
• Brackish water pool (S1)

GENERAL DESCRIPTION: Brackish pools occur on the Isles of Shoals in small depressions within maritime rocky barrens. Because of the small size of these pools (less than a few to several square meters), they alternatively could be considered fine-scale variation within rocky barrens rather than as a separate community type. Depending on salinity, fresh and/or brackish water graminoids and forbs occur within and along the margins of these pools. Salinity fluctuates as a result of salt inputs from storm waves and salt spray, fresh water precipitation, and evaporation.

The substrate consists of various types of bedrock.

CHARACTERISTIC VEGETATION: Fresh water species include *Anagallis arvensis* (scarlet pimpernel), *Epilobium ciliatum* (ciliated willowherb), *Hordeum jubatum* (foxtail barley), *Iris versicolor* (northern blue flag), *Lemna minor* (lesser duckweed), *Lycopus uniflorus* (common water horehound), *Lythrum salicaria* (purple loosestrife), *Persicaria hydropiper* (water pepper), *P. pennsylvanica* (Pennsylvania smartweed), *P. punctata* (dotted smartweed), *Portulaca oleracea* (common purslane), *Ranunculus sceleratus* (cursed crowfoot), *Scutellaria galericulata* (marsh skullcap), and *Typha latifolia* (common cattail). Species present that are often associated with brackish conditions, especially when they are commonly found together, include *Agrostis stolonifera* (common creeping bentgrass), *Argentina egedii* ssp. *groenlandica* (coastal silverweed), *Bolboschoenus robustus* (stout bulrush), *Carex hormathodes* (necklace sedge), *Eleocharis uniglumis* (salt-loving spike-rush), *Juncus bufonius* (inland toad rush), *J. gerardii* (salt marsh rush), *J. pelocarpus* (mud rush), *Lythrum hyssopifolium* (hyssop-leaved loosestrife), *Plantago maritima* var. *juncoides* (salt marsh plantain), *Schoenoplectus pungens* (three-square rush), *Solidago sempervirens* (seaside goldenrod), *Spergularia salina* (seabeach sand spurrey), *Symphyotrichum novi-belgii* (New York aster), *S. subulatum* (small salt marsh aster), and *Typha angustifolia* (narrow-leaved cattail).

CLASSIFICATION CONFIDENCE: 3

DISTRIBUTION: This community is known from the Isles of Shoals (Rye) in the Coastal Lowland subsection.

SOURCES: NHB field surveys.

• Fenny marsh (S3S4)

GENERAL DESCRIPTION: This community is transitional between fens and marshes, with well-decomposed organic matter, often with a significant cover (25% to over 50%) of *Sphagnum* moss, but dominated by graminoids and forbs of at least weakly minerotrophic and more marshy tendencies (i.e., they are not restricted to fen habitats). The substrate is often saturated with pHs between 4.4 and 5.7 and with relatively little microtopography. Many are probably former swamps or medium level fens with grounded peat mats in beaver drainages, or late-successional emergent marsh beaver meadows that developed following dam-abandonment and subsequent paludification of the basin. Fenny marshes likely succeed into a mixed tall graminoid - scrub shrub marsh or shrub swamp and depending on dominant hydrologic regime, to different types of forested swamps (for northern variant, seasonally flooded boreal swamp, black spruce - larch swamp, or northern hardwood - black ash - conifer swamp). With paludification, this community could become a fen or with renewed impoundment by beavers, regress to a wetter marsh or aquatic bed.

This community is distinguished from floating marshy peat mats by vegetation differences and a mostly grounded (rather than floating) substrate. It is distinguished from marshy moats by the moats position along peatland margins and the relatively narrow width of most moats.

The substrate consists of mostly grounded, well-decomposed organic soils or mineral soils with a high organic content.

