VI. TERRESTRIAL SYSTEM

The terrestrial system consists of upland habitats. These habitats have well-drained soils that are dry to mesic (never hydric), and vegetative cover that is never predominantly hydrophytic, even if the soil surface is occasionally or seasonally flooded or saturated. In other words, this is a broadly defined system that includes everything except aquatic, wetland, and subterranean communities.

A. OPEN UPLANDS

This subsystem includes upland communities with less than 25% canopy cover of trees; the dominant species in these communities are shrubs, herbs, or cryptogammic plants (mosses, lichens, etc.). Three distinctive physiognomic types are included in this subsystem. Grasslands include communities that are dominated by grasses and sedges; they may include scattered shrubs (never more than 50% cover of shrubs), and scattered trees (usually less than one tree per acre, or 3 trees per hectare). Meadows include communities with forbs, grasses, sedges, and shrubs codominant; they may include scattered trees. Shrublands include communities that are dominated by shrubs (more than 50% cover of shrubs); they may include scattered trees.

1. Sand beach: a sparsely vegetated community that occurs on unstable sandy shores of large freshwater lakes, where the shore is formed and continually modified by wave action and wind erosion.

Characteristic species usually present at very low percent cover include various grasses such as beachgrass (*Ammophila breviligulata*, *A. champlainensis*), freshwater cordgrass (*Spartina pectinata*), common hairgrass (*Deschampsia flexuosa*), Canada wild-rye (*Elymus canadensis*), reed canary-grass (*Phalaris arundinacea*), Pickering's reedgrass (*Calamagrostis pickeringii*), poverty-grass *(Danthonia spicata*), sand dropseed (*Sporobolus cryptandrus*), and panic grasses (*Panicum* spp., *Panicum virgatum*). Other species present at low percent cover include common cocklebur (*Xanthium strumarium*), beach-pea (*Lathyrus japonicus* var. *glaber*), sea-rocket (*Cakile edentula* ssp. *lacustris*), silverweed (*Potentilla anserina*), tall wormwood (*Artemisia campestris* ssp. *caudata*), cyperus (*Cyperus* spp., *C. dentatus*), beggar-ticks (*Bidens* spp.), and knotweeds (*Polygonum* spp.).

Sand beaches provide feeding areas for migratory birds, and nesting habitat for shorebirds such as spotted sandpiper (*Actitis macularia*). Characteristic insects are tiger beetles (*Cincindela* spp.). More data on this community are needed.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 2001

Example: Ausable Delta, Clinton County; Southwick Beach State Park, Jefferson County.

Source: Bonano 1998; NYNHP field surveys.

2. Great Lakes dunes: a community dominated by grasses and shrubs that occurs on active and stabilized sand dunes along the shores of the Great Lakes. The composition and structure of the community is variable depending on stability of the dunes, the amount of sand deposition and erosion, and distance from the lake. Unstable dunes are sparsely vegetated, whereas the vegetation of stable dunes is more dense, and can eventually become forested. Great Lake dunes can be divided into six physiographic zones: 1) beach (see sand beach), 2) foredune front, 3) foredune back and swale, 4) secondary dunes, 5) last lee face of high dune, and 6) last lee face of low dune. Each of these zones may develop any one to several vegetation associations or "community types" (Bonano 1992). The species listed below are not necessarily restricted to a specific vegetation association. For example, beachgrass (*Ammophila breviligulata*) and dune grape (*Vitis riparia*) may occur in more than one of the listed associations, but their abundance will vary accordingly.

The first, and largest vegetation association is dominated by beachgrass (*Ammophila breviligulata*) and tall wormwood (*Artemisia campestris* var. *caudata*). Other characteristic species with low percent cover include cottonwood (*Populus deltoides*), heart-leaf sand dune willow (*Salix cordata*), sand dropseed (*Sporobolus cryptandrus*), beach-pea (*Lathyrus japonicus* var. *glaber*), and dune grape (*Vitis riparia*). In more natural settings this association usually occurs on the more active parts of the beach, foredune, and swale zones.

The second association is dominated by poison ivy (*Toxicodendron radicans*), dune grape (*Vitis riparia*), and cottonwood (*Populus deltoides*). Other characteristic shrubs and vines with low percent cover include red osier dogwood (*Cornus sericea*), silky dogwood (*C. amomum*), sand cherry (*Prunus pumila*), sand-dune willow (*Salix cordata*), poison ivy (*Toxicodendron radicans*), and bittersweet (*Celastrus scandens*). Other characteristic herbs with low percent cover include (*Ammophila breviligulata*), tall wormwood (*Artemisia campestris* var. *caudata*), Canada wild-rye (*Elymus canadensis*), spotted knapweed (*Centaurea maculosa*), starry Solomon's seal (*Smilacina stellata*), jointweed (*Polygonella articulata*), seaside spurge (*Euphorbia polygonifolia*),

and common hairgrass (*Deschampsia flexuosa*). In more natural settings this association occurs mostly on the moderately stabilized dune crests and occasionally in swales and on secondary dunes. This association may be split out as a new community (e.g., "Great Lakes dune shrubland") in future versions of this classification.

The third association is an open forest canopy dominated by red oak (*Quercus rubra*) and (*Acer rubrum*). Other characteristic species of the forested dunes sugar maple (*Acer saccharum*), striped maple (*Acer pensylvanicum*), shad bush (*Amelanchier* spp.), American beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), chokecherry (*Prunus virginiana*), blackberry (*Rubus allegheniensis*), red raspberry (*Rubus idaeus*), nannyberry (*Viburnum lentago*), arrowwood (*V. recognitum*), wild sarsparilla (*Aralia nudicaulis*), and wreath goldenrod (*Solidago caesia*). In more natural settings this association occurs on very stabilized secondary dunes and the leeward side of the last high dune. This association may be split out as a new community (e.g., "Great Lakes dune woodland") in future versions of this classification.

A fourth association dominated by speckled alder (*Alnus incana* ssp. *rugosa*) that is often found in wet dune swales is tentatively included under shrub swamp. See the appropriate palustrine communities for the classification of other wetland swales found within Great Lakes dunes. More data the physiognomic variants of this community are needed.

Distribution: only known from the eastern shore of Lake Ontario, in the Eastern Ontario Plain subzone of the Great Lakes Plain ecozone.

Rank: G3G4 S1S2 *Revised:* 2001

Examples: Southwick Beach, Jefferson County; El Dorado Beach, Jefferson County; Lakeview Wildlife Management Area, Jefferson County; Deer Creek Dunes, Oswego County.

Source: Bonano 1998; Significant Habitat Unit files; NYNHP field surveys.

3. Maritime beach: a community with extremely sparse vegetation that occurs on unstable sand, gravel, or cobble ocean shores above mean high tide, where the shore is modified by storm waves and wind erosion.

Characteristic species include beachgrass (*Ammophila breviligulata*), sea-rocket (*Cakile edentula* ssp. *edentula*), seaside atriplex (*Atriplex patula*), seabeach atriplex (*A. arenaria*), seabeach sandwort (*Honkenya peploides*), salsola (*Salsola kali*), seaside spurge (*Chamaesyce polygonifolia*), and seabeach knotweed (*Polygonum glaucum*).

This community is an important nesting ground for birds such as piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), common tern (*S. hirundo*), and roseate tern (*S. dougallii*).

Distribution: along the seacoast of the Coastal Lowlands ecozone.

Rank: G5 S5 *Revised:* 1990

Examples: Fire Island National Seashore, Suffolk County; Napeague Beach, Suffolk County; Orient Beach, Suffolk County.

Sources: Art 1976; Johnson 1985; Significant Habitat Unit files, NYNHP field surveys.

4. Maritime dunes: a community dominated by grasses and low shrubs that occurs on active and stabilized dunes along the Atlantic coast. This community consists of a mosaic of vegetation patches. This mosaic reflects past disturbances such as sand deposition, erosion, and dune migration. The composition and structure of the vegetation is variable depending on stability of the dunes, amounts of sand deposition and erosion, and distance from the ocean.

Characteristic species of the active dunes, where sand movement is greastest, include beachgrass (*Ammophila breviligulata*), dusty-miller (*Artemisia stelleriana*), beach pea (*Lathyrus japonicus*), sedge (*Carex silicea*), seaside goldenrod (*Solidago sempervirens*), and sand-rose (*Rosa rugosa*).

Characteristic species of stabilized dunes include beach heather (*Hudsonia tomentosa*), bearberry (*Arctostaphylos uva-ursi*), beachgrass (*Ammophila breviligulata*), cyperus (*Cyperus polystachyos* var. *macrostachyus*), seaside goldenrod (*Solidago sempervirens*), beach pinweed (*Lechea maritima*), jointweed (*Polygonella articulata*), sand-rose (*Rosa rugosa*), bayberry (*Myrica pensylvanica*), beach-plum (*Prunus maritima*), poison ivy (*Toxicodendron radicans*), and the lichens *Cladina submitis* and *Cetraria arenaria*). Seabeach amaranth (*Amaranthus pumilus*) is a federally threatened plant that is found on the dynamic foredune of some maritime dunes. A few stunted pitch pines (*Pinus rigida*) or post oaks (*Quercus stellata*) may be present in the dunes.

Distribution: along the seacoast of the Coastal Lowlands ecozone.

Rank: G4 S3 *Revised:* 2001

Examples: Napeague Dunes, Suffolk County; Fire

Island National Seashore, Suffolk County.

Sources: Andrle and Carroll 1988; Art 1976; Hancock 1995; Johnson 1985; Leatherman 1979; Robichaud and Buell 1983; Zaremba 1990, NYNHP field surveys.

5. Maritime shrubland: a shrubland community that occurs on dry seaside bluffs and headlands that are exposed to offshore winds and salt spray. This community typically occurs as a tall shrubland (2-3 m), but may include areas under 1m shrub height, to areas with shrubs up to 4 m tall forming a shrub canopy in shallow depressions. These low areas may imperceptibly grade into shrub swamp if soils are sufficiently wet. Trees are usually sparse or absent (ideally less than 25% cover).

Characteristic shrubs and sapling trees include shadbush (*Amelanchier canadensis*), bayberry (*Myrica pensylvanica*), black cherry (*Prunus serotina*), arrowwood (*Viburnum dentatum*), and shining sumac (*Rhus copallinum*). Other shrubs and stunted trees include beach-plum (*Prunus maritima*), sand-rose (*Rosa rugosa*), wild rose (*R. virginiana*), eastern red cedar (*Juniperus virginiana*), American holly (*Ilex opaca*), black oak (*Quercus velutina*), and sassafras (*Sassafras albidum*). Small amounts of highbush blueberry (*Vaccinium corymbosum*), sweet pepperbush (*Clethra alnifolia*), red maple (*Acer rubrum*), and black chokeberry (*Aronia melanocarpa*) are found in moister low areas, often grading to small patches of shrub swamp.

Characteristic vines include poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quiquefolius*), greenbrier (*Smilax rotundifolia*), oriental bittersweet (*Celastrus orbiculatus*), and Japanese honeysuckle (*Lonicera japonica*).

The herb layer is very sparse and may contain a few scatttered flat-topped goldenrod (Euthamia graminifolia), wild indigo (*Baptisia tinctoria*), white-topped aster (*Aster paternus*), and little bluestem (*Schizachyrium scoparium*).

Maritime shublands may form a patchy mosaic and grade into other maritime communities. For example, if trees become more prevalent it may grade into one of the maritime forest communities, such as successional maritime forest. If a severe storm reduces shrub cover and deposits sand into the community it may be converted to a maritime dune. This community shares many shrub species with maritime dunes, but typically lacks the maritime dune herb species. More data on possible landscape variants are needed (e.g., maritime shrublands on morainal headland vs. outwash barrier dune).

Birds that may be found in maritime shrublands include black-crowned night-heron (*Nycticorax nycticorax*), fish crow (*Corvus ossifragus*), yellow-breasted chat (*Icteria virens*), and migratory songbirds (especially in fall) (Levine 1998).

Distribution: along the seacoast of the Coastal Lowlands ecozone.

Rank: G4 S4 *Revised:* 2001

Example: Montauk Point, Suffolk County; Fire Island, Suffolk County.

Sources: Clark 1986b; Levine 1998; Robichaud and Buell 1983; Taylor 1923, Thompson 1997; NYNHP field surveys.

6. Maritime heathland: a dwarf shrubland community that occurs on rolling outwash plains and moraine of the glaciated portion of the Atlantic coastal plain, near the ocean and within the influence of offshore winds and salt spray. This community is dominated by low heath or heath-like shrubs that collectively have greater than 50% cover.

Characteristic shrubs include bearberry (*Arctostaphylos uva-ursi*), beach heather (*Hudsonia tomentosa*), blueberry (*Vaccinium angustifolium*), black huckle-berry (*Gaylussacia baccata*), bayberry (*Myrica pensylvanica*), and beach-plum (*Prunus maritima*).

Grasses and forbs are present, but they do not form a turf; characteristic species include common hairgrass (*Deschampsia flexuosa*), little bluestem (*Schizachyrium scoparium*), Pennsylvania sedge (*Carex pensylvancica*), rush (*Juncus greenei*), asters (*Aster dumosum, A. linariifolius, A. solidagineus*), bushy rockrose (*Helianthemum dumosum*), and New England blazing star (*Liatris scariosa* var. *novae-angliae*).

A characteristic bird in winter is yellow-rumped warbler (*Dendroica coronata*). This community intergrades with maritime grassland, and the two communities may occur together in a mosaic.

