, more sunlight, and deeper snow packs in winter.

Open Talus: There is usually a sharp demarcation between cliff and talus and strong differences in overall structure and composition of the vegetation between the two communities, but they are almost always adjacent to one another and can share many species in common.

Conservation Status and Management Considerations

Boreal Acidic Cliffs are not threatened communities in Vermont since they do not contain merchantable timber or developable land. A few examples are protected in conservation areas, such as Groton State Forest. But cliffs and their plants are vulnerable to erosion. Rock climbing should be restricted to only the most stable cliffs, and to cliff communities without rare species. Cliffs where peregrine falcons nest should never be climbed.

Characteristic Plants

Trees

Red spruce – *Picea rubens*
Balsam fir – *Abies balsamea*
Heart-leaved paper birch – *Betula papyrifera* var. *cordifolia*
American mountain-ash – *Sorbus americana*
Red maple – *Acer rubrum*

Shrubs

Bush-honeysuckle – *Diervilla lonicera*
Swamp red currant – *Ribes triste*

Herbs

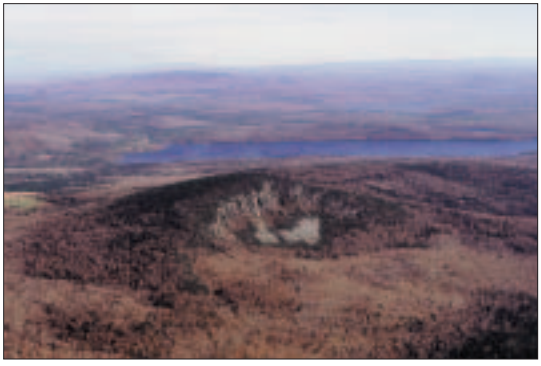
Rand's goldenrod – *Solidago simplex*
Harebell – *Campanula rotundifolia*
Appalachian polypody – *Polypodium appalachianum*
Three-toothed cinquefoil – *Potentilla tridentata*
Poverty grass – *Danthonia spicata*
Hay-scented fern – *Dennstaedtia punctilobula*
Hairgrass – *Deschampsia flexuosa*

Rare and Uncommon Species

Fragrant fern – *Dryopteris fragrans*
Scirpus-like sedge – *Carex scirpoidea*
Deer-hair sedge – *Scirpus caespitosus*

Places to Visit

Groton State Forest, Groton, Marshfield and Peacham, Vermont Department of Forests, Parks and Recreation (VDFPR)
Brousseau Mountain, Kingdom State Forest, VDFPR



The Boreal Acidic Cliff and Open Talus of Brousseau Mountain in the Northeastern Highlands.

Boreal Calcareous Cliff

Distribution/ Abundance

This is a rare community type in Vermont. Only a few examples are known. The best examples are in the Northeastern Highlands and the Northern Green Mountains, but there are examples in the Southern Green Mountains and in the Taconic Mountains as well. The community has affinities to the north. Related communities can be found in the Gaspé Peninsula of Québec.

Ecology and Physical Setting

Boreal Calcareous Cliffs are among Vermont's most interesting natural communities. With their rare and unusual plants, they have attracted the attention of botanists for over a century.

Boreal Calcareous Cliffs occur on limestone, marble, and calcareous schist at relatively high elevations (over 2,000 feet in most cases) throughout Vermont. The rock types vary in origin, structure and hardness, and the plant communities that occur on them are likewise variable. But they all share three features: calcium and other plant nutrients are present in the rock; the rock breaks down rapidly enough to release some of these nutrients; and moisture moves through fractures in the rock, carrying these nutrients to the cliff surface where plants are growing. The combination of calcareous rock, a ready supply of mineral-rich groundwater, cold temperatures, and vertical rock is very unusual in Vermont, and only a few examples of this community type are known.

The moisture in the rock serves not only to move nutrients, but also to break down rock through winter freezing and thawing, thus moving rock and soil and creating unstable conditions. Landslides are a dramatic result of this instability. A less dramatic effect is the creation of new habitat for the germination of the plants that are adapted to bare soils and rock.

Vegetation

Boreal Calcareous Cliffs are, to botanists working in Vermont, among the most intriguing of natural communities. One example of this community was known to 19th century botanical explorers as "The Garden of Eden." The fascination with these places is explained by their great diversity of rare and interesting plants, many of which grow in no other natural communities in the state. Many of these species have northern affinities and are reminiscent of places like Newfoundland and the Gaspé Peninsula.