CHARACTERISTIC VEGETATION: Characteristic species include *Carex canescens* (silvery sedge), *Carex stricta* (tussock sedge), *Carex utriculata* (bottle-shaped sedge), *Calamagrostis canadensis* (blue-joint), *Dulichium arundinaceum* (three-way sedge), *Iris versicolor* (northern blue flag), *Juncus* spp. (rushes), *Lycopus uniflorus* (common water horehound), *Lysimachia terrestris* (swamp candles), *Sagittaria latifolia* (common arrowhead), *Scirpus cyperinus* (woolly bulrush), *Sparganium americanum* (lesser bur-reed), *Sphagnum* moss, and *Triadenum virginicum* (marsh St. John's-wort). Other species are *Carex echinata* (prickly sedge), *Carex lacustris* (lake sedge), *Carex lasiocarpa* (hairy-fruited sedge), *Eleocharis* spp. (spike-rushes), *Hypericum* spp. (St. John's-worts), *Osmunda cinnamomea* (cinnamon fern), and *Typha latifolia* (common cattail). Peatland heaths and other shrubs typically occur with <5% cover and include *Acer rubrum* (red maple), *Alnus incana* ssp. *rugosa* (speckled alder), *Betula populifolia* (gray birch), *Cephalanthus occidentalis* (buttonbush), *Chamaedaphne calyculata* (leatherleaf), *Doellingeria umbellata* (flat-topped white aster), *Ilex verticillata* (winterberry), *Lyonia ligustrina* (male berry), *Myrica gale* (sweet gale), *Spiraea alba* var. *latifolia* (eastern meadowsweet), *Spiraea tomentosa* (steeple bush), *Toxicodendron vernix* (poison sumac), and *Vaccinium corymbosum* (highbush blueberry).

VARIANTS: Two variants are presently recognized:

1. Typic southern variant (S4): As described above. This variant is most common in central and southern New Hampshire and is distinguished from the next variant by the absence of species more frequent in northern NH (e.g., *Carex rostrata* (swollen-beaked sedge)*, *Eupatorium maculatum* var. *foliosum* (northeastern spotted Joe-pye-weed), and *Triadenum fraseri* (Fraser's marsh St. John's-wort)) and/or the presence of species more common in southern NH (e.g., *Toxicodendron vernix* (poison sumac)).
2. Northern medium sedge meadow variant (S3): This variant is dominated by medium sized sedges [0.3-0.6 m (1-2 ft.) high] and other herbs and occurs in old, abandoned, "filled-in" beaver marshes in montane settings in the northern part of the state. Characteristic species are *Carex echinata* (prickly sedge), *C. utriculata* (bottle-shaped sedge), and a diverse assemblage of marsh forbs. Other marsh plants may include *Agrostis* spp. (bent-grasses), *Calamagrostis canadensis* (blue-joint), *Carex stricta* (tussock sedge), *C. lacustris* (lake sedge), *Dulichium arundinaceum* (three-way sedge), *Eupatorium maculatum* var. *foliosum* (northeastern spotted Joe-pye-weed), *Galium* spp. (bedstraws), *Glyceria canadensis* (rattlesnake manna-grass), *Hypericum* spp. (St. John's-worts), *Iris versicolor* (northern blue flag), *Juncus canadensis* (Canada rush), *Leersia* spp. (cutgrasses), *Lycopus uniflorus* (common water horehound), *Scirpus cyperinus* (woolly bulrush), *Symphotrichum puniceum* (purple-stemmed aster), *Thalictrum pubescens* (tall meadow-rue), and *Triadenum fraseri* (Fraser's marsh St. John's-wort). The rare northern sedge *Carex rostrata* (swollen-beaked sedge)* can occur in this variant.

CLASSIFICATION CONFIDENCE: 3

DISTRIBUTION: This community is widespread in New Hampshire. Good examples of the typic variant occurs in Deering Wildlife Sanctuary (Deering) and in Orenda-Stickey Wicket Wildlife Sanctuary (Marlow). Good examples of the northern medium sedge meadow variant occur at Norton Pool Preserve (Pittsburg) and Elbow Pond (Woodstock).

SOURCES: NHB field surveys.

• **Hudsonia maritime shrubland (S1)**

GENERAL DESCRIPTION: This community occurs in interdunal areas where sand movement from wind and waves, although quite significant, is more limited than in the beach grass grassland dominated foredunes. These interdunes are occasionally overwashed (and waterborne sand deposited) when portions of foredunes are blown out during severe storms. *Hudsonia tomentosa* (hairy hudsonia)* is adapted to withstand a

certain degree of sand burial and can form dense stands in more stabilized areas. In other areas, patches of sparse or unvegetated sand can occur. Because of its sand binding ability, hairy hudsonia is considered a keystone species in this community, by allowing other plant species to become established (NatureServe 2007). Only one example occurs in NH, between a foredune and beach cottages on the remnant back portion of an interdune. Historically, this community likely was common in NH (as it is today on Plum Island's dune system nearby in MA) within the once extensive dune system along the coast from the state line in Seabrook through Hampton Beach.