Distribution: along the seacoast of the Coastal Lowlands ecozone, in eastern Long Island.

Rank: G3 S1 *Revised:* 1990

Example: Napeague Dunes, Suffolk County; Montauk Mountain, Suffolk County.

Sources: Dunwiddie et al. 1996; Thompson 1997; NYNHP field surveys.

7. Maritime grassland: a grassland community that occurs on rolling outwash plains of the glaciated portion of the Atlantic coastal plain, near the ocean and within the influence of offshore winds and salt spray. This community is dominated by grasses that usually form a turf; the grasses collectively have greater than 50% cover. Low heath shrubs may be present, with less than 50% cover.

The dominant grasses are little bluestem (*Schizachyrium scoparium*), common hairgrass (*Deschampsia flexuosa*), and poverty-grass (*Danthonia spicata*).

Other characteristic species include Pennsylvania sedge (*Carex pensylvanica*), rush (*Juncus greenei*), Indian grass (*Sorghastrum nutans*), Atlantic golden aster (*Pityopsis falcata*), bushy rockrose (*Helianthemum dumosum*), hoary frostweed (*H. propinquum*), flat-top goldenrod (*Euthamia graminifolia*), white-topped aster (*Aster paternus*), pussy's-toes (*Antennaria plantaginifolia*), bitter milkwort (*Polygala polygama*), bayberry (*Myrica pensylvanica*), shining sumac (*Rhus copallinum*), and northern dewberry (*Rubus flagellaris*). A characteristic lichen is *Cladina rangiferina*.

Distribution: along the seacoast of the Coastal Lowlands ecozone, in eastern Long Island.

Rank: G2G3 S1 *Revised:* 1990

Examples: Conscience Point, Suffolk County; Shinnecock Hills, Suffolk County; Sayville Grasslands, Suffolk County.

Source: Taylor 1923; Dunwiddie et al. 1996; Thompson 1997; NYNHP field surveys.

8. Hempstead Plains grassland: a tall grassland community that occurs on rolling outwash plains in west-central Long Island. This community occurs inland, beyond the influence of offshore winds and salt spray. Historically this community covered about 15,000 hectares (approximately 38,000 acres) of western Long Island; less than 12 hectares (30 acres) remain today, and most of these are severely degraded.

This community was dominated by species characteristic of midwestern tallgrass prairie: big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). These species are present in today's remnants, but they are not always dominant.

Other characteristic species that still occur in this community include rush (*Juncus greenei*), wild indigo (*Baptisia tinctoria*), dwarf cinquefoil (*Potentilla canadensis*), rough goldenrod (*Solidago nemoralis*), early goldenrod (*Solidago juncea*), butterfly-weed (*Asclepias tuberosa*), stargrass (*Hypoxis hirsuta*), fringed violet (*Viola fimbriatula*), bird's-foot violet (*V. pedata*), stiff-leaf aster (*Aster linariifolius*), boneset (*Eupatorium hyssopifolium*), and northern dewberry (*Rubus flagellaris*).

Characteristic birds include vesper sparrow (*Pooecetes gramineus*), savannah sparrow (*Passerculus sandwichensis*), grasshopper sparrow (*Ammodramus savannarum*), and bobolink (*Dolichonyx oryzivorus*).

Distribution: only known from the Coastal Lowlands ecozone, in western Long Island.

Rank: G1Q S1 *Revised:* 1990

Example: Mitchell Field, Nassau County.

Sources: Cain et al. 1937; Seyfert 1973; NYNHP field surveys.

9. Riverside ice meadow: a meadow community that occurs on gently sloping cobble shores and rock outcrops along large rivers in areas where winter ice floes are pushed up onto the shore, forming an ice pack that remains until late spring. The ice scours the meadow, cutting back woody plants. The late-melting ice pack, which is up to 8 ft (2.4 m) deep in late April or early May (in the southern Adirondacks), creates a cool microclimate in late spring, and shortens the growing season. The ice pack deposits organic matter that has accumulated in the ice during the winter, apparently enriching the sandy soils of the cobble and rocky shores. Within this community there is a gradient of two to three vegetation zones that vary with elevation above the river and soil moisture.

Along the river there is often a narrow zone of seepy, wet meadow; characteristic species of this riverside seep include sweet-gale (*Myrica gale*), twig-rush (*Cladium mariscoides*), Canadian burnet (*Sanguisorba canadensis*), stiff willow (*Salix rigida*), silky dogwood (*Cornus amomum*), three-way sedge (*Dulichium arundinaceum*), slender spikerush (*Eleocharis elliptica*), beakrush (*Rhynchospora capitellata*), cranberry (*Vaccinium macrocarpon*), brook lobelia (*Lobelia kalmii*), and rose pogonia (*Pogonia ophioglossoides*).

Where the cobble shores are broad and the soil is coarse and dry, there is a zone of grassy meadow. The dominant grasses include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and Indian grass (*Sorghastrum nutans*); in at least one location, nutrush (*Scleria triglomerata*) is codominant. Characteristic species of the dry meadow include

sweet-fern (*Comptonia peregrina*), woodland sunflower (*Helianthus divaricatus*), meadow-sweet (*Spiraea latifolia*), sand-cherry (*Prunus pumila*), butterfly-weed (*Asclepias tuberosa*), wild rose (*Rosa virginiana*), frostweed (*Helianthemum canadense*), and bush-clover (*Lespedeza capitata*). Farthest from the river there may be a shrubby zone that includes some tree saplings and seedlings.

Characteristic species of the shrubby zone include hazelnut (*Corylus americana*), virgin's-bower (*Clematis virginiana*), bush honeysuckle (*Diervilla lonicera*), ostrich fern (*Matteuccia struthiopteris*), interrupted fern (*Osmunda claytoniana*), red raspberry (*Rubus idaeus*), deer-tongue grass (*Panicum clandestinum*), and flat-top white aster (*Aster umbellatus*). Data on characteristic animals are needed.

Distribution: along upper reaches of large rivers, reported from the Hudson River in the Adirondacks ecozone, Delaware River in the Appalachian Plateau ecozone, and St. Regis River in the St. Lawrence Plains subzone.

Rank: G2G3 S1 *Revised:* 1990

Example: South of The Glen, Warren County.

Source: NYNHP field surveys.

10. Riverside sand/gravel bar: a meadow community that occurs on sand and gravel bars deposited within, or adjacent to, a river channel. The community may be very sparsely vegetated, depending on the rates of deposition and erosion of the sand or gravel.

Characteristic species include sandbar willow (*Salix exigua*), sand-cherry (*Prunus pumila*), dogbane (*Apocynum cannabinum*), switchgrass (*Panicum virgatum*), and poison ivy (*Toxicodendron radicans*). More data on this community are needed.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

Examples: Ausable River, Clinton County; Deer River Gorge, Lewis County; Upper Schroon River, Essex County.

Sources: NYNHP field surveys.

11. Shoreline outcrop: a community that occurs along the shores of lakes and streams on outcrops of non-calcareous rocks such as anorthosite, granite, quartzite, sandstone, gneiss, or schist. The shoreline is exposed to wave action and ice scour. The vegetation is sparse; most plants are rooted in rock crevices.

Characteristic species include blueberries (*Vaccinium angustifolium, V. pallidum*), black huckleberry (*Gaylussacia baccata*), poverty-grass (*Danthonia spicata*), and common hairgrass (*Deschampsia flexuosa*). Crustose and foliose lichens may be common on the rocks. More data on this community are needed.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G5 S5 *Revised:* 2001

Examples: Lake Lila, Hamilton County; Twin Hill, Essex County.

Source: NYNHP field surveys.

12. Calcareous shoreline outcrop: a community that occurs along the shores of lakes and streams on outcrops of calcareous rocks such as limestone and dolomite. The vegetation is sparse, most plants are rooted in rock crevices. Mosses and lichens may be common on the rocks.

Characteristic species include wild columbine (*Aquilegia canadensis*), sedges (*Carex eburnea, C. granularis*), silky dogwood (*Cornus amomum*), red osier dogwood (*Cornus sericea*), and meadow-rue (*Thalictrum* spp.). Characteristic mosses include *Tortella tortuosa* and *Tortula ruralis*. More data on this community are needed.

Distribution: throughout upstate New York north of the Coastal Lowlands ecozone, at sites where the bedrock is calcareous.

Rank: G3G4 S2 *Revised:* 1990

*Examples:*Valcour Island, Clinton County; Hudson River Gorge, Essex and Hamilton Counties.

Source: NYNHP field surveys.

13. Cobble shore: a community that occurs on the well-drained cobble shores of lakes and streams. These shores are usually associated with high-energy waters (such as high-gradient streams), and they are likely to be scoured by floods or winter ice floes. This community includes both active and stable shores. Active cobble shores have loose cobbles that are moved by waves or river currents; these shores are sparsely vegetated, and they have comparatively few species. Stable cobble shores have cobbles embedded in sand or

peat, usually with vegetation rooted between the cobbles, and are generally more diverse than active cobble shores. Characteristic species include Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), dogbane (*Apocynum androsaemifolium*), deer-tongue grass (*Panicum clandestinum*), flat-top goldenrod (*Euthamia graminifolia*), beggar-ticks (*Bidens frondosa*), silverweed (*Potentilla anserina*), and bluejoint grass (*Calamagrostis canadensis*). More data on this community are needed.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G4G5 S4 *Revised:* 1990

Example: South of the Glen, Warren County; Schuyler Island, Essex County; Doyles Islands, Delaware County.

Source: NYNHP field surveys.

Alvar Communities: Alvar ecosystems are grasslands, shrublands, woodlands, and sparsely vegetated rock barrens that devevelop on flat limestone or dolostone where soils are very shallow. Almost all of North America's alvars occur within the Great Lake basin, primarily in an arc from northern Lake Michigan across northern Lake Huron and along the southern edge of the Canadian Shield to include eastern Ontario and northwestern New York state. In New York, alvar ecosystems may include up to six different communities recognized by the International Alvar Conservation Initiative (Gilman 1998, Reschke et al. 1999). Communities in this classification that may be considered part of the alvar ecosystem include alvar shrubland, alvar grassland, alvar pavement-grassland, and alvar woodland.

14. Alvar shrubland: a shrub-dominated community that has over 25% cover of tall, short, and dwarf shrubs. There are often deep crevices or grikes in the limestone pavement; trees and shrubs are often rooted in the grikes. Characteristic small trees and tall shrubs are eastern red cedar (*Juniperus virginiana*), northern white cedar (*Thuja occidentalis*), and bur oak (*Quercus macrocarpa*). Other less common trees include shagbark hickory (*Carya ovata*), rock elm (*Ulmus thomasii*), and white ash (*Fraxinus americana*).

Many of the shrubs occur in dense thickets; they are rooted either in rock crevices or in shallow soil over bedrock. Characteristic short shrubs include common juniper (*Juniperus communis*), gray dogwood (*Cornus foemina* spp. *racemosa*), fragrant sumac (*Rhus aromatica*), chokecherry (*Prunus virginiana*), downy arrow-wood (*Viburnum rafinesquianum*), round-leaf dogwood (*Cornus rugosa*), juneberry (*Amelanchier* spp.), meadow rose (*Rosa blanda*), wild honeysuckle (*Lonicera dioica*), and buffalo-berry (*Shepherdia canadensis*). Some dwarf shrubs are usually present including bearberry (*Arctostaphylos uva-ursi*) and snowberry (*Symphoricarpos albus*). Characteristic vines include poison ivy (*Toxicodendron radicans*) and river grape (*Vitis riparia*).

The herb layer forms a dry, grassy meadow between the shrubs. The most abundant herbs are poverty grass (*Danthonia spicata*), upland white aster (*Solidago ptarmicoides*), and the sedge *Carex umbellata*. Less than 50% of the ground surface is exposed limestone bedrock, which is ususally covered with lichens, mosses, and algae. This community often forms a patchy mosaic with other alvar communities and may succeed to alvar woodland. A more detailed description this community and an explanation of its global distribution can be found in Conserving Great Lake Alvars (Reschke et al. 1999) where it is called "juniper alvar shrubland." More data on this community are needed in New York.

Distribution: only known from a few outcrops of Chaumont limestone in Jefferson County, in the Eastern Ontario Plain ecozone.

Rank: G3 S2S3 *Revised:* 2001

Example: Chaumont Barrens, Jefferson County; Three Mile Creek Road Barrens, Jefferson County; Lucky Star Alvar, Jefferson County.

Sources: Gilman 1998; Reschke et al. 1999; NYNHP field surveys.

Alvar grasslands and pavement communities: Five distinct alvar grassland types have been described in Conserving Great Lakes Alvars (Reschke 1999) as follows: tufted hairgrass wet alvar grassland, little bluestem alvar grassland, annual alvar pavement-grassland, alvar nonvascular pavement, poverty grass dry alvar grassland. These five types have been tentatively lumped into two broader defined communities below, alvar grassland and alvar pavement-grassland, based on moisture regime and amount of bedrock pavement outcrop. It is suspected that some of these types occur as very small patch examples at New York's alvar sites, and in some cases imperceptibly grade into each other. More data are needed on patch size and distribution of these grassland types in New York before they are recognized as distinct community types.

15. Alvar grassland: a grassland community that occurs on shallow soils over level outcrops of calcareous bedrock (limestone or dolomite). Apparently alvar grasslands are restricted to areas that are seasonally flooded in spring or after heavy rainfall, as well as seasonally dry by late summer. Alvar grasslands range in size from 0.8 hectares (2 acres) to 20 hectares (50 acres) or more.