Boreal Calcareous Cliffs are generally very sparsely vegetated, but in moister areas they may have more plant cover and higher plant diversity. In especially seepy places, diversity may be quite high, and there may be concentrations of rare species.

ANIMALS

Ravens and peregrine falcons are known to nest on Boreal Calcareous Cliffs, as well as other cliff types. There are no animals known to be specific to this community type.

VARIANTS

None recognized at this time.

RELATED COMMUNITIES

Boreal Acidic Cliff: These may be found adjacent to Boreal Calcareous Cliffs at the same site, depending on local conditions of bedrock chemistry, moisture content, and soil accumulation. Boreal Calcareous Cliffs are recognized by their diversity of calcium-loving plants. Rocks that are neutral in reaction or only mildly calcareous may have communities of either type.

Temperate Calcareous Cliff: Boreal Calcareous Cliffs have some affinities with Temperate Calcareous Cliffs, and there is certainly some overlap in species. Northern white cedar, for example, occurs commonly in both communities. Temperate Calcareous Cliffs occur at elevations below 2,000 feet, and tend to be drier and more stable.

CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

Several examples of this rare community type are protected, but all are threatened by rock climbers and ice climbers. These sites should not be used for recreational activities because of the fragile nature of the plant communities, the possible presence of nesting peregrine falcons, and the instability of the rock.

PLACES TO VISIT

Smugglers Notch, Stowe and Morrisville, Mount Mansfield State Forest, Vermont Department of Forests, Parks, and Recreation (VDFPR)

Mount Pisgah, Westmore, Willoughby State Forest, VDFPR

Alpine sweet-broom is a rare plant, characteristic of Boreal Calcareous Cliffs.

Characteristic Plants

Trees

Sugar maple – *Acer saccharum*
Paper birch – *Betula papyrifera*
Northern white cedar – *Thuja occidentalis*
Red spruce – *Picea rubens*
Balsam fir – *Abies balsamea*

Shrubs

Shrubby cinquefoil – *Potentilla fruticosa*
Green alder – *Alnus viridis*
Mountain maple – *Acer spicatum*
Striped maple – *Acer pensylvanicum*
Purple-flowering raspberry – *Rubus odoratus*
Swamp red currant – *Ribes triste*
American mountain-ash – *Sorbus americana*

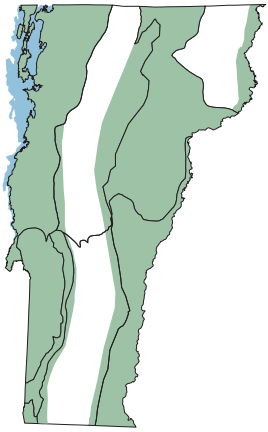
Herbs

Kalm's lobelia – *Lobelia kalmii*
Early saxifrage – *Saxifraga virginiensis*
Scirpus-like sedge – *Carex scirpoidea*
Brownish sedge – *Carex brunnescens*
Steller's cliff brake – *Cryptogramma stelleri*
Bulblet fern – *Cystopteris bulbifera*
Rand's goldenrod – *Solidago simlex*
Harebell – *Campanula rotundifolia*
Wild columbine – *Aquilegia canadensis*
Large-leaved aster – *Aster macrophyllus*
Mountain fir clubmoss – *Lycopodium appalachianum*

Rare and Uncommon Plants

Roseroot – *Sedum rosea*
Lyre-leaved rock-cress – *Arabis lyrata*
Purple mountain saxifrage – *Saxifraga oppositifolia*
White mountain saxifrage – *Saxifraga aizoon*
Yellow mountain saxifrage – *Saxifraga aizoides*
Tall wormwood – *Artemisia campestris* ssp. *borealis*
Fragrant fern – *Dryopteris fragrans*
Smooth woodsia – *Woodsia glabella*
Birds-eye primrose – *Primula mistassinica*
Scirpus-like sedge – *Carex scirpoidea*
Butterwort – *Pinguicula vulgaris*
Blake's milk-vetch – *Astragalus robbinsii* var. *minor*
Hyssop-leaved fleabane – *Erigeron hyssopifolius*
Braya – *Braya humilis*
Few-flowered spikerush – *Eleocharis pauciflora*
Capillary beak-rush – *Rhynchospora capillacea*
Mountain fir clubmoss – *Lycopodium appalachianum*
Alpine sweet-broom – *Hedysarum alpinum*
Green spleenwort – *Asplenium trichomanes-ramosum*