The xeric substrate consists of sand (to gravelly-sand). The sand substrate is wind and water deposited and supports essentially no soil development.

CHARACTERISTIC VEGETATION: Occasional associates of the dominant hairy hudsonia* include *Ammophila breviligulata* (beach grass)*, *Artemisia campestris* ssp. *caudata* (tall wormwood)*, *Carex silicea* (sea-beach sedge), *Cyperus grayi* (Gray's umbrella sedge)*, *Festuca rubra* (red fescue), *Lathyrus japonicus* (beach pea), *Lechea maritima* (seabeach pinweed), *Polygonella articulata* (jointweed), *Solidago sempervirens* (seaside goldenrod), *Astraeus hygrometricus* (earthstar fungus), and several lichen species. Less frequent associates are *Aristida tuberculosa* (sea-beach needle grass)*, *Artemisia stelleriana* (dusty miller), *Bromus tectorum* (drooping brome grass), *Cyperus lupulinus* (perennial umbrella sedge), *Oenothera biennis* (biennial evening primrose), *Schizachyrium scoparium* (little bluestem), *Sporobolus cryptandrus* (sand dropseed)*, and few others. Collectively, these herbaceous associates have a sparse cover (<5%).

CLASSIFICATION CONFIDENCE: 2

DISTRIBUTION: Restricted to one interdunal site at Seabrook Beach (Seabrook) in the Coastal Lowland subsection.

SOURCES: NHB field surveys.

• Maritime intertidal rocky shore (S2)

GENERAL DESCRIPTION: This community occurs along exposed intertidal marine shorelines on the Isles of Shoals and the coastal mainland. This broadly defined community type is particularly exposed to wave action, tides, salt spray, sun, and wind. These environmental factors have a strong influence on species composition and zonation.

The substrate typically consists of bedrock and small to large boulders.

CHARACTERISTIC VEGETATION: Vascular plants are absent. In the supralittoral and high littoral zones, non-vascular species include cyanobacteria or "blue-green algae" and lichens. Commonly seen macroalgae in lower intertidal zones include the rockweeds *Ascophyllum nodosum*, *Fucus* spp., and many other species (Borror 1994).

CLASSIFICATION CONFIDENCE: 3

DISTRIBUTION: This community is restricted to the Isles of Shoals (Rye), Odiorne Point State Park (Rye), and other exposed maritime shores in the Coastal Lowland subsection.

SOURCES: NHB field surveys; Borror 1994.

• Maritime cobble beach (S1)

GENERAL DESCRIPTION: This community, characterized by a low to moderate cover of forbs and graminoids, is found along short stretches of "cobble" beaches above the reach of spring tides but overwashed during severe storms. These dynamic beaches can be significantly altered over relatively short

periods of time. On Lunging Island in the Isles of Shoals, the cobble beach has grown 3.5 m in elevation over the last 20 years (R. Randall, pers. comm.) as a result of storm waves moving sand, gravel, cobble, and larger rock landward onto the beach.

The substrate is primarily cobble and/or gravel.

CHARACTERISTIC VEGETATION: Frequent species are *Achillea millefolium* (yarrow), *Ambrosia artemisiifolia* (common ragweed), *Cakile edentula* (sea rocket), *Calystegia sepium* (hedge bindweed), *Chenopodium album* (pigweed), *Elymus repens* (quack grass), *Galeopsis tetrahit* (brittlestem hemp nettle), *Lathyrus japonicus* (beach pea), *Raphanus raphanistrum* (wild radish), *Rumex crispus* (curly dock), *Sisymbrium altissimum* (tumble mustard), *Solanum dulcamara* (nightshade), and *Solidago sempervirens* (seaside goldenrod). One of the cobble beaches on the Shoal's supports the only extant population of *Leymus mollis* (sea lyme grass)* in New Hampshire.

CLASSIFICATION CONFIDENCE: 2

DISTRIBUTION: This community is known from the Isles of Shoals (Rye) and Odiorne Point State Park (Rye) in the Coastal Lowland subsection.

SOURCES: NHB field surveys.