The typical variant is the "tufted hairgrass wet alvar grassland" (Reschke et al. 1999). The dominant grasses and sedges are tufted hairgrass (*Deschampsia cespitosa*), Craw's sedge (*Carex crawei*), prairie dropseed (*Sporobolus heterolepis*), and flat-stemmed spikerush (*Eleocharis elliptica* var. *elliptica*).

Other characteristic grasses and herbs include balsam ragwort (*Senecio pauperculus*), small rush grass (*Sporobolus neglectus*), sheathed rush grass (*S. vaginiflorus*), false pennyroyal (*Trichostema brachiatum*), and wild chives (*Allium schoenoprasum*).

Typically there are several turf and weft mosses forming a patchy mat at the base of grasses and forbs; typical mosses are marsh bryum (*Bryum psuedo-triquetrum*), fern moss (*Abietinella abietinum*), twisted moss (*Tortella tortuosa*), and sickle-leaf feathermoss (*Drepanocladus* spp.). There are usually few shrubs in this grassland community (usually less than 1% cover). This grassland occurs a patchy mosaic with other alvar communities and usually occupies the lowest, wettest positions. Soils are very shallow (<10 cm) and organic. This community has a characteristic soil moisture regime of alternating wet and dry seasons; many of them have flooded or saturated soils in early spring and late fall, combined with summer drought in most years.

A second variant that is suspected in New York is the "little bluestem alvar grassland" (Reschke 1999). Characteristic species include prairie dropseed (*Sporobolus heterolepis*), little bluestem (*Schizachyrium scoparium*), northern single spike sedge (*Carex scirpoidea*), tufted hairgrass (*Deschampsia cespitosa*), balsam ragwort (*Senecio pauperculus*), Craw's sedge (*Carex crawei*), and creeping juniper (*Juniperis horizantalis*) in examples outside of New York.

Soils are shallow (<20 cm) loams high in organic matter. This community has a characteristic soil moisture regime of alternating wet and dry seasons; many of them have flooded or saturated soils in early spring and late fall, combined with summer drought in most years.

Other characteristic alvar grassland species include sedges (*Carex molesta, C. castanea, C. vulpinoidea, C. granularis*), slender wheatgrass (*Agropyron trachycaulum*), brome grass (*Bromus kalmii*), spike muhly (*Muhlenbergia glomerata*), balsam groundsel (*Senecio pauperculus*), upland white aster (*Solidago ptarmicoides*), golden Alexanders (*Zizia aurea*), white camas (*Zigadenus elegans* ssp. *glaucus*), Indian paintbrush (*Castilleja coccinea*), prairie-smoke (*Geum triflorum*), and the mosses *Bryum pseudotriquetrum* and *Ditrichum flexicaule*.

Within the grassland are small patches of rock outcrop with a distinctive assemblage of mosses, lichens, and small herbs, much like the rock outcrops in alvar pavement-grassland. These outcrops have dry, very shallow soils (less than an inch deep). Characteristic species of these outcrops include the mosses *Tortella tortuosa* and *Bryum cespiticium*, which form a mat at the borders of the outcrop, and herbs including southern hairgrass (*Agrostis hiemalis*), false pennyroyal (*Trichostema brachiatum*), early saxifrage (*Saxifraga virginiensis*), harebell (*Campanula rotundifolia*), small skullcap (*Scutellaria parvula* var. *leonardii*), rock sandwort (*Minuartia michauxii*), thyme-leaf sandwort (*Arenaria serpyllifolia*), rough cinquefoil (*Potentilla norvegica*), and sleepy catch-fly (*Silene antirrhina*).

A characteristic bird is upland sandpiper (*Bartramia longicauda*). More data on characteristic animals are needed.

This community is usually surrounded by, or in a mosaic with with other alvar communities. Patches of the dry grass-savanna assemblage of alvar pavement barrens may occur within moist alvar grassland. The term "alvar" has been used for similar communities on limestone outcrops in Ontario and Sweden, and on dolomite outcrops in Michigan. In Ontario this community and related communities (such as alvar pavement barrens) are collectively called "alvar."

Distribution: only known from a few outcrops of Chaumont limestone in Jefferson County, in the Eastern Ontario Plain ecozone.

Rank: G2 S1 *Revised:* 1990

Example: Chaumont Barrens, Jefferson County; Three Mile Creek Road Barrens, Jefferson County; Lucky Star Alvar, Jefferson County.

Sources: Catling et al. 1975; Reschke and Gilman 1988; Slack et al. 1988; Gilman 1998; Reschke et al. 1999; NYNHP field surveys.

16. Alvar pavement-grassland: Three of the drier alvar grassland and pavement types described in Conserving Great Lakes Alvars (Reschke et al. 1999) are tentatively included here.

The first type is the "annual alvar pavement-grassland." This community consists of a mosaic of pavement and grassland areas dominated by characteristic species, such as small rush grass

(*Sporobolus neglectus*), sheathed rush grass (*S. vaginiflorus*), Philadelphia panic grass (*Panicum philadelphicum*), Canada bluegrass (*Poa compressa*), upland white aster (*Solidago ptarmicoides*), poverty grass (*Danthonia spicata*), false pennyroyal (*Trichostema brachiatum*), balsam ragwort (*Senecio pauperculus*), Craw's sedge (*Carex crawei*), and wiry panic grass (*Panicum flexile*).

There may be nearly equal cover of grassy vegetation, and exposed rock covered with nonvascular plants. Lichens and mosses are common on "pavement" rock outcrops that occur as patches within this mosaic. Soils are very shallow (<10 cm) and organic. This community has a characteristic soil moisture regime of alternating wet and dry seasons; many of them have flooded or saturated soils in early spring and late fall, combined with summer drought in most years. Due to very shallow soils, and often saturated conditions during freeze-thaw cycles in early and late winter, needle ice often forms in the soils, causing frost-heaving of the shallow soils.

The second variant is the "alvar nonvascular pavement." This community consists of exposed, flat limestone or dolostone pavement that is sparsely vegetated with a mosaic of mossy patches and exposed bedrock that is covered with crustose and foliose lichens. In the mossy patches, characteristic mosses are twisted moss (*Tortella tortuosa* and other *Tortella* spp.) and tortula moss (*Tortula ruralis*), and a characteristic lichen is cup lichen (*Cladonia pocillum*). Other characteristic mosses include *Ceratodon purpureus, Grimmia apocarpa,* and *Bryum argenteum*.

On exposed pavement patches, characteristic lichens are blackthread lichen (*Placynthium nigrum*) and silver skin lichen *Dernatocarpon cf miniatum*).

Very small herbs (<15 cm) grow in the mossy patches, including early saxifrage (*Saxifraga virginiensis*), hairy beardtongue (*Penstemon hirsutus*), Norwegian cinquefoil (*Potentilla norvegica*), false pennyroyal (*Trichostema brachiatum*), wild strawberry (*Fragaria virginiana*), Michaux's stitchwort (*Minuartia michauxii*), and longleaf summer bluet (*Houstonia longifolia*). Some taller herbs and low shrubs grow primarily in rock crevices that crisscross the pavement, including gray goldenrod (*Solidago nemoralis*), snowberry (*Symphoricarpos albus*), river grape (*Vitis riparia*), red columbine (*Aquilegia canadensis*), southern hairgrass (*Agrostis hiemalis*), small skullcap (*Scutellaria parvula* var. *leonardii*), and tall hawkweed (*Hieracium piloselloides*).

There is usually less than 15% cover of herbs. A few trees and shrubs are usually rooted in deep crevices of the pavement; characteristic trees and shrubs that occur sparsely northern white cedar (*Thuja occidentalis*), common juniper (*Juniperus communis*), white birch (*Betula papyrifera*), eastern red cedar (*Juniperus virginianus*), butternut (*Juglans cinerea*), and white pine (*Pinus strobus*).

The third type is the "poverty grass dry alvar grassland." This dry grass land is dominated by poverty grass (*Danthonia spicata*), Canada bluegrass (*Poa compressa*), and sometimes little bluestem (*Schizachyrium scoparium*).

Other characteristic species that may be found in each variant include panic grasses (*Panicum flexile, P. philadelphicum*), sedges (*Carex pensylvanica, C. eburnea, C. aurea*), slender spikerush (*Eleocharis elliptica* var. *elliptica*), bastard-toadflax (*Comandra umbellata*), harebell (*Campanula rotundifolia*), wild strawberry (*Fragaria virginiana*), pale bluets (*Hedyotis longifolia*), penstemon (*Penstemon hirsutus*), upland white aster (*Solidago ptarmicoides*), balsam groundsel (*Senecio pauperculus*), wild columbine (*Aquilegia canadensis*), blue phlox (*Phlox divaricata*), aster (*Aster ciliolatus*), and goldenrod (*Solidago hispida*). Fruticose and foliose lichens are locally common in the grassy areas, including *Cladina rangiferina, C. mitis, Peltigera canina,* and *Cetraria arenaria*.

There is usually about 50% cover of herbs and up to 50% cover of nonvascular plants growing on expose pavement areas. Soils are very shallow (<10 cm) loam and have a characteristic soil moisture regime of summer drought in most years. These grasslands are sometime disturbed by grazing and may include non-native species such as timothy (*Phleum pratense*).

Characteristic birds include prairie warbler (*Dendroica discolor*) and upland sandpiper (*Bartramia longicauda*). Characteristic butterflies include Olympia marble butterfly (*Euchloe olympia*), an elfin (*Incisalia polios*), and a dusky wing (*Erynnis lucilius*).

Distribution: only known from Jefferson County, in the Eastern Ontario Plain ecozone.

Rank: G3 S2S3 *Revised:* 2001

Example: Chaumont Barrens, Jefferson County; Three Mile Creek Road Barrens, Jefferson County; Lucky Star Alvar, Jefferson County.

Sources: Gilman 1998; Reschke et al. 1999; NYNHP field surveys.

16. Alpine meadow: a meadow community that is similar to arctic tundra. Alpine meadows occur above timberline (about 4900 ft or 1620 m) on the higher mountain summits and exposed ledges of the Adirondacks. This community consists of a mosaic of small grassy meadows, dwarf shrublands, small boggy depressions, and exposed bedrock covered with lichens and mosses. The flora includes arctic-alpine species

that are restricted (in New York) to these meadows, as well as boreal species that occur in forests and bogs at lower elevations. The soils are thin and organic, primarily composed of sphagnum peat or black muck. The soils are often saturated because they can be recharged by atmospheric moisture.

Characteristic species of the grassy meadows include deer's hair sedge (*Scirpus cespitosus*), Bigelow's sedge (*Carex bigelowii*), bluejoint grass (*Calamagrostis canadensis*), alpine sweetgrass (*Hierochloe alpina*), common hairgrass (*Deschampsia flexuosa*), mountain woodrush (*Luzula parviflora*), arctic rush (*Juncus trifidus*), three-toothed cinquefoil (*Potentilla tridentata*), bunchberry (*Cornus canadensis*), mountain sandwort (*Minuartia groenlandica*), and dwarf rattlesnake-root (*Prenanthes nana*).

Characteristic species of the low shrublands are bog bilberry (*Vaccinium uliginosum*), leatherleaf (*Chamaedaphne calyculata*), Labrador tea (*Ledum groenlandicum*), dwarf birch (*Betula glandulosa*), black crowberry (*Empetrum nigrum*), lapland rosebay (*Rhododendron lapponicum*), diapensia (*Diapensia lapponica*), and bearberry willow (*Salix uva-ursi*). On a few mountains there are distinctive patches of low shrublands consisting of dwarf birches including *Betula glandulosa*, *B. minor*, and stunted *B. cordifolia*.

Characteristic species of the small boggy depressions include the peat mosses *Sphagnum nemoreum* and *S. fuscum*, cottongrass (*Eriophorum vaginatum* var. *spissum*), bog laurel (*Kalmia polifolia*), and small cranberry (*Vaccinium oxycoccos*). Rock outcrops that are relatively undisturbed by trampling are covered with arctic-alpine lichens such as map lichen (*Rhizocarpon geographicum*) and may have scattered cushions of diapensia.

Characteristic birds include dark-eyed junco (*Junco hyemalis*) and white-throated sparrow (*Zonotrichia albicollis*).

This community is very sensitive to trampling because of the thin, often saturated soils and the very slow growth rate of the vegetation in the stressful alpine environment. Every effort should be made to minimize off-trail trampling by the many hikers who climb to these meadows in the High Peaks.

Distribution: restricted to the Adirondack High Peaks subzone of the Adirondacks ecozone.

Rank: G3G4 S1 *Revised:* 1990

Examples: MacIntyre Range (includes Algonquin Peak, Wright Peak, Boundary Peak, and Iroquois Peak) Essex County; Haystack Mountains, Essex County; Mount Marcy, Essex County.

Sources: DiNunzio 1972; LeBlanc 1981; Slack Bell 1993, 1995; Sperduto and Cogbill 1999; NYNHP field surveys.

17. Cliff community: a community that occurs on vertical exposures of resistant, non-calcareous bedrock (such as quartzite, sandstone, or schist) or consolidated material; these cliffs often include ledges and small areas of talus. There is minimal soil development, and vegetation is sparse. Different types of cliffs may be distinguished based on exposure and moisture; these variations are not well-documented in New York, therefore the assemblages associated with these variations (sunny, shaded, moist, or dry areas) are combined in one community.