Temperate Acidic Cliff



Distribution/Abundance

Temperate Acidic Cliffs are common throughout Vermont at lower elevations, generally below 2,000 feet depending on the latitude and biophysical region. Most examples are small. They are most common in the Taconic Mountains, Southern Vermont Piedmont, and Northern Vermont Piedmont but can be found in all biophysical regions. Similar communities are found throughout the northeastern United States and adjacent Canada.

Ecology and Physical Setting

Temperate Acidic Cliffs are found at lower elevations (generally below 2,000 feet), in areas where Northern Hardwood Forests and forests of warmer climates are dominant. Bedrock is acidic or circumneutral, and soils are often dry due to sunlight and to the loss of water downslope. Slopes are greater than 60 degrees. The structure of these cliffs varies depending on the bedrock type. Massive rocks such as granite create large open faces with few cracks and therefore little soil or vegetation. Platy rocks like schists or slates may have numerous small ledges where soil can accumulate. These rocks are less stable, however, so soil may not stay in place for very long.

Vegetation

As is the case with all cliff communities, vegetation cover is sparse, generally less than 25 percent on average. Occasional trees may take hold where soil has accumulated, and shrubs are common. Mosses persist in moist, shaded places. Lichens do especially well in these communities, in shaded as well as sunny places. Rock tripe is a typical and conspicuous lichen on Temperate Acidic Cliffs.

Variants

None recognized at this time.

Related Communities

Temperate Calcareous Cliff: This community shares many species in common with Temperate Acidic Cliff and grades into it. Temperate Calcareous Cliffs tend to have higher overall species diversity, but this diversity is dependent on moisture availability as well as the nature of the bedrock.

Boreal Acidic Cliff: This community grades into Temperate Acidic Cliff in areas of intermediate climate and shares many species in common with it. Boreal species such as red spruce, balsam fir, and heart-leaved paper birch are generally lacking on Temperate Acidic Cliffs.

Temperate Acidic Outcrop: This community is often found adjacent to Temperate Acidic Cliff, at a ledge crest where the slope abruptly or gradually levels out. When the two communities are adjacent, they share many species in common.

Red Cedar Woodland: These are found at ledge crests in the warmer parts of the state, on acidic to circumneutral bedrock, often directly above Temperate Acidic Cliffs.

CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

Temperate Acidic Cliffs are not threatened communities in Vermont since they do not contain merchantable timber or developable land, but along with all cliff communities, they contribute to the overall biodiversity of the state and should be recognized and protected. Cliffs and their plants are vulnerable to erosion. Rock climbing should be restricted to only the most stable cliffs and to cliff communities with no known rare species.

PLACES TO VISIT

North Pawlet Hills Natural Area, Pawlet, The Nature Conservancy

CHARACTERISTIC PLANTS

TREES

Eastern hemlock – *Tsuga canadensis*
Red maple – *Acer rubrum*
Paper birch – *Betula papyrifera*
Eastern red cedar – *Juniperus virginiana*

SHRUBS AND WOODY VINES

Purple-flowering raspberry – *Rubus odoratus*
Bush-honeysuckle – *Diervilla lonicera*
Virginia creeper – *Parthenocissus quinquefolia*

HERBS

Harebell – *Campanula rotundifolia*
Wild columbine – *Aquilegia canadensis*
Heart-leaved aster – *Aster cordifolius*