• Maritime meadow (S1)

GENERAL DESCRIPTION: This community, characterized by forbs and graminoids and invariably linked to seabird nesting colonies, dominates upland habitats landward of maritime rocky barrens on most of the smaller islands in the Isles of Shoals (i.e., Seaveys, and White in NH and Duck and Malaga in ME) and considerable areas of Appledore and Smuttynose in ME where sizable nesting colonies occur. Guano deposition from gulls and cormorants plays a significant role in maintaining species composition and structure in this community (Ellis et al. 2006). Gulls and cormorants also pull and trample vegetation in nesting areas. Shrub cover is markedly reduced or absent. George (1980) notes "the influence of larger birds on Duck Island, where hardly a sprig of a living woody form can be found, and where the air reeks of guano is the extreme example." Vegetation cover and composition influences whether the nesting habitat is more suitable for terns, gulls, or cormorants (D. Hayward and S. Fuller, pers. comm.).

The substrate consists of thin, dry, organic rich, sandy loams.

CHARACTERISTIC VEGETATION: On thinner, drier soils in more exposed areas, herb cover is sparse to moderate and characterized by *Achillea millefolium* (yarrow), *Ambrosia artemisiifolia* (common ragweed), *Festuca rubra* (red fescue), *Rumex acetosella* (red sorrel), *Solidago rugosa* (rough goldenrod), and *Symphotrichum novi-belgii* (New York aster), with lesser amounts of *Anagallis arvensis* (scarlet pimpernel), *Bromus tectorum* (drooping brome grass), *Lepidium ruderale* (narrow-leaved peppergrass), *L. virginicum* (poor-man's pepper), *Persicaria maculosa* (lady's thumb), *Polygonum aviculare* (birds' knotweed), *Portulaca oleracea* (common purslane), and *Solanum nigrum* (black nightshade). In more protected areas where soil accumulation and moisture increases, a moderate to dense cover of herbs can occur. Together with the species mentioned above, additional herbs characteristic of these less exposed areas are *Artemisia vulgaris* (common mugwort), *Elymus repens* (quack grass), *Ligusticum scoticum* (Scotch lovage), *Persicaria punctata* (dotted smartweed), *Raphanus raphanistrum* (wild radish), *Sisymbrium altissimum* (tumble mustard), *S. officinale* (hedge mustard), *Solidago sempervirens* (seaside goldenrod), and *Stellaria media* (common chickweed). The few shrubs or woody vines that may be present typically include *Rubus allegheniensis* (common blackberry), *R. idaeus* (red raspberry), *Solanum dulcamara* (nightshade), and *Toxicodendron radicans* (climbing poison ivy).

CLASSIFICATION CONFIDENCE: 2

DISTRIBUTION: This community is restricted to the Isles of Shoals (Rye) in the Coastal Lowland subsection.

SOURCES: NHB field surveys; Ellis et al. 1994; George 1980.

• **Maritime rocky barren (S1)**

GENERAL DESCRIPTION: This sparsely vegetated community on exposed bedrock occurs on all nine islands between the maritime intertidal rocky shore and the maritime meadow or shrub thicket. Plant cover is affected by concentrations of seabird guano, lack of soil, and exposure to heavy surf, wind, and salt spray. A low cover of herbs and even fewer shrubs creeps down into protected crevices from more vegetated communities above.

The substrate is dominated by exposed bedrock.

CHARACTERISTIC VEGETATION: Most frequent are *Achillea millefolium* (yarrow), *Elymus repens* (quack grass), *Festuca rubra* (red fescue), *Lepidium ruderae* (narrow-leaved peppergrass), *L. virginicum* (poor-man's pepper), *Polygonum aviculare* (birds' knotweed), *Portulaca oleracea* (common purslane), *Solanum dulcamara* (nightshade), *Solidago sempervirens* (seaside goldenrod), *Spergularia rubra* (red sand spurrey), and *Symphyotrichum novi-belgii* (New York aster). Several other associated species occur with an even sparser cover.

CLASSIFICATION CONFIDENCE: 2

DISTRIBUTION: This community is restricted to the Isles of Shoals (Rye) and exposed coastal shorelines on the mainland in the Coastal Lowland subsection.

SOURCES: NHB field surveys.