Characteristic species include rock polypody (*Polypodium virginianum*), marginal wood fern (*Dryopteris marginalis*), common hairgrass (*Deschampsia flexuosa*), mountain laurel (*Kalmia latifolia*), and hemlock (*Tsuga canadensis*).

A characteristic bird that nests on cliffs is the common raven (*Corvus corax*). More data on this community are needed.

Distribution: throughout upstate New York north of the Coastal Lowlands ecozone, where bedrock is not calcareous.

Rank: G5 S4? *Revised:* 1990

Examples: Wallface Mountain, Essex County; Poke O Moonshine Mountain, Essex County; Catskill Escarpment, Greene County; Smiley Cliff, Ulster County; Palisades Orangetown, Rockland County.

Source: NYNHP field surveys.

18. Calcareous cliff community: a community that occurs on vertical exposures of resistant, calcareous bedrock (such as limestone or dolomite) or consolidated material; these cliffs often include ledges and small areas of talus. There is minimal soil development, and vegetation is sparse. Different types of calcareous cliffs may be distinguished based on exposure and moisture; these variations are not well-documented in New York, therefore the assemblages associated with these variations (sunny, shaded, moist, or dry areas) are combined in one community.

Characteristic small trees and shrubs include eastern red cedar (*Juniperus virginiana*), hop hornbeam (*Ostrya virginiana*), round-leaf dogwood (*Cornus rugosa*), Canada yew (*Taxus canadensis*), black cherry (*Prunus serotina*), downy arrow-wood (*Viburnum rafinesquianum*), and northern white cedar (*Thuja*

occidentalis).

Characteristic herbs growing in cracks and on ledges include bulblet fern (*Cystopteris bulbifera*), sedge (*Carex eburnea*), herb robert (*Geranium robertianum*), zig-zag goldenrod (*Solidago flexicaulis*), Campanula rotundifolia, purple cliff brake (*Pellaea atropurpurea*), early saxifrage (*Saxifraga virginiensis*), and red columbine (*Aquilegia canadensis*).

Characteristic nonvascular species include lichens and mosses, such as *Thuidium* sp., *Anomodon attenuatus, A. rostratus,* and *Brachythecium* sp.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone, where bedrock is calcareous.

Rank: G4 S3S4 *Revised:* 2001

Examples: The Diameter, Washington County; Helderberg Escarpment at Thatcher State Park, Albany County; Deer Leap, Warren County; Rogers Rock and Slide, Essex and Warren Counties.

Source: NYNHP field surveys.

19. Shale cliff and talus community: a community that occurs on nearly vertical exposures of shale bedrock and includes ledges and small areas of talus. Talus areas are composed of small fragments that are unstable and steeply sloping; the unstable nature of the shale results in uneven slopes and many rock crevices. There is minimal soil development, and vegetation is sparse. Different types of shale cliffs may be distinguished based on exposure and moisture; these variations are not well-documented in New York, therefore the assemblages associated with these variations (sunny, shaded, moist, or dry areas) are combined in one community.

Characteristic species include blunt-lobed woodsia (*Woodsia obtusa*), rusty woodsia (*W. ilvensis*), penstemon (*Penstemon hirsutus*), herb-robert (*Geranium robertianum*), cyperus (*Cyperus filiculmis*), little bluestem (*Schizachyrium scoparium*), panic grass (*Panicum linearifolium*), Pennsylvania sedge (*Carex pensylvanica*), and eastern red cedar (*Juniperus virginiana*).

A characteristic invertebrate is the silvery blue butterfly (*Glaucopsyche lygdamus lygdamus*), which feeds on wood-vetch (*Vicia caroliniana*). More data on this community are needed.

Distribution: scattered throughout upstate New York, north of the Coastal Lowlands ecozone, where bedrock is shale.

Rank: G4 S3 *Revised:* 1990

Examples: Chautauqua Gorge, Chautauqua County; Lorraine Gulf, Jefferson County; Cattaraugus Creek Zoar Valley, Cattaraugus and Erie Counties; Neversink Guymard Cliffs, Orange County; Whetstone Gulf, Lewis County.

Sources: Hotchkiss 1932; NYNHP field surveys.

20. Erosional slope/bluff: a sparsely vegetated community that occurs on vertical exposures of unconsolidated material, such as small stone, gravel, sand and clay, that is exposed to erosional forces, such as water, ice, or wind. Several regional and edaphic variants are known: the "maritime bluff" variant is adjacent to maritime and marine communities and is actively eroded by the oceanic forces; the "Great Lakes bluff" variant is adjacent to, and is exposed to erosional forces of, one of the Great Lakes; other variants may be more generally identified as "riverside bluff" or "lakeside bluff" depending on landscape setting.

The "maritime bluff" is comprised of areas of unvegetated, near vertical morainal sand cliffs, and less steep (about 45 degrees) areas of slumped bluff-face at the base of the bluff that support beach grass (*Ammophila breviligulata*), seaside goldenrod (*Soligago sempervirens*), and bayberry (*Myrica pensylvanica*). More data are needed for this community and its variants.

Distribution: Maritime variant known from Coastal Lowland ecozone. Great Lakes variant known from the drumlins region of the Great Lakes Plain ecozone. Other variants likely occur throughout New York.

Rank: G4 S4 *Revised:* 2001

Examples: Montauk Peninsula (south shore), Suffolk County; Chimney Bluffs State Park, Wayne County.

Sources: Office of Parks, Recreation and Historic Preservation 1988; NYNHP field surveys.

21. Rocky summit grassland: a grassland community that occurs on rocky summits and exposed rocky slopes of hills. Woody plant are sparse and may be scattered near the margin of the community. Small trees and shrubs at low percent cover include eastern red cedar (*Juniperus virginiana*) and red oak (*Quercus rubra*).

Characteristic and dominant grasses include little bluestem (*Schizachyrium scoparium*), tufted hairgrasss (*Deschampsia flexuosa*), poverty-grass (*Danthonia spicata, D. compressa*), and Indian grass (*Sorghastrum*

nutans). Other grasses and sedges include Pennsylvania sedge (*Carex pennsylvanica*), big bluestem (*Andropogon geradii*), and deer-tongue grass (*Panicum clandestinum*).

Other herbs include ebony spleenwort (*Asplenium platyneuron*), dittany (*Cunila origanoides*), fragrant goldenrod (*Solidago odora*), bush-clover (*Lespedeza violacea*), and whorled loosestrife (*Lysimachia quadrifolia*). Characteristic nonvascular species include lichens and mosses on scattered rock outcrops.

Distribution: not well known; currently reported from the Hudson Valley, Hudson Highlands, Triassic Lowlands ecozones.

Rank: G3G4 S3 *Revised:* 2001

Example: Rocky Peak Ridge, Essex County; Bigelow Mountain, Essex County; Cranberry Mountain, Orange Countgy; Sugarloaf Mountain, Orange County.

Source: NYNHP field surveys.

22. Successional fern meadow: a meadow dominated by ferns that occurs on sites that have been cleared (for logging, farming, etc.) or otherwise disturbed.

Characteristic ferns that may be dominant include bracken fern (*Pteridium aquilinum*) and hay-scented fern (*Dennstaedtia punctilobula*); blueberries (*Vaccinium angustifolium, V. pallidum*) are common associates. This community may be relatively short-lived; it gradually succeeds to a blueberry heath or a forest community. More data on this community are needed.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G4 S4 *Revised:* 1990

Example: Brandon Burn, Franklin County.

Sources: NYNHP field surveys.

23. Successional blueberry heath: a shrubland dominated by ericaceous shrubs that occurs on sites with acidic soils that have been cleared (for logging, farming, etc.) or otherwise disturbed.

Characteristic species include blueberries (*Vaccinium corymbosum, V. pallidum, V. myrtilloides, V. stamineum*), black huckleberry (*Gaylussacia baccata*), wintergreen (*Gaultheria procumbens*), trailing arbutus (*Epigaea repens*), poverty-grass (*Danthonia spicata*), and common hairgrass (*Deschampsia flexuosa*). This community may be relatively short-lived; it gradually succeeds to a forest community. More data on this community are needed.

Distribution: throughout New York State.

Rank: G4 S4 *Revised:* 2001

Example: Example: Brandon Burn, Franklin County. Finger Lakes National Forest, Schuyler County.

Source: NYNHP field surveys.

24. Successional northern sandplain grassland: a meadow community that occurs on open sandplains that have been cleared and plowed (for farming or development), and then abandoned. This community is usually dominated by low, dry turf of sedges and grasses less than 30 cm (12 inches) tall, and include patches of open sand, and patches of soil covered with mosses and lichens.

These grasslands are dominated by Pennsylvania sedge (*Carex pensylvanica*), common hairgrass (*Deschampsia flexuosa*), and haircap moss (*Polytrichum juniperinum*), with substantial amounts of poverty panic grass (*Panicum depauperatum*), poverty grass (*Danthonia spicata*), bracken fern (*Pteridium aquilinum*), sedge (*Carex rugosperma*), stiff-leaf aster (*Aster linariifolius*), and pale bluets (*Hedyotis longifolia*). They have relatively few other herbs, but include small amounts of characteristic sandplain species, such as bitter milkwort (*Polygala polygama*), panic grass (*Panicum xanthophysum*), and jointweed (*Polygonella articulata*). Adjacent areas of disturbed sands occasionally have Houghton umbrella-sedge (*Cyperus houghtonii*). These grasslands consist primarily of native species, although in some areas near roads they are invaded by exotic weeds such as St. Johns-wort (*Hypericum perforatum*) and common milkweed (*Asclepias syriaca*). There are essentially no exotic grasses, and thus they are very different from abandoned pastures and old fields on heavier soils. Shrubs may be present, but collectively they have less than 50% cover in the community.

Characteristic birds include upland sandpiper (*Bartramia longicauda*), grasshopper sparrow (*Ammodramus savannarum*), savannah sparrow (*Passerculus sandwichensis*), and vesper sparrow (*Pooecetes gramineus*). These grasslands provide important habitat for grassland birds.

Characteristic butterflies include meadow fritillary and black swallowtail. Some of these grasslands probably originate from anthropogenic disturbances such as trampling by vehicles. It is also possible that fire is an important part of the disturbance regime.

Ecoregional variants of sandplain grassland within the state may be recognized and are included here until further inventory warrants separation. This is a relatively short-lived community that succeeds to a shrubland, woodland, or forest community.

Distribution:.

Rank: G4? S3 *Revised:* 2001

Example: Brandon Burn, Franklin County; Fort Drum, Jefferson County.

Source: NYNHP field surveys.

25. Successional old field: a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned.

Characteristic herbs include goldenrods (*Solidago altissima, S. nemoralis, S. rugosa, S. juncea, S. canadensis,* and *Euthamia graminifolia*), bluegrasses (*Poa pratensis, P. compressa*), timothy (*Phleum pratense*), quackgrass (*Agropyron repens*), smooth brome (*Bromus inermis*), sweet vernal grass (*Anthoxanthum odoratum*), orchard grass (*Dactylis glomerata*), common chickweed (*Cerastium arvense*), common evening primrose (*Oenothera biennis*), old-field cinquefoil (*Potentilla simplex*), calico aster (*Aster lateriflorus*), New England aster (*Aster novae-angliae*), wild strawberry (*Fragaria virginiana*), Queen-Anne's-lace (*Daucus corota*), ragweed (*Ambrosia artemisiifolia*), hawkweeds (*Hieracium* spp.), dandelion (*Taraxacum officinale*), and ox-tongue (*Picris hieracioides*).

Shrubs may be present, but collectively they have less than 50% cover in the community. Characteristic shrubs include gray dogwood (*Cornus foemina* ssp. *racemosa*), silky dogwood (*Cornus amomum*), arrowwood (*Viburnum recognitum*), raspberries (*Rubus* spp.), sumac (*Rhus typhina, R. glabra*), and eastern red cedar (*Juniperus virginiana*).

A characteristic bird is the field sparrow (*Spizella pusilla*). This is a relatively short-lived community that succeeds to a shrubland, woodland, or forest community.

Distribution: throughout New York State.

Rank: G4 S4 *Revised:* 1990

Example: Chippewa Creek Plains, St. Lawrence County; Finger Lakes National Forest, Schuyler County.

Sources: Mellinger and McNaughton 1975; NYNHP field surveys.

26. Successional shrubland: a shrubland that occurs on sites that have been cleared (for farming, logging, development, etc.) or otherwise disturbed. This community has at least 50% cover of shrubs.

Characteristic shrubs include gray dogwood (*Cornus foemina* ssp. *racemosa*), eastern red cedar (*Juniperus virginiana*), raspberries (*Rubus* spp.), hawthorne (*Crataegus* spp.), serviceberries (*Amelanchier* spp.), choke-cherry (*Prunus virginiana*), wild plum (*Prunus americana*), sumac (*Rhus glabra, R. typhina*), nanny-berry (*Viburnum lentago*), arrowwood (*Viburnum recognitum*), and multiflora rose (*Rosa multiflora*).

Birds that may be found in successional shrublands brown thrasher, blue-winged warbler, golden-winged warbler, chestnut-sided warbler, yellow-breasted chat, eastern towhee, field sparrow, song sparrow, and indigo bunting (Levine 1998).

Distribution: throughout New York State.

Rank: G4 S4 *Revised:* 1990

Example: Chippewa Creek Plains, St. Lawrence County; Finger Lakes National Forest, Schuyler County.

Source: NYNHP field surveys.

