

• Maritime rocky shore

Landscape settings: offshore islands

Soils: Well to somewhat excessively well drained, thin soils over bedrock and in cracks in outcrop

Spatial pattern: small patch (<5 – 100+ acres); zonation parallel to shoreline

Physiognomy: shrub thickets, and sparsely vegetated rocky barrens and intertidal areas

Distribution: Isles of Shoals

Description: This system occurs on the Isles of Shoals off the New Hampshire coast. As small islands set miles off the coast into the Atlantic Ocean, they are considerably more exposed to and battered by the maritime environment than nearby mainland shore areas. Despite a long history of human use, these islands support substantial areas of largely natural shrub thickets, meadows, rocky barrens, and intertidal areas exposed to and shaped by wave action, tides, heavy surf, salt spray, and when the tide is drawn down, dehydrating sun and wind. Early records indicate that these islands were probably never heavily wooded. Historically, the interior portions on some of these islands may have been somewhat more wooded and corresponded to a mosaic of *maritime shrub thicket* and *coastal rocky headland* communities with the latter community characterized by *Juniperus virginiana* (eastern red cedar) and *Myrica pensylvanica* (northern bayberry). *Coastal rocky headlands* are otherwise restricted to some rocky estuarine points in Great Bay.

There are seven natural communities that comprise the maritime rocky shore system. The *maritime shrub thicket* consists of short (mostly less than 1 m) to tall (mostly 1 – 2.5 m) shrub thickets found in interior areas away from the exposed rocky shorelines. These thickets are dominated by shrubs and stunted trees with a lower abundance of understory herbs. Prior to the Shoal's long history of human land use, the maritime thicket likely covered most of the islands.

Maritime cobble beaches, characterized by forbs and graminoids on a cobble and/or gravel dominated substrate, are found along short stretches of shoreline above the reach of spring tides but overwashed during severe storms. Cobble beaches occur on six of the nine islands in the Isles of Shoals and at Odiorne Point State Park in Rye.

Maritime meadows, 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. On thinner, drier soils in more exposed areas, herb cover is sparse to moderate. In more protected areas where soil accumulation and moisture increases, a moderate to dense cover of herbs can occur.

Maritime rocky barrens lie between *maritime shrub thickets* and *maritime meadows* at higher elevations and *maritime intertidal rocky shores* at lower elevations. These exposed rocky barrens have a sparse cover of herbs and even fewer shrubs that creep down from the shrub thicket above into protected crevices. Little to no soil and wind-driven salt spray limit plant growth on the exposed bedrock. Small depressions within this community hold *brackish water pools*. 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.

Coastal salt pond marshes are a broadly defined community type with vegetation zones distributed along hydrologic and salinity gradients. Basins are typically seasonally to semi-permanently flooded. They support a greater number of freshwater shallow emergent marsh species closer to their upper margins and medium-depth emergent marsh species tolerant of wetter, more brackish conditions in lower areas.

Salinities fluctuate seasonally and yearly in response to freshwater input, evaporation, and periodic infusion with salt water.

Maritime intertidal rocky shores are found from the supra-littoral (splash) zone down to the shore exposed at low tide. They are exposed to wave action, tides, and when the tides are drawn down, sun and wind. These environmental factors have a strong influence on species composition and zonation. Vascular plant species are absent. Non-vascular species include cyanobacteria or “blue-green algae” and lichens in the supra-littoral and high littoral zones and several species of macroalgae in the middle and lower intertidal zones.

Diagnostic natural communities:

- Brackish water pool (S1)
- Coastal salt pond marsh (S1)
- Maritime cobble beach (S1)
- Maritime intertidal rocky shore (S1)
- Maritime meadow (S1)
- Maritime rocky barren (S1)
- Maritime shrub thicket (S1)

Peripheral or occasional natural communities:

- Coastal rocky headland (S1)
- Coastal shoreline strand/swale (S2)
- Highbush blueberry - winterberry shrub thicket (S4)
- Short graminoid - forb emergent marsh/mud flat (S4)

Associated natural community systems: This system occurs by itself on the Isles of Shoals.