• **Maritime shrub thicket (S1)**

GENERAL DESCRIPTION: This community dominates natural upland habitats landward of maritime rocky barrens on Star Island in the Island of Shoals. Maritime shrub thickets also characterize most natural upland habitats on other larger islands on the Shoal's nearby in Maine (i.e., Appledore, Cedar, and Smuttynose). Two expressions occur: 1) a short to moderate-height shrub thicket comprising stunted and low-growing shrubs on thin-soiled, exposed ridgelines and areas closer to shorelines near rocky barrens, and 2) a moderate to tall shrub thicket in more protected island interiors in deeper soils.

The substrate consists of relatively thin, dry to dry-mesic, sandy loams.

CHARACTERISTIC VEGETATION: Both expressions support similar shrub species, including *Amelanchier canadensis* (eastern shadbush), *A. stolonifera* (dwarf shadbush), *Gaylussacia baccata* (black huckleberry), *Myrica pensylvanica* (northern bayberry), *Parthenocissus quinquefolia* (Virginia creeper), *Photinia melanocarpa* (black chokeberry), *Rosa rugosa* (beach rose), *R. virginiana* (Virginia rose), *Rubus allegheniensis* (common blackberry), *R. idaeus* (red raspberry), *Toxicodendron radicans* (climbing poison ivy), and occasionally, stunted forms of *Acer rubrum* (red maple) and *Prunus serotina* (black cherry). Common herbs are *Achillea millefolium* (yarrow), *Agrostis capillaris* (Rhode Island bentgrass), *Anthoxanthum odoratum* (sweet vernal grass), *Elymus repens* (quack grass), *Fallopia scandens* (large climbing false buckwheat), *Festuca rubra* (red fescue), *Fragaria virginiana* (wild strawberry), *Maianthemum stellatum* (starry false Solomon's seal), *Poa compressa* (Canada bluegrass), *P. pratensis* (Kentucky bluegrass), *Sedum* spp. (stonecrops), *Sibbaldiopsis tridentata* (three-toothed cinquefoil), and *Symphyotrichum novi-belgii* (New York aster).

CLASSIFICATION CONFIDENCE: 2

DISTRIBUTION: In NH, this community is restricted to Star Island on the Isles of Shoals (Rye) in the Coastal Lowland subsection.

SOURCES: NHB field surveys.

• **Riverwash plain and dunes (G2 S1)**

GENERAL DESCRIPTION: This globally rare community is known in New Hampshire only from high floodplain point bars associated with the broad meanders of the upper Merrimack River in Canterbury, just north of the confluence with the Contoocook River. These terraces have been periodically scoured during major flood events, burying the point bars with fresh sand and gravel deposits. Subsequent re-working of sand deposits by wind has formed 0.5–1.5 m dunes on portions of these plains; dunes a very rare geologic phenomenon away from the coast in New England. The two largest riverwash plains and dunes are 6-12 ha. in size and 1.5–3 m above the current average river level. A smaller sand plain is 7.5 m above the river. The lowest plain was overtopped during the spring floods of 2006, reaching the base of some of the dunes.

The bottomlands along this part of the upper Merrimack River consist of glaciolacustrine deposits (lake-bed and river delta sediments) associated with glacial Lake Merrimack, which existed between 14,300 to 14,750 years ago. Thinly-bedded, alternating layers of silt and clay lake-bed deposits (called “varves”) found near the current river level were covered by river delta deposits, which were in turn capped by deep fluvial deposits of more recent origin that eventually filled Lake Merrimack. Since then, the river has cut its way through about 25 m of these deposits to reach its present day level, maintaining a series of broad, sandy point bars that support riverwash plain and dune communities.

The current plain and dunes consist of fine sand near the surface, with a fine gravel lag (or gravel “pavement”). The 1927 USGS 15 minute topographic map, air photos (1942, 1953, 1974, 1999), and recent surveys indicate that these areas have been sparsely vegetated since at least 1927, although open areas have diminished as trees and other vegetation have re-colonized portions of the dunes and plain. A large 5 ha.+ area on one of the plains has remained open with little vegetation for at least 60-75 years, supporting very sparse vascular plants and a variable cover of cryptogamic organisms (see characteristic vegetation below). Historic maps and geologic evidence suggest that these open areas have been present for more than 100 years, and lenses of buried A horizon organic material with charcoal dated to about 2500-3000 years ago are found in high floodplain sediments on adjacent point bars. This indicates that flood and fire dynamics have been operating on these terraces for thousands of years.