NON-VASCULAR PLANTS

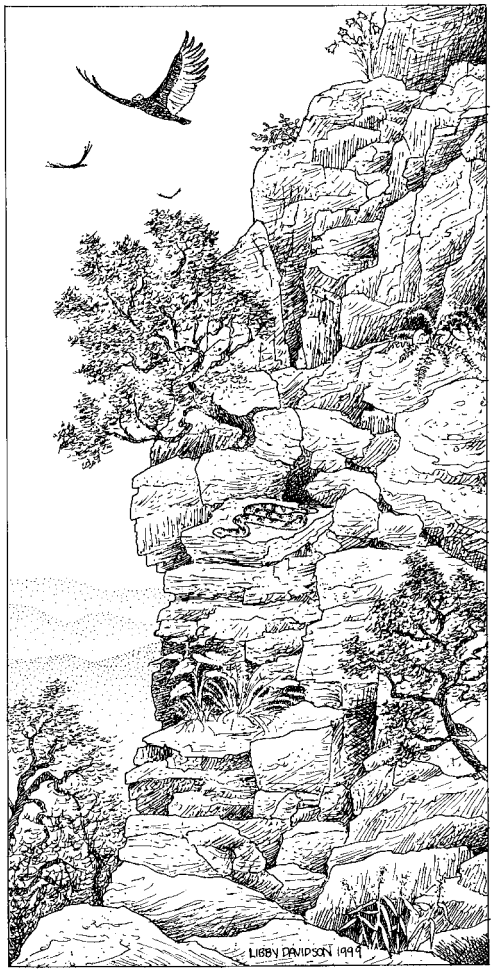
Rock tripe – *Umbilicaria* sp.

NON-NATIVE PLANTS

Canada bluegrass – *Poa compressa*

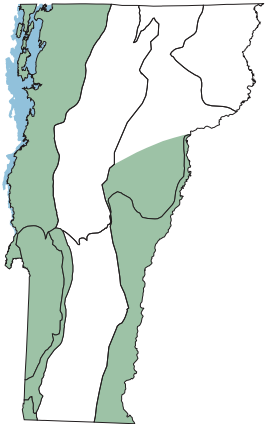
A Temperate Acidic Cliff with Open Talus in the Connecticut River Valley.

Temperate Calcareous Cliff



Distribution/ Abundance

Temperate Calcareous Cliffs are found in the limestone regions of Vermont. The largest and best examples are found in the Champlain Valley Outside Vermont, similar communities are found in the St. Lawrence Lowlands, south into Massachusetts, Connecticut and New York, and west into the Great Lakes region.



Ecology and Physical Setting

These are calcareous (limestone, marble, dolomite, or calcareous schist) cliffs at lower elevations and in the warmer regions of Vermont. They are generally found at elevations below 2,000 feet and most are lower. In physical characteristics and vegetative physiognomy they are very similar to other kinds of cliffs: they are vertical or nearly vertical and are sparsely vegetated. But calcium-rich rocks weather faster than other kinds of rock, so there is greater potential for soil development in cracks and on ledges. Temperate Calcareous Cliffs vary in moisture availability and shade but have many characteristic plants that distinguish them from acidic or boreal cliffs.

Vegetation

Temperate Calcareous Cliffs are favorite places for early spring botanizing since their overall diversity is high and several conspicuous and interesting plants grow on them or in the talus below them. They also tend to harbor plant species that flower early in the spring in this warm, sunny setting. Small trees grow occasionally on ledges or in cracks where soil has accumulated, along with scattered low shrubs. Herbs are more prominent members of the community, growing in such tiny amounts of soil that they appear to be growing out of bare rock.

Mosses, liverworts, and lichens grow on Temperate Calcareous Cliffs. Some mosses and liverworts prefer moist, shaded areas, but others can withstand extended periods of desiccation.

Animals

Turkey vultures may nest on these cliffs. Ledges on the cliffs are favorite sunning places for snakes, including garter snake, black rat snake, and, rarely, eastern timber rattlesnake.

Variants

None recognized at this time.

RELATED COMMUNITIES

Temperate Acidic Cliff: This community shares many species in common with Temperate Calcareous Cliff but overall is less diverse and lacks calcium-loving plants.

Temperate Calcareous Outcrop: These are often found associated with Temperate Calcareous Cliffs, and the two communities share a number of species in common. Outcrops have slopes of less than 60 degrees.

CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

Rock climbing can be a threat to Temperate Calcareous Cliffs, as can recreational wildflower hunting. Temperate Calcareous Cliffs should be viewed from a distance or from their bases. No plants should be collected at these sites. Several examples of Temperate Calcareous Cliff are protected by The Nature Conservancy and other organizations and agencies.

PLACES TO VISIT

Shelburne Pond Preserve, Shelburne, University of Vermont and The Nature Conservancy.