B. BARRENS AND WOODLANDS

This subsystem includes upland communities that are structurally intermediate between forests and open canopy uplands. Several physiognomic types are included in this subsystem. Savannas are communities with a sparse canopy of trees (25 to 60% cover), and a groundlayer that is predominantly either grassy or shrubby (these will be called, respectively, grass-savanna and shrub-savanna). Woodlands include communities with a canopy of stunted or dwarf trees (less than 16 ft or 4.9 m tall), and wooded communties occurring on shallow soils over bedrock with numerous rock outcrops. The term "barrens" is commonly applied to both savannas and woodlands (e.g. pine barrens).

1. Serpentine barrens: a grass-savanna community that occurs on shallow soils over outcrops of serpentine bedrock. The appearance and composition of vegetation on serpentine soils is often striking because it represents an abrupt change from surrounding vegetation on non-serpentine soils. In New York this

community is known only from Staten Island, where the remnants are relatively disturbed. The best examples of this community occur in southeastern Pennsylvania and northeastern Maryland.

On Staten Island, the open grassland areas are dominated by little bluestem (*Schizachyrium scoparium*), panic grasses (such as *Panicum virgatum* and *P. philadelphicum*), Indian grass (*Sorghastrum nutans*), and poverty-grass (*Danthonia spicata*). Characteristic forbs in the grassy areas are heath aster (*Aster ericoides*), calico aster (*A. lateriflorus*), small white snakeroot (*Eupatorium aromaticum*), old-field cinquefoil (*Potentilla simplex*), and green milkweed (*Asclepias viridiflora*).

Trees and shrubs are scattered in the barrens; usually there is roughly 20 to 40% cover of trees and 15 to 30% cover of shrubs. On Staten Island, the characteristic woody plants are gray birch (*Betula populifolia*), black oak (*Quercus velutina*), sassafras (*Sassafras albidum*), quaking aspen (*Populus tremuloides*), bayberry (*Myrica pensylvanica*), shining sumac (*Rhus copallinum*), sawbrier (*Smilax glauca*), arrowwood (*Viburnum recognitum*), and blueberries (*Vaccinium corymbosum, V. pallidum*). A characteristic butterfly is the arogos skipper (*Atrytone arogos arogos*).

The remnant serpentine barrens of Staten Island are currently lacking many of the species that characterize the serpentine barrens of Pennsylvania and Maryland, such as Virginia pine (*Pinus virginiana*), blackjack oak (*Quercus marilandica*), fameflower (*Talinum teretifolium*), and chickweed (*Cerastium arvense* var. *villosum*).

Distribution: only known from the Manhattan Hills ecozone.

Rank: G2 S1 *Revised:* 1990

Examples: Heyerdahl Hill, Richmond County; Seaview, Richmond County.

Sources: Reed 1986; NYNHP field surveys.

2. Dwarf pine plains: a woodland community dominated by dwarf individuals of pitch pine (*Pinus rigida*) and scrub oak (*Quercus ilicifolia*) that occurs on nearly level outwash sand and gravel plains in eastern Long Island. The soils are infertile, coarse textured sands that are excessively well-drained. The canopy of dwarf pitch pines and scrub oaks is generally from 4 to 8 ft (1.2 to 2.4 m) tall, and it may form a dense thicket. The community includes very few species of vascular plants.

The majority of the biomass in the community consists of seven woody plant species: pitch pine, scrub oak, black huckleberry (*Gaylussacia baccata*), blueberry (*Vaccinium pallidum*), hudsonia (*Hudsonia ericoides*), bearberry (*Arctostaphylos uva-ursi*), and wintergreen (*Gaultheria procumbens*). The huckleberries and blueberries form a low shrub canopy under the pines and oaks.

The groundcover under the oaks and pines includes many foliose and fruticose lichens; the lichen flora is probably more diverse than the vascular plant flora in this community. Characteristic lichens include *Cetraria arenaria, Cladina mitis, C. submitis, Cladonia alpestris, C. cristatella, Parmelia rudecta, P. saxatilis,* and *Peltigera canina*.

There are numerous sandy openings in the shrub thicket with scattered bearberry, wintergreen, hudsonia, and a few low herbs such as jointweed (*Polygonella articulata*), stiff-leaf aster (*Aster linariifolius*), and orange-grass (*Hypericum gentianoides*).

This community is a favored nesting area for prairie warbler (*Dendroica discolor*) and brown thrasher (*Toxostoma rufum*); pine warbler (*Dendroica pinus*) and ovenbird (*Seiurus aurocapillus*) are also characteristic birds. This community also provides prime habitat for the buck moth (*Hemileuca maia*); the largest and most dense population of buck moths in New York occurs in the dwarf pine plains.

Distribution: restricted to the Coastal Lowlands ecozone.

Rank: G1G2 S1 *Revised:* 1990

Example: Dwarf Pine Barrens, Suffolk County.

Sources: Jordan 1998; Kerlinger and Doremus 1981; Olsvig 1980; Olsvig et al. 1979; NYNHP field surveys.

3. Dwarf pine ridges: a woodland community dominated by dwarf individuals of pitch pine (*Pinus rigida*) and black huckleberry (*Gaylussacia baccata*), which occurs on flat-topped summits of rocky ridges. The bedrock is a white quartzite conglomerate; soils are very thin, and they are rich in organic matter from litter that has accumulated on the bedrock.

Characteristic woody plants associated with the dwarf pines in the tall shrub "canopy" are wild raisin (*Viburnum cassinoides*), black chokeberry (*Aronia melanocarpa*), and stunted gray birch (*Betula populifolia*). There is also a low shrub stratum with blueberries (*Vaccinium angustifolium* and *V. pallidum*), sweet-fern (*Comptonia peregrina*), and sheep laurel (*Kalmia angustifolia*).

Characteristic groundlayer species are wintergreen (*Gaultheria procumbens*), bunchberry (*Cornus*

canadensis), Canada mayflower (*Maianthemum canadense*), moccasin flower (*Cypripedium acaule*), and cow-wheat (*Melampyrum lineare*). More data on characteristic animals are needed.

The dwarf pine ridges community grades into the pitch pine-oak-heath rocky summit community, which occurs on the top and upper slopes of ridges. The dwarf pine ridges are distinguished primarily by the height of the canopy pines: stands with pines less than 4.9 m (16 ft) tall are classified as dwarf pine ridges.

Distribution: only known from the Shawangunk Hills sub-zone of the Hudson Valley ecozone.

Rank: G1G2 S1 *Revised:* 1990

Example: Sam's Point, Ulster County.

Sources: Olsvig 1980; Thompson 1996; NYNHP field surveys.

4. Maritime pitch pine dune woodland: a maritime woodland that occurs on stabilized parabolic dunes. The substrate is wind and wave depositedsand that is usually excessively well-drained and nutrient poor. The litter layer is shallow. The community is subject to high winds, sand-blasting, salt spray, and shifting substrate.

Trees are stunted (10-12 m high) and salt pruned. The canopy is sparse with some openings. Pitch pine (*Pinus rigida*) is the dominant tree and may have lower branches that grow out horizontally like aprons. Tree oaks including black oak (*Quercus velutina*), white oak (*Quercus alba*) and post oak (*Quercus stellata*) may also occur and can be codominant with pitch pine in more developed examples.

The shrub layer is usually well developed. Characteristic shrubs are bearberry (*Arctostaphylos uva-ursi*), black huckleberry (*Gaylussacia baccata*), highbush blueberry (*Vaccinium corymbosum*), beach heather (*Hudsonia tomentosa*), bayberry (*Myrica pennsylvanica*), and scrub oak (*Quercus ilicifolia*). The vine layer is often well developed. Characteristic vines are greenbrier (*Smilax rotundifolia*) and poison ivy (*Toxicodendron radicans*).

The herbaceous layer is dominated by hairgrass (*Deschampsia flexuosa*). Other characteristic herbaceous species include Pennsylvania sedge (*Carex pensylvanica*), little bluestem (*Schizachyrium scoparium*), starflower (*Trientalis borealis*), panic grass (*Panicum* spp.), jointweed (*Polygonella articulata*), and pine barren sandwort (*Minuartia caroliniana*).

The non-vascular layer is often well developed. Characteristic species are *Cladonia uncialis, Cladonia rangiferina, Cladonia arbuscula, Geaster hygrometricus, Leucobryum glaucum, Polytricum juniperinum,* and *Tortella tortuosa.*

Distribution: currently known only from the Coastal Lowlands ecozone.

Rank: G2G3 S1 *Revised:* 2001

Examples: Napeague Woods, Suffolk County; Walking Dunes, Suffolk County.

Source: Johnson 1981, 1985; Robichaud-Collins and Anderson 1994; Thompson 1997; NYNHP field surveys.

5. Pitch pine-scrub oak barrens: a shrub-savanna community that occurs on well-drained, sandy soils that have developed on sand dunes, glacial till, and outwash plains.

Pitch pine (*Pinus rigida*) is the dominant tree; the percent cover of pitch pine is variable, ranging from 20 to 60%. The shrublayer dominants are scrub oaks (*Quercus ilicifolia* and *Q. prinoides*), which often form dense thickets. Beneath this tall shrub canopy is a low shrublayer primarily composed of sweet-fern (*Comptonia peregrina*), blueberries (*Vaccinium angustifolium* and *V. pallidum*), and black huckleberry (*Gaylussacia baccata*). These scrub oak thickets cover 60 to 80 percent of the community; pitch pines are scattered through the shrub thicket, occurring as emergent trees within an extensive shrubland.

Within the shrub thickets are small patches of grassland dominated by the following prairie grasses: big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and Indian grass (*Sorghastrum nutans*). These grassy areas are usually found near ant mounds, along trails, and in some of the low areas between dunes where the water table may be very close to the soil surface. This community can be rich in species. Characteristic forbs include bush-clovers (*Lespedeza capitata, L. hirta, L. procumbens,* and *L. stuevii*), pinweed (*Lechea villosa*), milkwort (*Polygala nuttallii*), goat's-rue (*Tephrosia virginiana*), and wild lupine (*Lupinus perennis*).

Rare butterflies of some northern Hudson Valley pitch pine-scrub oak barrens include Karner blue butterfly (*Lycaeides melissa samuelis*) and frosted elfin (*Incisalia irus*). Buck moth (*Hemileuca maia*) is a characteristic species throughout the range of the community, but the density of buck moths is usually low.

Birds that may be found in pitch pine-scrub oak barrens include eastern towhee (*Pipilo erythrophthalmus*), brown thrasher (*Toxostoma rufum*), pine warbler (*Dendroica pinus*), prairie warbler (*D.*

discolor), ovenbird (*Seiurus aurocapillus*), common yellowthroat (*Geothlypis trichas*), field sparrow (*Spizella pusilla*), chipping sparrow (*S. passerina*), and gray catbird (*Dumetella caroliniensis*) (Levine 1998, Drennan 1981). This community is adapted to, and maintained by, periodic fires; frequency of fires ranges from 6 to 15 years.

Distribution: mainly known from the Coastal Lowlands ecozone and the Central Hudson subzone of the Hudson Valley ecozone; small examples are reported from the Appalachian Plateau ecozone.

Rank: G2 S1 *Revised:* 2001

Examples: Albany Pine Bush, Albany County; Edgewood Oak Brush Plains, Suffolk County.

Sources: Cryan and Turner 1981; Drennan 1981; Forman 1979; Kerlinger and Doremus 1981; Levine 1998; Olsvig 1980; NYNHP field surveys.

6. Pitch pine-oak-heath woodland: a pine barrens community that occurs on well-drained, infertile, sandy soils in eastern Long Island (and possibly on sandy or rocky soils in upstate New York). The structure of this community is intermediate between a shrub-savanna and a woodland.

Pitch pine (*Pinus rigida*) and white oak (*Quercus alba*) are the most abundant trees, and these form an open canopy with 30 to 60% cover. Scarlet oak (*Quercus coccinea*) and black oak (*Q. velutina*) may also occur in the canopy.

The shrublayer is dominated by scrub oaks (*Quercus ilicifolia, Q. prinoides*), and includes a few heath shrubs such as huckleberry (*Gaylussacia baccata*) and blueberry (*Vaccinium pallidum*). The density of the shrublayer is inversely related to the tree canopy cover; where the trees are sparse, the shrubs form a dense thicket, and where the trees form a more closed canopy, the shrublayer may be relatively sparse. Stunted, multiple-stemmed white oaks may be present in the shrublayer if the site has burned regularly.

Characteristic species of the groundcover include bearberry (*Arctostaphylos uva-ursi*), Pennsylvania sedge (*Carex pensylvanica*), golden heather (*Hudsonia ericoides*), beach heather (*Hudsonia tomentosa*), and pinweed (*Lechea villosa*). Like other closely related pine barrens communities, the woodland provides habitat for buck moth (*Hemileuca maia*) and prairie warbler (*Dendroica discolor*).

This community is adapted to periodic fires; the fire frequency has not been documented, but it probably burns less frequently than pitch pine-scrub oak barrens (i.e., more than 15 years between fires). This community may have a fairly low species richness: it is more diverse than dwarf pine plains, but less diverse than pitch pine-scrub oak barrens.

Distribution: currently known only from the Coastal Lowlands ecozone.

Rank: G3G4 S2S3 *Revised:* 1990

Examples: Rocky Point Pine Barrens, Suffolk County; Dwarf Pine Barrens, Suffolk County.

Source: NYNHP field surveys.