This community is described in “Rare Plant Communities of the Conterminous United States” (TNC 1994) as “Inland Sand Barren” (*Betula populifolia* – *Schizachyrium scoparium* – *Ionactis linariifolius* Sparse Vegetation), a globally rare type restricted to Canterbury, NH and Kennebec Plains area of Maine.

CHARACTERISTIC VEGETATION: The plains and dunes range from unvegetated to forested cover, depending on degree of natural and human disturbance and corresponding degree of colonization by vascular plants and cryptogamic organisms. The more open areas include active dune zones and flat riverwash areas, with a moderate to sparse cover of drought-tolerant grasses, sedges, forbs, and a cryptogamic crust. Cryptogamic crusts are ecologically important biotic layers at the soil surface found in arid and semi-arid landscapes worldwide, and consist of some combination of mosses, lichens, fungi, bacteria, and algae. In many cases their development takes decades. Cryptogamic organisms have not been examined closely in this community, but deserve detailed study given their potential ecological importance and rarity in the region. Shrubs and tree saplings are widely scattered and are more abundant at the margins of the open plains and dunes.

The open riverwash plains contain less than 1% cover of vascular plants and zero to 100% local cover of cryptogamic organisms. Vascular plants here include *Schizachyrium scoparium* (little bluestem), *Carex tonsa* var. *tonsa* (shaved sedge), *Lechea maritima* (seabeach pinweed), and *Polygonella articulata* (sand jointweed). These plants are also found in active dune areas along with *Ionactis linariifolius* (stiff-leaved aster), *Panicum* spp. (panic grasses), *Rumex acetosella* (red sorrel), *Andropogon gerardii* (big bluestem),

and the rare *Cenchrus longispinus* (common sandbur). Other plants in open to semi-wooded dune areas include *Poa compressa* (Canada bluegrass), *Dichanthelium linearifolium* (linear-leaved panic grass), *Dichanthelium clandestinum* (deertongue), *Eragrostis spectabilis* (tumble grass), *Agrostis scabra* (rough bentgrass), *Aristida basiramea* (branching needle grass), *Digitaria cognata* (fall witchgrass), *Juncus greenei* (Greene's rush), *Cyperus dentatus* (bulblet umbrella sedge), *Cyperus filicinus* (beach umbrella sedge), *Trichostema dichotomum* (bluecurls), *Oenothera parviflora* (northern evening primrose), *Solidago bicolor* (silverrod), *Solidago nemoralis* (northern gray goldenrod), *Diphasiastrum tristachyum* (blue ground-cedar), *Rubus idaeus* (red raspberry), *Juniperus communis* var. *depressa* (ground juniper), and *Comptonia peregrina* (sweet fern). Trees form a woodland cover in some areas and include *Quercus coccinea* (scarlet oak), *Quercus velutina* (black oak), *Quercus rubra* (red oak), *Pinus strobus* (white pine), *Pinus rigida* (pitch pine), and *Prunus serotina* (black cherry). Lawns of the rare *Carex siccata* (hay sedge) are found in woodland border areas, one of two sites known for this species in New Hampshire.

CLASSIFICATION CONFIDENCE: 1-2

DISTRIBUTION: This natural community is globally restricted to a limited stretch of the Merrimack River in Canterbury, New Hampshire and the Kennebec Plains area of Maine. The two documented NH examples are the Canterbury Dunes on the town property off Intervale Road, and on the point bar just upstream from Muchyedo (Muchido) Banks.

SOURCES: NHB Field Surveys; Field (2004); Pendleton (1995a and 1995b); Sperduto (1994a); TNC (1994); USGS (1927).

• Pitch pine rocky ridge (S1)

GENERAL DESCRIPTION: This *Pinus rigida* (pitch pine) dominated community is found on rocky summits and ridges in southern and east-central New Hampshire with a history of fire. Pitch pine forms a stunted to moderate-height (5-30 ft. tall), sparse woodland (5-25%) to woodland (25-60%) tree canopy cover, sometimes in combination with other conifers and oaks. On the most barren and xeric microsites within the community, scattered bonsai-like pitch pine trees grow to 5-15 feet tall and can exceed 70 years of age. This community is similar to other pine and oak dominated rocky ridge communities in the abundance of heath shrubs, lichens, and bedrock outcrops. It differs from other rocky ridge types by the predominance of pitch pine and probably by a more frequent or intense fire history necessary to favor perpetuation of pitch pine over other trees. Pitch pine rocky ridges are similar to pitch pine – scrub oak barrens in many ways, but are found in bedrock-controlled settings rather than on sand plains, and exhibit some differences in species composition. This community is rare in the New Hampshire, and rare or uncommon in other New England states and New York. It is found at both low (270 ft) and moderate (1700 feet) elevations.