Highgate State Park, Highgate, Vermont Department of Forests, Parks, and Recreation

Harebell – *Campanula rotundifolia*

CHARACTERISTIC PLANTS

TREES

Northern white cedar – *Thuja occidentalis*
White ash – *Fraxinus americana*
Eastern red cedar – *Juniperus virginiana*
Hophornbeam – *Ostrya virginiana*

SHRUBS AND WOODY VINES

Virginia creeper – *Parthenocissus quinquefolia*
Purple clematis – *Clematis occidentalis*

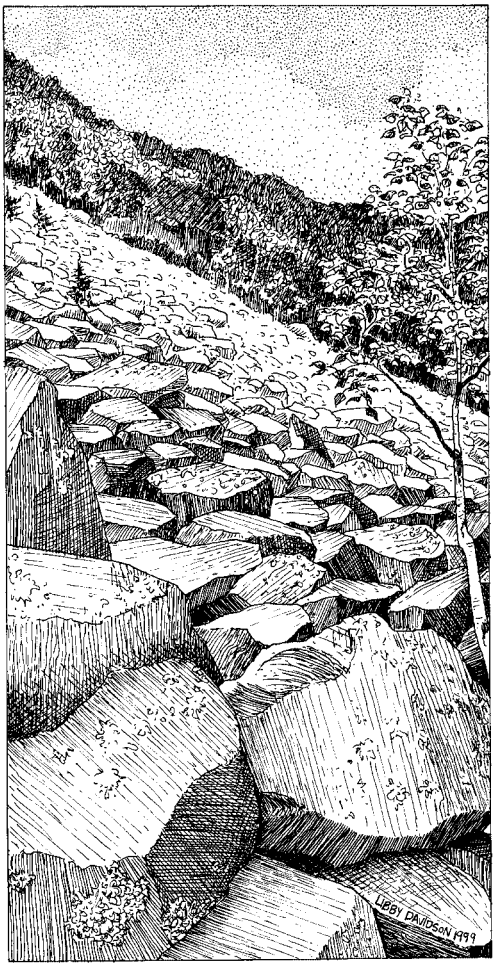
HERBS

Ebony sedge – *Carex eburnea*
Wild columbine – *Aquilegia canadensis*
Bulblet fern – *Cystopteris bulbifera*
Wall-rue – *Asplenium rutamuraria*
Steller's cliff brake – *Cryptogramma stelleri*
Hairy rock cress – *Arabis hirsuta*
Maidenhair spleenwort – *Asplenium trichomanes*
Smooth cliff brake – *Pellaea glabella*
Purple-stemmed cliff brake – *Pellaea atropurpurea*
Harebell – *Campanula rotundifolia*
Herb Robert – *Geranium robertianum*
Pellitory – *Parietaria pensylvanica*
Slender wheatgrass – *Elymus trachycaulus*
Canada anemone – *Anemone canadensis*
Kalm's brome grass – *Bromus kalmii*
White snakeroot – *Eupatorium rugosum*

RARE AND UNCOMMON PLANTS

Wall-rue – *Asplenium rutamuraria*
Steller's cliff brake – *Cryptogramma stelleri*
Smooth cliff brake – *Pellaea glabella*
Purple cliff brake – *Pellaea atropurpurea*
Missouri rock-cress – *Arabis missouriensis*
Spiral whitlow-grass – *Draba arabisans*
Walking fern – *Asplenium rhizophyllum*
Purple clematis – *Clematis occidentalis*
Maple-leaved goosefoot – *Chenopodium gigantospermum*
Strawberry-blite – *Chenopodium capitatum*
American stickseed – *Hackelia deflexa*
Drummond's rock-cress – *Arabis drummondii*
Supple panic grass – *Panicum flexile*

Open Talus



Distribution/ Abundance

Open Talus is common in Vermont, though most examples are small. Open Talus is perhaps more abundant in New Hampshire than in Vermont but is generally widespread in small patches throughout the northeast.

Ecology and Physical Setting

Open Talus is the accumulation of rockfall below cliffs. It can occur on any rock type, from limestone to shale to schist to granite. In areas of soft, easily weathered rock like limestone, the rock fragments tend to be small, soil develops relatively quickly, and plants can easily get established. In these places, open talus is rare – most limestone talus has some trees on it and is therefore considered woodland. The largest Open Talus areas occur either where the rock is so unstable that it prevents the establishment of trees, as on shale talus, or where the structure of the rock causes it to break into large, angular blocks where soil cannot accumulate, as on granite, quartzite, or gneiss talus. Once large blocks are in place, they may be quite stable, but vegetation cannot become established because there is no soil – any soil that develops is far beneath the surface in deep fissures.