7. Post oak-blackjack oak barrens: open barrens on upper slopes and low ridges characterized by the presence of stunted individuals of post oak (*Quercus stellata*), scarlet oak (*Q. cocinea*), and blackjack oak (*Q. marilandica*). Other trees at low cover include white oak (*Q. alba*), black oak *(Q. velutina*), sassafras *(Sassafras albidum*), American chestnut (*Castanea dentata*), gray birch (*Betula populifolia*), red maple (*Acer rubrum*), pitch pine (*Pinus rigida*), and black gum (*Nyssa sylvatica*). There is a sparse heath and grass ground cover growing in very dry, deep, exposed sand overlying a clay subsoil.

The shrub layer includes sapling canopy trees along with blueberries (*Vaccinium corymbosum, V. pallidum*), and black huckleberry (*Gaylussacia baccata*). Characteristic vines are carrion flower (*Smilax herbacea*) and greenbrier (*S. glauca*).

The herb layer has low percent cover of old field toadflax (*Linaria canadensis*), bracken fern (*Pterdium aquilinum*), bastard toadflax (*Commandra umbellata*), switch grass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), gray goldenrod (*Solidago nemoralis*), and wild indigo (*Baptisia tinctoria*).

This community is may be adapted to periodic fires; the fire frequency has not been documented.

Distribution: currently only known from the Manhattan Hills ecozone.

Rank: G2G3 S1 *Revised:* 2001

Examples: Clay Pit Ponds, Richmond County.

Source: NYNHP field surveys.

8. Pitch pine-heath barrens: a shrub-savanna community that occurs on well-drained, sandy or rocky soils. This is a broadly defined community with several regional variants.

The most abundant tree is pitch pine (*Pinus rigida*); in some stands there is an admixture of one or more species including big tooth aspen (*Populus grandidentata*), white pine (*Pinus strobus*), or jack pine (*P. banksiana*). The percent cover of trees is variable, ranging from 30 to 60%.

The shrublayer is dominated by heath shrubs such as black huckleberry (*Gaylussacia baccata*), blueberries (*Vaccinium angustifolium, V. pallidum,* and *V. myrtilloides*), and sheep-laurel (*Kalmia angustifolia*), as well as sweet-fern (*Comptonia peregrina*). This shrublayer may be quite diverse.

Characteristic groundlayer species include wintergreen (*Gaultheria procumbens*), wild sarsaparilla (*Aralia nudicaulis*), Canada mayflower (*Maianthemum canadense*), cow-wheat (*Melampyrum lineare*), wild strawberry (*Fragaria virginiana*), moccasin flower (*Cypripedium acaule*), Pennsylvania sedge (*Carex pensylvanica*), and bracken fern (*Pteridium aquilinum*). Characteristic birds include ovenbird (*Seiurus aurocapillus*), veery (*Catharus fuscescens*), common yellowthroat (*Geothlypis trichas*), chestnut-sided warbler (*Dendroica pensylvanica*), and wood thrush (*Hylocichla mustelina*).

This community is distinguished from pitch pine-scrub oak barrens by the dominance in the shrublayer of heath shrubs rather than scrub oaks (*Quercus ilicifolia* and *Q. prinoides*). Scrub oaks may be present, but they are never abundant or dominant in the shrublayer of pitch pine-heath barrens.

Distribution: known from sandplains in northern and north-central New York, from the Great Lakes Plain ecozone, Western Adirondack Foothills subzone, and the Champlain Valley subzone.

Rank: G4 S1S2 *Revised:* 1990

Examples: Clintonville Pine Barrens, Clinton County; Rome Sand Plains, Oneida County.

Source: NYNHP field surveys.

9. Boreal heath barrens: a dwarf shrubland or shrub-savanna dominated by heath or heath-like shrubs. Boreal heath barrens occur on nearly level outwash plains of the Adirondacks, in frost pockets lying in valleys. Soils are sandy, dry, and poor in nutrients. Boreal heath barrens are seasonally flooded because the soils have a discontinuous subsurface layer of podzolized soil (an ortstein), which impedes water drainage.

The dominant shrubs are blueberries (*Vaccinium myrtilloides, V. angustifolium, V. vacillans*), black chokeberry (*Aronia melanocarpa*), meadow-sweet (*Spiraea latifolia*), and mountain fly honeysuckle (*Lonicera villosa*).

Other characteristic plants include spreading ricegrass (*Oryzopsis asperifolia*), small ricegrass (*Oryzopsis pungens*), swamp dewberry (*Rubus hispidus*), Canada goldenrod (*Solidago canadensis*), flat-top goldenrod (*Euthamia graminifolia*), northern tree clubmoss (*Lycopodium dendroideum*), running-pine (*Lycopodium digitatum*), lichens (*Cladonia alpestris, C. pyxidata, Cladina rangiferina*), and mosses (*Pleurozium schreberi, Polytrichum commune,* and *Dicranum* spp.).

Trees may be scattered through the barrens, or they may be confined to the edges of open shrublands. Characteristic trees are black spruce (*Picea mariana*), white pine (*Pinus strobus*), black cherry (*Prunus serotina*), and tamarack (*Larix laricina*). More data are needed on characteristic animals of this community.

Distribution: only known from the Adirondacks ecozone.

Rank: G3G4 S1 *Revised:* 1990

Example: Oswegatchie Plains, St. Lawrence County; Chase Lake Sandplain, Lewis County.

Sources: Bray 1915; Bray 1921; Curran 1974.

10. Sandstone pavement barrens: an open canopy woodland that occurs on very shallow soils over sandstone bedrock; this community is best developed where the bedrock is nearly level, thus forming a pavement.

In New York the dominant tree is jack pine (*Pinus banksiana*), although white pine (*P. strobus*) or red pine (*P. resinosa*) are reported as locally dominant in some sites in southern Quebec. Other characteristic trees include red maple (*Acer rubrum*), paper birch (*Betula papyrifera*), red oak (*Quercus rubra*), and scarlet oak (*Q. coccinea*).

The shrublayer is dominated by heath shrubs including blueberry (*Vaccinium angustifolium*), black huckleberry (*Gaylussacia baccata*), black chokeberry (*Aronia melanocarpa*), and sweet-fern (*Comptonia peregrina*).

The groundcover includes many lichens and mosses, which may form a continuous cover in some areas. Characteristic lichens include *Cladina* spp., *Cladonia* spp., *Stereocaulon* sp., and *Xanthoparmelia* sp.; characteristic mosses include *Polytrichum* spp. and *Pleurozium schreberi*. Herbs are scattered through this mossy carpet; common herbs include bracken fern (*Pteridium aquilinum*), wintergreen (*Gaultheria procumbens*), poverty-grass (*Danthonia spicata*), and

common hairgrass (*Deschampsia flexuosa*). More data on characteristic animals are needed.

This community is only known from the northernmost counties of New York, north of the Adirondacks and from southern Quebec; its distribution outside of this range is unknown, however similar communities may occur in Ontario, Maine, Minnesota, and Iowa.

Distribution: only known from the Champlain Transition and Champlain Valley sub-zones of the Lake Champlain ecozone.

Rank: G2? S1 *Revised:* 2001

Examples: Altona Flat Rock, Clinton County; Gadway Road Flat Rock, Clinton County.

Source: NYNHP field surveys.

11. Oak openings: a grass-savanna community that occurs on well-drained soils. In New York, these savannas originally occurred as openings within extensive oak-hickory forests. They were restricted to excessively well-drained sites such as on knobs or hilltops with shallow soil over dolomite outcrops, sandy to gravelly soils of kames and eskers, or gravelly glacial deltas and terraces. The best remnants occur on dolomite knobs.

Characteristic trees in New York occurrences are chinquapin oak (*Quercus muhlenbergii*), white oak (*Q. alba*), and black oak (*Q. velutina*); these oaks typically occur as open-grown trees with broadly spreading canopies.

The oaks are sparsely distributed amidst a grassy groundlayer dominated by Indian grass (*Sorghastrum nutans*), little bluestem (*Schizachyrium scoparium*), and big bluestem (*Andropogon gerardii*). Characteristic forbs in the grassy groundlayer include thimbleweed (*Anemone cylindracea*), butterfly-weed (*Asclepias tuberosa*), tick-trefoils (*Desmodium glabellum, D. paniculatum*), wild bergamot (*Monarda fistulosa*), everlasting (*Antennaria* sp.), heath aster (*Aster ericoides*), early goldenrod (*Solidago juncea*), and black-eyed-Susan (*Rudbeckia hirta*). Shrubs are scattered through the grassy area, and they may be locally dominant under the shade of larger trees.

Characteristic shrubs include gray dogwood (*Cornus foemina* ssp. *racemosa*), which typically grows in small clones, and northern dewberry (*Rubus flagellaris*). More data on characteristic animals are needed.

Distribution: only known from the Erie-Ontario Plain subzone of the Great Lakes Plain ecozone.

Rank: G2 S1 *Revised:* 1990

Example: Rush Oak Openings, Monroe County.

Sources: Shanks 1966; NYNHP field surveys.

Note: Calcareous pavement barrens has been split into the following component communiy types: alvar shrubland, alvar grassland, alvar pavement-grassland, and alvar woodland.

12. Alpine krummholz: a dwarf woodland dominated by balsam fir (*Abies balsamea*) that occurs at or near the summits of the high peaks of the Adirondacks at elevations of 3500 to 4900 ft (1067 to 1494 m).

Approximately 85% of the canopy consists of balsam fir; common associates include mountain paper birch (*Betula cordifolia*) and black spruce (*Picea mariana*). Less common are red spruce (*Picea rubens*), old-field juniper (*Juniperus communis*), tamarack (*Larix laricina*), and northern white cedar (*Thuja occidentalis*). The trees form dense stands of stunted trees; at the uppermost elevations below timberline the trees are under 5 ft (1.5 m) tall, with branches extending to the ground (i.e., there is no self-pruning of lower branches), and an average dbh of 3 in (7.6 cm).

The groundlayer is densely shaded; the groundcover consists of a thick carpet of mosses, with scattered lichens and herbs.

The dominant bryophytes are *Sphagnum nemoreum, Pleurozium schreberi, Dicranum scoparium, Polytrichum juniperinum, P. strictum, Ptilidium ciliare,* and *Paraleucobryum longifolium*. *Cladina rangiferina* and *Cetraria islandica* are the most common lichens.

Characteristic herbs include bunchberry (*Cornus canadensis*), large-leaf goldenrod (*Solidago macrophylla*), common wood-sorrel (*Oxalis acetosella*), goldthread (*Coptis trifolia*), and Canada mayflower (*Maianthemum canadense*).

Characteristic birds include blackpoll warbler (*Dendroica striata*), white-throated sparrow (*Zonotrichia albicollis*), dark-eyed junco (*Junco hyemalis*), yellow-rumped warbler (*Dendroica coronata*), and gray-cheeked thrush (*Catharus minimus*).

Distribution: restricted to the Adirondack High Peaks.

Rank: G3G4 S2 *Revised:* 1990

Examples: MacIntyre Range (includes Algonquin Peak, Wright Peak, Boundary Peak, and Iroquois Peak) Essex County; Haystack Mountains, Essex County; Mount

Marcy, Essex County; Whiteface Mountain, Essex County.

Source: Slack Bell 1993, 1995; Sperduto and Cogbill 1999; NYNHP field surveys.

13. Limestone woodland: a woodland that occurs on shallow soils over limestone bedrock in non-alvar settings, and usually includes numerous rock outcrops. The tree canopy may be open or closed. There are usually several codominant trees, although one species may become dominant in any one stand.

Characteristic canopy trees in some stands are primarily conifers such as northern white cedar (*Thuja occidentalis*), white pine (*Pinus strobus*), white spruce (*Picea glauca*), and balsam fir (*Abies balsamea*). In other stands the characteristic canopy trees are primarily hardwoods such as eastern hop hornbeam (*Ostrya virginiana*), sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), white oak (*Quercus alba*), bur oak (*Q. macrocarpa*), red oak (*Q. rubra*), and basswood (*Tilia americana*). There are also stands that include mixtures of these conifers and hardwoods. More data are needed on these variations in canopy composition and related changes in understory composition.

The shrublayer is variable, becoming more dense where the canopy is open and soils are deeper. Characteristic shrubs include gray dogwood (*Cornus foemina* ssp. *racemosa*), wild honeysuckle (*Lonicera dioica*), alder-leaf buckthorn (*Rhamnus alnifolia*), prickly gooseberry (*Ribes cynos-bati*), raspberries (*Rubus idaeus, R. occidentalis*), bladdernut (*Staphylea trifolia*), juneberry (*Amelanchier* spp.), and poison ivy (*Toxicodendron radicans*).

The groundlayer may be quite diverse, with many grasses, sedges, and forbs. Characteristic herbs include sedges (*Carex eburnea, C. pensylvanica, C. platyphylla*), marginal wood fern (*Dryopteris marginalis*), rattlesnake fern (*Botrychium virginianum*), bracken fern (*Pteridium aquilinum*), barren strawberry (*Waldsteinia fragarioides*), big-leaf aster (*Aster macrophyllus*), wild strawberry (*Fragaria virginiana*), black snakeroot (*Sanicula marilandica*), herb-robert (*Geranium robertianum*), Canada mayflower (*Maianthemum canadense*), false Solomon's-seal (*Smilacina racemosa*), early meadow-rue (*Thalictrum dioicum*), white trillium (*Trillium grandiflorum*), and blue-stem goldenrod (*Solidago caesia*). Shaded rock surfaces and crevices often support ferns such as rock polypody (*Polypodium virginianum*) and maidenhair spleenwort (*Asplenium trichomanes*). More data on regional variants and characteristic animals are needed.