Drought and fire plays an important role in the maintenance of pitch pine and other fire-adapted species found in this community. Fire sources have included escaped human fires. Return intervals of less than 50 years would tend to perpetuate pitch pine; longer return intervals could lead to more mixed composition, greater overall tree cover, and possible succession to other community types maintained by longer return intervals. Barren outcrops are abundant, ranging from 25 – 75% cover, forming small to large patches (<0.1 to 1+ acres) as part of a woodland – barren mosaic. Without fire, a greater abundance of fire-intolerant species and tree cover in general can be expected in areas with soil cover. Xeric, barren outcrop areas are may remain open for longer periods due to time required to build up soil.

CHARACTERISTIC VEGETATION: Canopy composition ranges from nearly pure pitch pine to pitch pine co-dominating with a variable mix of other trees. Areas where pitch pine is not among the most abundant species indicates other community types or areas transitional or successional to other types. Associated trees include pines, oaks, birches, and red spruce. At low elevations (below 1000 feet), Appalachian oaks and other southern species may be present, including *Quercus alba* (white oak), *Q. montana* (chestnut oak),

Q. velutina (black oak), *Q. prinoides* (bear oak), and *Sassafras albidum* (sassafras). At higher elevations, *Pinus resinosa* (red pine) and *Picea rubens* (red spruce) can mix with pitch pine. Trees found at either elevation include *Quercus rubra* (red oak), *Pinus strobus* (white pine), *Betula papyrifera* (paper birch), *B. populifolia* (gray birch), and *Acer rubrum* (red maple).

Shrub cover is moderate (5-40%) and consists of low or dwarf shrubs; in places, extensive thickets of *Quercus ilicifolia* (scrub oak) form. Other common shrubs include *Gaylussacia baccata* (black huckleberry), *Vaccinium angustifolium* (lowbush blueberry), *V. pallidum* (hillside blueberry), *Kalmia angustifolia* (sheep laurel), *Juniperus communis* (ground juniper), *Gaultheria procumbens* (wintergreen), *Sibbaldiopsis tridentata* (three-toothed cinquefoil), *Photinia melanocarpa* (black chokeberry), and *Amelanchier* spp. (shadbush). At higher elevation sites, scrub oak and hillside blueberry are absent, and tall shrubs are limited to scattered individuals of other species.

Herbaceous cover is sparse, but a moderate diversity of grasses and sedges is typical. *Deschampsia flexuosa* (common hairgrass) and *Pteridium aquilinum* (bracken fern) are always present. Other frequent species include *Comandra umbellata* (bastard toadflax), *Carex tonsa* (shaved sedge), *C. brevior* (Fernald's sedge), *Danthonia spicata* (poverty oatgrass), *Schizachyrium scoparium* (little bluestem), *Maianthemum canadense* (Canada mayflower), *Solidago puberula* (downy goldenrod). *Carex cumulata* (piled-up sedge)* is a rare plant documented from two examples; *Nabalus serpentarius* (gall-of-the-earth)* is a rare herb found at one site. Lichens are a prominent life form, growing extensively on and around barren rock outcrops including reindeer lichen (*Cladonia* spp.) under and among heath shrubs.

This community differs from pitch pine – scrub oak barrens on sand plains by having a greater abundance of lichens on thin soils and on rock outcrops, a higher frequency of common hairgrass, and at higher elevation sites, plants such as three-toothed cinquefoil, red pine, and red spruce.

CLASSIFICATION CONFIDENCE: 1-2

DISTRIBUTION: This natural community is restricted to southern and east-central NH from 270 to 1700 feet elevation in the Coastal Plain and Sebago-Ossipee subsections. Good examples include Rock Rimmon (Manchester) and Moose Mtns (Brookfield).

SOURCES: NHB Field Surveys; Ellis (2007).

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