Characteristic species (for selected natural communities):

Maritime shrub thicket:

Short and tall shrub thickets:

Abundant shrubs

Myrica pensylvanica (bayberry)
Aronia arbutifolia (red chokeberry)
Aronia melanocarpa (black chokeberry)
Toxicodendron radicans (poison ivy)
Rosa virginiana (low rose)
Amelanchier stolonifera (dwarf shadbush)

Other occasional species

Achillea millefolium (yarrow)
Festuca rubra (red fescue)
Aster novi-belgii (New York aster)
Sedum spp. (stonecrops)
Potentilla tridentata (three-toothed cinquefoil)
Agrostis capillaris (Rhode Island bent-grass)
Polygonum scandens (false buckwheat)
Prunus maritima (beach plum)

Tall shrub thickets (additional species):

Shrubs

Amelanchier canadensis (eastern shadbush)
Parthenocissus quinquefolia (Virginia creeper)
Rosa rugosa (rugose rose)
Rubus allegheniensis (common blackberry)
Rubus idaeus (red raspberry)
Prunus serotina (black cherry)
Acer rubrum (red maple)
Ilex verticillata (winterberry) – dom. in low wet swales

Herbs

Agrostis capillaris (Rhode Island bent-grass)
Anthoxanthum odoratum (sweet vernal grass)
Elytrigia repens (quack-grass)
Poa pratensis (Kentucky bluegrass)
Poa compressa (Canada bluegrass)
Fragaria virginiana (wild strawberry)
Smilacina stellata (starry Solomon's seal).

Maritime rocky barren:

Herbs

Solidago sempervirens (seaside goldenrod)
Juncus gerardii (salt marsh rush)
Festuca rubra (red fescue)
Aster subulatus (small salt marsh aster)
Achillea millefolium (yarrow)
Toxicodendron radicans (climbing poison ivy)

Dwarf shrubs

Myrica pensylvanica (northern bayberry).

Small embedded fresh to brackish water depressions:

Lemna minor (lesser duckweed)
Polygonum hydropiper (water-pepper)
Polygonum punctatum (dotted smartweed)
Scutellaria galericulata (marsh skullcap)
Iris versicolor (northern blue flag)
Lycopus uniflorus (common water horehound)
Typha latifolia (common cattail)
Scirpus pungens (three-square rush)
Scirpus robustus (stout bulrush)
Eleocharis halophila (salt-loving spike-rush)
Potentilla egedii (coastal silverweed)
Lythrum hyssopifolia (hyssop-leaved loosestrife)
Juncus gerardii (salt marsh rush)

• **Temperate ridge-cliff-talus system**

Landscape settings: steep slopes and ridges with exposed bedrock—outcrops, cliffs, and talus

Soils: variable soils; little to no soil development on open talus, cliffs, and rock outcrops; variable organic development or coarse to fine mineral soil colluvium among talus boulders or in gullies; mostly shallow, draughty, acidic soils on ridges and slopes

Spatial pattern: elliptical to irregularly linear along steep slope contours (1-50+ acres)

Physiognomy: mosaic of sparsely vegetated barrens on talus, cliffs and outcrops, and woodlands and sparse woodlands on talus and dry slopes

Distribution: Mostly below 2200 ft. elevation, primarily in southern and central New Hampshire

Description: This system is found on steep slopes and adjacent rocky ridges at elevations below 2200 ft., primarily in southern and central New Hampshire. It typically expresses itself as a complex mosaic of rocky woodlands, rock outcrops, cliffs, and talus slopes with an abundance of oaks, pitch or white pines, and other temperate species. Rocky ridge communities typically occupy ridgetops and upper slopes and have a woodland or sparse woodland structure with extensive bedrock exposure. These bedrock outcrops include slabs with less than 65 degree slopes. Slabs with slopes greater than 65 degrees are classified as **lowland acidic cliffs**. Where erosion of cliffs and slabs produces accumulations of large boulders, talus communities are formed. These include **temperate lichen talus barrens**, which are lichen-dominated boulder fields with little vascular plant cover, and wooded talus communities such as **red oak - black birch wooded talus**, which generally have an open woodland structure. Wooded talus communities have variable and patchy understories of tall shrubs, herbs, vines, and *Polypodium virginianum* (rock polypody) on boulders depending on local soil development. Large talus slopes with big boulders can produce a cold micro-climate created by late melting ice which supports species with more northern affinities, such as red spruce or mountain ash.