In Open Talus that is made from quartzite, gneiss, or granite, the spaces between the rocks are large and can form deep caverns. These deep spaces have some curious properties. They can be so well insulated from outside temperatures that they are cool in summer and warm in winter: like true caves, they are close to the temperature of the earth itself (50 degrees) rather than the temperature of the atmosphere. These temperature-moderated places are the perfect habitat for certain snakes that need stable temperatures to overwinter.

At the surface, however, temperatures on a talus slope can be extreme. The open rock can absorb a lot of heat on a sunny summer day, and the result can be a dry, scorching environment.

Vegetation

Soil is a sparse commodity in Open Talus. It may accumulate so far beneath the jumble of rocks that no light can reach it. In this case, it will support no green plants. Occasionally, though, rocks are tightly enough packed that the spaces between them can hold some soil as it forms over the millennia or as it moves

downslope from above. Soil can also accumulate on horizontal rock tops. Where there is adequate soil, a few small, poorly formed trees grow from between rocks, and herbaceous plants grow among them or in mossy places on the rocks. Lichens are very abundant on Open Talus, but these have not been studied well enough to present a list of species here.

ANIMALS

Eastern timber rattlesnake is a rare inhabitant of Open Talus. These and other snakes use the temperature-moderated spaces between rocks as winter hibernacula. Other species using Open Talus may include black rat snake, common garter snake, and rock vole.

Eastern timber rattlesnake is a rare inhabitant of Open Talus.

VARIANTS

Shale Talus: This community is made from smaller, flatter rock fragments. Shale Talus is inherently less stable than Open Talus made from large rock fragments, and this difference, along with the differences in the size of the rock fragments and the chemical nature of the rock, are presumed to correlate with differences in soils, vegetation, and other biota, but we know so little about these communities that we cannot generalize. In Vermont, shale, slate, schist, and other very platy rocks are most common in the Taconic Mountains, although rocks of this type are also found in the northern Green Mountains and in the Vermont Piedmont. Shale Talus can therefore be found throughout the state but is most common in the Taconic Mountains.

RELATED COMMUNITIES

Cold Air Talus: This rare community occurs where cold temperatures persist at the bases of talus slopes. Here black spruce, Labrador tea, and other northern or high elevation plants can be found outside of their normal ranges.

Boreal Talus Woodland: This community is often adjacent to Open Talus, but has a canopy cover greater than 25 percent.

Northern Hardwood Talus Woodland: In temperate climate areas, this community is often found adjacent to Open Talus but has a canopy cover greater than 25 percent

Transition Hardwood Talus Woodland: In warm climate areas where bedrock is calcareous, this community can be adjacent to Open Talus.

CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

Several high quality examples of Open Talus are protected on conservation lands. Visitors should use extreme care when visiting Open Talus communities, as they are steep and difficult to climb, and may have deep crevices between boulders. A misplaced step could be disastrous. Shale Talus is inherently unstable and difficult to climb and ascending it can uproot any plants that have taken hold there.

PLACES TO VISIT

Brousseau Mountain, Averill, Kingdom State Forest, Vermont Department of Forests, Parks, and Recreation (VDFPR)

Umpire Mountain, Victory, Victory State Forest, VDFPR

White Rocks, Wallingford, White Rocks National Recreation Area, GMNF

Characteristic Plants

Trees

Mountain maple – *Acer spicatum*
American mountain-ash – *Sorbus americana*
Eastern hemlock – *Tsuga canadensis*
Paper birch – *Betula papyrifera*
Hophornbeam – *Ostrya virginiana*
Eastern red cedar – *Juniperus virginiana*

Shrubs and Woody Vines

Bladdernut – *Staphylea trifolia*
Virginia creeper – *Parthenocissus quinquefolia*
Poison ivy – *Toxicodendron radicans*

Herbs

Appalachian polypody – *Polypodium appalachianum*
Sarsaparilla – *Aralia nudicaulis*
Marginal wood fern – *Dryopteris marginalis*
Herb Robert – *Geranium robertianum*