Distribution: scattered throughout upstate New York north of the Coastal Lowlands ecozone, at sites where the bedrock is limestone.

Rank: G3G4 S2S3 *Revised:* 1990

Examples: Skene Mountain, Washington County; Valcour Island, Clinton County, Split Rock Mountain, Clinton County; Rush Oak Opening, Monroe County.

Sources: Reschke and Gilman 1988; NYNHP field surveys.

14. Alvar woodland: a subset of the limestone woodland community restricted to the alvar region in Jefferson County, New York. The woodland tree canopy consists of a variable mixture of eastern red cedar (*Juniperus virginiana*), northern white cedar (*Thuja occidentalis*), bur oak (*Quercus macrocarpa*), white ash (*Fraxinus americana*), paper birch (*Betula papyrifera*), white pine (*Pinus strobus*), shagbark hickory (*Carya ovata*), eastern hop hornbeam (*Ostrya virginiana*), white spruce (*Picea glauca*), balsam fir (*Abies balasamea*), basswood (*Tilia americana*), American elm (*Ulmus americana*), rock elm (*U. thomasii*), and pin-cherry (*Prunus pensylvanica*). Jack pine (*Pinus banksiana*) is characteristic of alvar woodlands outside of New York.

The understory is a mosaic of shrubby patches, exposed pavement, and grassy patches. The most abundant shrub is common juniper (*Juniperus horizonatalis*), buffaloberry (*Shepherdia canadensis*), and bearberry (*Arctostaphylos uva-ursi*).

Characteristic herbs include false pennyroyal (*Trichostema brachiatum*), Craw's sedge (*Carex crawei*), balsam ragwort (*Senecio pauperculus*),ebony sedge (*Carex eburnea*), Richardson's sedge (*C. richardsonii*), and sheathed rush grass (*Sporobolus vaginiflorus*).

Areas of exposed limestone or dolostone pavement are common, usually with a cover of mosses such as twisted moss *Tortella* spp.) and grimmia (*Schistidium* spp.), lichens such as reindeer 'moss' (*Cladina rangiferina*) and dog lichen (*Peltigera canina*), and rock surface algae (*Gloeocapsa alpina*). This community is related to alvar shrubland and may represent a later successional stage of that community. This woodland often forms a mosaic with other alvar communities and may include patches of alvar shrubland, alvar grassland, and alvar pavement-grassland.

A more detailed description this community and an explanation of its global distribution can be found in Conserving Great Lake Alvars (Reschke et al. 1999) where it is called "mixed conifer/comon juniper alvar

woodland." Another type in that classification that may occur in New York is the "red cedar/early buttercup alvar woodland." More data on alvar woodland communities are needed in New York.

Distribution: only known from a few outcrops of Chaumont limestone in Jefferson County, in the Eastern Ontario Plain ecozone.

Rank: G2? S2 *Revised:* 2001

Example: Chaumont Barrens, Jefferson County; Three Mile Creek Road Barrens, Jefferson County; Lucky Star Alvar, Jefferson County.

Sources: Gilman 1998; Reschke et al. 1999; NYNHP field surveys.

15. Ice cave talus community: a community that occurs on rocks and soil at the base of talus slopes that emit cold air. The emission of cold air results from air circulation among the rocks of the talus slope where winter ice remains through the summer. The air is cooled by the ice deep in the talus, and settles; gravity eventually forces the air out along the face of rocks at the base of the slope (Core, 1968).

The vegetation is distinctive because it includes species characteristic of climates much cooler than the climate of the area where the ice caves occur. For example, at the ice caves of the Shawangunks in southeastern New York, there are northern species such as black spruce (*Picea mariana*), hemlock (*Tsuga canadensis*), mountain ash (*Sorbus americana*), and creeping snowberry (*Gaultheria hispidula*); the surrounding communities are mostly pine barrens and oak forests.

Some rare bryophytes have been collected from these talus slopes, including *Mylia taylori* from the Shawangunks and *Anastrophyllum saxicola* and *Mnium hymenophylloides* from Wilmington Notch in the Adirondacks. A characteristic animal is the rock vole (*Microtus chrotorrhinus*).

In the midwest, similar cold air producing talus slopes have been called "algific talus slopes", and they are the habitat of a rare species of snail. In New York these communities need to be surveyed; special attention should be paid to their invertebrate fauna.

Distribution: not well known, reported from the Adirondacks ecozone and the Shawangunk Hills subzone of the Hudson Valley ecozone.

Rank: G3? S1S2 *Revised:* 1990

Examples: Shingle Gully, Ulster County; Moss Lake Mountain, Herkimer County; Indian Pass, Essex County; Sam's Point, Ulster County.

Sources: Core 1968; comments by Norton Miller (of the New York State Museum Biological Survey); NYNHP field surveys.

16. Calcareous talus slope woodland: An open or closed canopy community that occurs on talus slopes composed of calcareous bedrock such as limestone or dolomite. The soils are usually moist and loamy; there may be numerous rock outcrops.

Characteristic trees include sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), eastern hop hornbeam (*Ostrya virginiana*), eastern red cedar (*Juniperus virginiana*), northern white cedar (*Thuja occidentalis*), basswood (*Tilia americana*), slippery elm (*Ulmus rubra*) and butternut (*Juglans cinerea*).

Shrubs may be abundant if the canopy is open; characteristic shrubs include round-leaf dogwood (*Cornus rugosa*), downy arrowwood (*Viburnum rafinesquianum*), prickly ash (*Zanthoxylum americanum*), and bladdernut (*Staphylea trifolia*). Common vines include bittersweet (*Celastrus scandens*), Virginia creeper (*Parthenocissus quinquefolia*), and climbing fumitory (*Adlumia fungosa*).

Herbaceous vegetation may be quite diverse; characteristic species include bulblet fern (*Cystopteris bulbifera*), lady fern (*Athyrium filix-femina var. asplenioides*), oak fern (*Gymnocarpium dryopteris*), bottlebrush grass (*Elymus hystrix*), herb-robert (*Geranium robertianum*), Solomon's-seal (*Polygonatum pubescens*), wild ginger (*Asarum canadense*), white baneberry (*Actaea pachypoda*), early meadow-rue (*Thalictrum dioicum*), bloodroot (*Sanguinaria canadensis*), blue-stem goldenrod (*Solidago caesia*), blue cohosh (*Caulophyllum thalictroides*), lyre-leaved rock cress (*Arabis lyrata*), white wood aster (*Aster divaricatus*) and ricegrass (*Oryzopsis racemosa*). Rock outcrops may have ferns such as walking fern (*Asplenium rhizophyllum*) and maidenhair spleenwort (*Asplenium trichomanes*). Bryophytes on wet forested talus can include *Hylocomium splendens.*

Physiognomic variants range from northern white cedar-dominated to hardwood-dominated forest to non-vegetated talus.

Distribution: throughout upstate New York north of the Coastal Lowlands ecozone, at sites where the bedrock is calcareous.

Rank: G3G4 S3 *Revised:* 2001

Example: Warner Hill, Washington County; The Diameter, Washington County; Deer Leap, Warren County; Clarence Escarpment, Erie County.

Sources: McVaugh 1958; Zenkert 1934; NYNHP field surveys.

17. Acidic talus slope woodland: An open to closed canopy woodland that occurs on talus slopes composed of non-calcareous bedrock such as granite, quartzite, or schist.

Characteristic trees include chestnut oak (*Quercus montana*), red oak (*Q. rubra*), white oak (*Q. alba*), white pine (*Pinus strobus*), red pine (*P. resinosa*), paper birch (*Betula papyrifera*), black birch (*B. lenta*), and mountain paper birch (*B. cordifolia*); striped maple (*Acer pensylvanicum*) and mountain maple (*A. spicatum*) are common subcanopy trees.

Characteristic groundlayer species include many ferns: rock polypody (*Polypodium virginianum*), Christmas fern (*Polystichum acrostichoides*), marginal wood fern *(Dryopteris marginalis*), and rusty woodsia (*Woodsia ilvensis*). Other common herbs include wild sarsaparilla (*Aralia nudicaulis*). Crustose lichens are abundant on the talus.

Rare snakes of some acidic talus slope woodlands include include copperhead (*Agkistrodon contortrix*) and timber rattlesnake (*Crotalus horridus*).

Regional variants are known. Species characteristic of the Hudson River Valley may include witch hazel (*Hamamelis virginiana*), mountain laurel (*Kalmia latifolia*), scrub oak (*Quercus ilicifolia*), black huckleberry (*Gaylussacia baccata*), blueberry (*Vaccinium pallidum*), and Pennsylvania sedge (*Carex pensylvanica*).

Distribution: scattered throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G4? S3S4 *Revised:* 2001

Examples: Black Rock Forest, Orange County; The Trapps, Ulster County; Catamount Mountain, Warren County;Chapel Pond Valley, Essex County; West Point Bull Hill, Orange County.

Sources: McVaugh 1958; NYNHP field surveys.

18. Shale talus slope woodland: an open to closed canopy woodland that occurs on talus slopes composed of shale. These slopes are rather unstable, and they are usually very well-drained, so the soils are shallow and dry. The canopy cover is usually less than 50%, due to the instability of the substrate.

Characteristic trees include chestnut oak (*Quercus montana*), pignut hickory (*Carya glabra*), red oak (*Quercus rubra*), white oak (*Q. alba*), white pine (*Pinus strobus*), white ash (*Fraxinus americana*), and eastern red cedar (*Juniperus virginiana*).

Characteristic shrubs and herbs include smooth sumac (*Rhus glabra*), scrub oak (*Quercus prinoides*), poison ivy (*Toxicodendron radicans*), penstemon (*Penstemon hirsutus*), everlasting (*Antennaria plantaginifolia*), and Pennsylvania sedge (*Carex pensylvanica*). More data on this community are needed.

Distribution: scattered throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G3G4 S3 *Revised:* 1990

Example: Chemung Shale Slope, Chemung County; Poyic Mountain, Greene County.

Sources: McVaugh 1958; NYNHP field surveys.

Summit communities: Summit communities typically occur on ridgetops and upper slopes, but can also occur midslope. They are typically variable in physiognomy with much clustering of woody and herbaceous vegetation and occurrences should be evaluated over broad areas. Included associations are often numerous: woodland, dwarf woodland, tall shrubland, dwarf heathland, herbaceous patches, rock outcrops. Trees are often stunted/dwarfed, or contorted. Extreme fluctuations in the dominant species within an occurrence over time is possible. Ecological processes that influence the distribution of these associations and determines dominant species include fire regime, wind events, and ice damage.

19. Pitch pine-oak-heath rocky summit: a community that occurs on warm, dry, rocky ridgetops and summits where the bedrock is non-calcareous (such as quartzite, sandstone, or schist), and the soils are more or less acidic. The vegetation may be sparse or patchy, with numerous rock outcrops. This community is broadly defined and includes examples that may lack pines and are dominated by scrub oak and/or heath shrubs apparently related to fire regime. This community is often surrounded by chestnut oak forest.

Characteristic species include pitch pine (*Pinus rigida*), chestnut oak (*Quercus montana*), red oak (*Q. rubra*), and scarlet oak (*Q. coccinea*). Other trees may include black cherry (*Prunus serotina*), red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), gray birch (*Betula populifolia*), choke-cherry (*Prunus virginiana*),

serviceberry (*Amelanchier arborea*), and white pine (*Pinus strobus*).

Characteristic shrubs include scrub oak (*Q. ilicifolia*), common juniper (*Juniperus communis*), blueberry (*Vaccinium angustifolium*, *V. pallidum*), sweet-fern (*Comptonia peregrina*), and black huckleberry (*Gaylussacia baccata*). Other shrubs include highbush blueberry (*Vaccinium corymbosum*), sheep laurel (*Kalmia angustifolia*), mountain laurel (*Kalmia latifolia*), chokeberry (*Aronia* spp), and deerberry (*Vaccinium stamineum*).

Characteristic herbs include Pennsylvania sedge (*Carex pensylvanica*), poverty-grass (*Danthonia spicata*), common hairgrass (*Deschampsia flexuosa*), three-toothed cinquefoil (*Potentilla tridentata*), and cow-wheat (*Melampyrum lineare*). Other herbs include bracken fern (Pteridium aquilinum), wintergreen (*Gaultheria procumbens*), little bluestem (*Schizachyrium scoparium*), and pink corydalis (*Corydalis sempervirens*)

Characteristic lichens include various crustose, foliose, and fruticose lichens, such as *Cetraria arenaria* and *Cladonia* spp. Characteristic mosses include hair cap moss (*Polytrichum* spp.) and pincushion moss (*Leucobryum glaucum*).

Examples dominated by white pine (*Pinus strobus*) or other oaks (e.g., *Quercus rubra* and *Q. montana*) are tentatively included here until further evaluation warrants the recognition of new community types.

Distribution: common in the Hudson Valley ecozone, also occurs in the Appalachian Plateau ecozone, and along the St. Lawrence River in the St. Lawrence Plains subzone.

Rank: G4 S3S4 *Revised:* 2001

Examples: Shawangunk Mountains, Ulster County; Schunnemunk Mountain, Orange County; Bellvale Mountain, Orange County; Crane and Huckleberry Mountains, Warren County.

Sources: McVaugh 1958; Olsvig 1980; NYNHP field surveys.