At elevations below 1000 feet, species of Appalachian distribution are common, such as *Quercus alba* (white oak), *Quercus velutina* (black oak), *Quercus montana* (chestnut oak), *Pinus rigida* (pitch pine), and

Carya spp. (hickories). *Quercus rubra* (red oak) and *Pinus strobus* (white pine) are also common in these areas. Sites with Appalachian communities such as ***Appalachian oak - pine rocky ridge*** and ***chestnut oak forest/woodland*** are generally restricted to the southern tier of the state. Above 1000 feet elevation, Appalachian species disappear and *Quercus rubra* (red oak) is often the dominant tree in rocky woods and on forested talus communities. Dry-site species dominate the understory, including an abundance of blueberries, huckleberries, grasses and sedges, and lichens.

At higher elevations in the mountains, this system is replaced by the ***montane rocky ridge system***, ***montane acidic talus system***, and/or ***montane cliff system***. Large montane ridges, cliffs and talus slopes in the mountains are classified as independent systems because they are considerably larger and support more diverse complexes of communities than their temperate counterparts. These systems are differentiated from the temperate system by the presence of communities dominated by *Picea rubens* (red spruce) and/or *Pinus resinosa* (red pine), and the absence of *Quercus rubra* (red oak).

Diagnostic natural communities

- Appalachian oak – pine rocky ridge (S3)
- Chestnut oak forest/woodland (S1S2)
- Red oak – pine rocky ridge (S3S4)
- Pitch pine rocky ridge (S1)
- Red oak – black birch wooded talus (S3S4)
- Red oak – hickory wooded talus (S1S2)
- Temperate lichen talus barren (S2S3)
- Lowland acidic cliff (S4)
- Cliff seep (S3S4)

Peripheral or occasional natural communities

- Dry red oak – white pine forest (S3S4)
- Dry Appalachian oak – hickory forest (S3)
- Lowland circumneutral cliff (S2)

Associated natural community systems: This system represents the combination of three system types described in the 2005 systems classification—***Appalachian oak rocky ridge system***, ***temperate acidic talus system***, and ***temperate cliff system***—and ***red oak – pine rocky ridges***, previously included in the ***montane rocky ridge system***. Individual rocky ridge, cliff or talus landscape settings at lower elevations rarely occur at system-level scales that support more than 1 or 2 natural community types. However, system-level complexes of communities are found where ridge, cliff, and talus formations co-occur at single sites (or at least two out of three). In these circumstances, each setting may only contain one or two communities, but collectively form repeating assemblages of 3-6 communities.

In the mountains, the ***montane rocky ridge system***, ***montane cliff system***, and ***montane acidic talus system*** will remain separate, as they tend to occur at larger scales and with a greater diversity of communities, meriting their system status. Ridge, cliff, and talus examples that support more mineral-rich conditions over significant areas are classified as separate systems due to the distinctly different assemblage of communities.

Characteristic species:

Trees

Quercus rubra (red oak)
Quercus alba (white oak)
Quercus velutina (black oak)
Quercus montana (chestnut oak)
Quercus ilicifolia (scrub oak)
Carya spp. (hickories)
Pinus strobus (white pine)
Pinus rigida (pitch pine)
Betula lenta (black birch)
Ostrya virginiana (ironwood)
Acer spicatum (mountain maple)

Shrubs and vines (lianas)

Vaccinium pallidum (hillside blueberry)
Gaylussacia baccata (black huckleberry)
Juniperus communis (ground juniper)
Comptonia peregrina (sweet fern)

Arctostaphylos uva-ursi (bearberry)
Hamamelis virginiana (witch hazel)
Rubus spp. (raspberries and blackberries)
Sambucus racemosa (red elderberry)
Fallopia cilinodis (fringed bindweed)
Parthenocissus quinquefolia (Virginia creeper)

Herbs

Aureolaria pedicularia var. *intercedens* (fern-leaved false foxglove)*
Solidago odora (sweet goldenrod)*
Schizachyrium scoparium (little bluestem)
Deschampsia flexuosa (common hairgrass)
Polypodium virginianum (rock polypody)
Dryopteris marginalis (marginal wood fern)
Maianthemum canadense (Canada mayflower)
Aralia nudicaulis (wild sarsaparilla)