20. Red pine rocky summit: a community that occurs on cool, dry, rocky ridgetops and summits where the bedrock is non-calcareous (such as anorthosite, quartzite, or sandstone), and the soils are more or less acidic. Red pine (*Pinus resinosa*) is typically dominant, but may also be codominant with red oak, (*Quercus rubra*) and/or white pine (*Pinus strobus*).

Characteristic shrubs include blueberry (*Vaccinium angustifolium*) and bearberry (*Arctostaphylos uva-ursi*).

Characteristic herbs include trailing arbutus (*Epigaea repens*), wintergreen (*Gaultheria procumbens*), tufted hairgrass (*Deschampsia flexuosa*), poverty-grass (*Danthonia spicata*), and Pennsylvania sedge (*Carex pensylvanica*).

Rock outcrops dominated by various crustose, foliose, and fruticose lichens. More data on this community are needed.

Distribution: primarily in the Adirondack Mountains and possibly in the Catskill mountains.

Rank: G S *Revised:* 2001

Examples: Crane and Huckleberry Mountains, Warren County; White Face Mountain, Essex County; Peaked Hill, Essex County.

Sources: NYNHP field surveys.

21. Spruce-fir rocky summit: a community that occurs on cool, dry, rocky ridgetops and summits where the bedrock is non-calcareous (such as anorthosite, quartzite, or sandstone), and the soils are more or less acidic. The vegetation may be sparse or patchy, with numerous rock outcrops and rock slides. The species have predominantly boreal distributions.

Characteristic trees include red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), mountain ash (*Sorbus americana*), and mountain paper birch (*Betula cordifolia*). Eastern hemlock (*Tsuga canadensis*) may be an associate in examples in the Catskill Mountains. The shrub layer includes sapling canopy trees along with blueberry (*Vaccinium angustifolium*, *V. myrtilloides*).

Characteristic herbs include harebell (*Campanula rotundifolia*), three-toothed cinquefoil (*Potentilla tridentata*), mountain goldenrod (*Solidago spathulata* ssp. *randii*), large-leaf goldenrod (*S. macrophylla*), common hairgrass (*Deschampsia flexuosa*), bunchberry (*Cornus canadensis*), whorled aster (*Aster acuminatus*), and small ricegrass (*Oryzopsis pungens*). There are usually many mosses and crustose lichens growing on rock outcrops. More data on this community are needed.

Distribution: primarily in the Adirondack and Catskill mountains.

Rank: G4 S3S4 *Revised:* 2001

Example: East Dix Mountain, Essex County; Pitchoff Mountain, Essex County; Giant Mountain, Essex County.

Source: NYNHP field surveys.

22. Red cedar rocky summit: a community that occurs on warm, dry, rocky ridgetops and summits where the bedrock is calcareous (such as limestone or dolomite, but also marble, amphibolite, and calcsilicate rock), and the soils are more or less calcareous. The vegetation may be sparse or patchy, with numerous lichen covered rock outcrops. This community is often surrounded by Appalachian oak-hickory forest.

Characteristic trees include eastern red cedar (*Juniperus virginiana*), red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), white ash (*Fraxinus americana*), eastern hop hornbeam (*Ostrya virginiana*), and serviceberry (*Amelanchier* spp.). In many examples many dead or dying red cedars may be evident which is often associated with severe heat stress characteristic of this community.

Characteristic shrubs include sapling canopy trees along with common juniper (*Juniperus communis*), downy arrow-wood (*Viburnum rafinesquianum*), prickly ash (*Zanthoxylum americanum*), fragrant sumac (*Rhus aromatica*), and snowberry (*Symphoricarpos albus*). Other shrubs with low percent cover include blueberry (*Vaccinium pallidum, V. angustifolium*) and scrub oak (*Quercus ilicifolia*).

The herb layer can be quite diverse. Characteristic herbs include little bluestem (*Schizachyrium scoparium*), sedge (*Carex eburnea*), tufted hairgrass (*Deschampsia flexuosa*), buttercups (*Ranunculus fasciculatus, R. micranthus*) maidenhair spleenwort (*Asplenium trichomanes*), upland white aster (*Solidago ptarmicoides*), rockcress (*Arabis missouriensis, A. lyrata*), knotweed (*Polygonum douglasii*), bluets (*Houstonia caerulea*), and dittany (*Cunila origanoides*).

Other herbs include Pennsylvania sedge (*Carex pensylvanica*), rock cap fern (*Polypodium virginianum*), marginal wood fern (*Dryopteris marginalis*), and everlasting (*Antennaria plantaginifolia*). Larger grass dominated areas (e.g., > 0.5 acres) with little or no woody vegetation may be better classified as rocky summit grassland.

Nonvascular species include lichens such as *Cladonia furcata* and *C stellaris,* and mosses such as hair cap moss (*Polytrichum* spp.), *Hypnum cupressiforme, Anomodon attenuatus,* and *Hedwegia ciliatia.*

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone, where bedrock is calcareous; more common in the southern part of this range.

Rank: G3G4 S3 *Revised:* 2001

Example: Neversink Glade, Orange County; Split Rock Mountain, Essex County; Tongue Mountain, Warren County; Black Rock Forest, Orange County; Nellie Hill, Dutchess County.

Source: NYNHP field surveys.

23. Northern white cedar rocky summit: a community that occurs on cool, dry, rocky ridgetops and summits where the bedrock is calcareous (such as limestone or dolomite), and the soils are more or less calcareous. The vegetation may be sparse or patchy, with numerous rock outcrops. The species have predominantly boreal distributions. This community is often surrounded by other calcareous communities, such as limestone woodland, calcareous talus slope woodland, and calcareous cliff community.

Characteristic species include northern white cedar (*Thuja occidentalis*), American basswood (Tilia americana), and eastern hop hornbeam (*Ostrya virginiana*). Other trees at low percent cover include sugar maple (Acer saccharum), American beech (Fagus grandifolia), and red pine (*Pinus resinosa*).

Characteristic herbs include upland white aster (*Solidago ptarmicoides*), sedge (*Carex eburnea*), red columbine (*Aquilegia canadensis*), bulblet fern (*Cystopteris bulbifera*), and oatgrass (*Trisetum triflorum*). More data on this community are needed.

Distribution: in upstate New York north of the Hudson Highlands ecozone, where bedrock is calcareous; more common in the northern part of this range.

Rank: G3G4 S3 *Revised:* 1990

Examples: Valcour Island, Clinton County; Hudson River Gorge, Hamilton and Essex Counties; Little Nose, Montgomery County.

Source: NYNHP field surveys.

24. Successional red cedar woodland: a woodland community that commonly occurs on abandoned agricultural fields and pastures, usually at elevations less than 1000 ft (305 m).

The dominant tree is eastern red cedar (*Juniperus virginiana*), which may occur widely spaced in young stands and may be rather dense in more mature stands. Smaller numbers of gray birch (*Betula populifolia*), hawthorn (*Crataegus* spp.), buckthorn (*Rhamnus cathartica*), and other early successional hardwoods may be present. On slopes along the Finger Lakes, red cedar is commonly found mixed with white ash

(*Fraxinus americana*) and black walnut (*Juglans nigra*).

Shrubs and groundlayer vegetation are similar to a successional old field; in some stands the groundcover consists of a nearly pure stand of non-native bluegrasses such as *Poa compressa* and *P. pratensis*.

A characteristic bird is the prairie warbler (*Dendroica discolor*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

Examples: Champlain Valley Essex, Essex County; Crown Point, Essex County; Beaver Brook Valley, Essex County; NY State Thruway at Cauterskill, Greene County.

Source: NYNHP field surveys.

C. FORESTED UPLANDS

This subsystem includes upland communities with more than 60% canopy cover of trees; these communities occur on substrates with less than 50% rock outcrop or shallow soil over bedrock.

Maritime forests: areas generally in immediate proximity to marine communities. Heavily influenced by coastal processes including strong salt spray, high winds and dune deposition, shifting and overwash processes. Forests generally contain stunted "salt pruned" trees with contorted branches and wilted leaves plus usually have a dense vine layer. Communities often occur as narrow bands under 50 meters wide. Greller (1977) has referred to maritime forests as "strand forest."

1. Maritime post oak forest: an oak-dominated forest that borders salt marshes or occurs on exposed bluffs and sand spits within about 200 meters of the seacoast. The trees may be somewhat stunted and flat-topped because the canopies are pruned by salt spray and exposed to winds.

The forest is usually dominated by two or more species of oaks. Characteristic canopy trees include post oak (*Quercus stellata*), black oak (*Q. velutina*), scarlet oak (*Q. coccinea*) and white oak (*Q. alba*). A small number of eastern red cedar (*Juniperis virginiana*) may be present.

The understory usually contains a dense shrub thicket dominated by bayberry (*Myrica pensylvanica*) and black huckleberry (*Gaylussacia baccata*), with saplings of black cherry (*Prunus serotina*) as a common associate. In most stands the understory is a dense thicket of catbrier (*Smilax rotundifolia*). The presence of catbrier is not well understood. They are likely to be favored from natural disturbances of exposure to salt spray and windthrow. However, other less natural disturbances such as insect infestations, heavy browsing by deer, clear-cutting and fires may produce similar effect. Other vines are common including poison ivy (*Toxicodendron radicans*), summer grape (*Vitis aestivalis*), and Virginia creeper (*Parthenocissus quinquefolia*). The sparse groundlayer under this shrub and vine thicket is dominated by common hairgrass (*Deschampsia flexuosa*).

Characteristic animals include eastern towhee (*Pipilo erythrophthalamus*) and white-tailed deer (*Odocoileus virginianus*).

Three topoedaphic variants of this community are known. The typical post oak-catbrier forest variant, experiencing the most extreme degree of salt spray, is most widespread. A post oak-basswood variant on windswept sands forming dunes on top of morainal bluffs is known along Long Island Sound (Lamont 1997). A post oak-blackjack oak variant on reddish sandy clay loam ridges is known from Staten Island.

Distribution: apparently restricted to eastern Long Island and islands in Block Island Sound, in the Coastal Lowlands ecozone.

Rank: G3G4 S2S3 *Revised:* 2001

Examples: Mashomack Preserve, Suffolk County; Barcelona Neck, Suffolk County; Jessup's Neck, Suffolk County.

Sources: Greller 1977; Lamont 1997; Rosza and Metzler 1982; Taylor 1923; NYNHP field surveys.

2. Maritime beech forest: A hardwood forest with beech (*Fagus grandifolia*) dominant that usually occurs on north-facing exposed bluffs and the back portions of rolling dunes in well-drained fine sands. Black oak (*Quercus velutina*) and red maple (*Acer rubrum*) may be present at low density. Occurrences are often associated with coastal oak-beech forest. Wind and salt spray cause the trees to be stunted (average height 4 m to 15 m) and multiple-stemmed with contorted branches, especially on the exposed bluffs. Trees are notably taller on the more protected dunes. Shrub, vine, and herb layers are not well developed. A characteristic vine is greenbrier (*Smilax rotundifolia*).

Characteristic herbs are wild sarsaparilla (*Aralia nudicaulis*), and beech drops (*Epifagus virginiana*). The non-vascular layer may or may not be well developed.

Distribution: Currently known only from the town of Riverhead, Suffolk County. Historically, may have occurred along the north-facing coastal bluffs of Long Island, in the Coastal Lowland Ecozone of Suffolk County.

Rank: G2 S1 *Revised:* 2001

Examples: Friars Head Forest, Suffolk County, Roanoke Point, Suffolk County.

Sources: Good and Good 1970; Greller 1977; Grossman et al. 1994; Lamont 1998; NYNHP field surveys.

3. Maritime holly forest: a broadleaf evergreen maritime strand forest that occurs in low areas on the back portions of maritime dunes. The dunes protect these areas from overwash and salt spray enough to allow forest formation. In New York State this forest is best developed and probably restricted to the barrier islands off the south shore of Long Island. The trees are usually stunted and flat-topped because the canopies are pruned by salt spray and exposed to winds; the canopy of a mature stand may be only 16 to 23 ft (5 to 7 m) tall.

The dominant tree is holly (*Ilex opaca*). Other characteristic trees at lower abundance include sassafras (*Sassafras albidum*), shadbush (*Amelanchier canadensis*), postoak (*Quercus stellata*) and black oak (*Quercus velutina*). Vines such as Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), greenbrier (*Smilax rotundifolia*), sawbrier (*S. glauca*), and grape (*Vitis* spp.) are common in the understory, and they often grow up into the canopy. Shrubs such as highbush blueberry (*Vaccinium corymbosum*), bayberry (*Myrica pensylvanica*) and black huckleberry (*Gaylussacia baccata*) are common in the understory, especially at the margins of the forest.

Characteristic groundlayer herbs include wild sarsaparilla (*Aralia nudicaulis*), starflower (*Smilacina stellata*), and Canada mayflower (*Maianthemum canadense*). There may be small, damp depressions that are somewhat boggy; species found in these depressions include black gum (*Nyssa sylvatica*), shadbush, highbush blueberry, and chokeberry (*Aronia melanocarpa*). More data on characteristic animals are needed.

Distribution: Restricted to southern fringe of Coastal Lowlands Ecozone, concentrated on maritime dunes of barrier islands. Known and suspected examples limited to Fire Island. Very unlikely to be found elsewhere.

Rank: G1G2 S1 *Revised:* 2001

Examples: Sunken Forest, Suffolk County.

Sources: Art 1976; Greller 1977; Sneddon et al. 1998; NYNHP field surveys.

4. Maritime red cedar forest: a conifer forest that occurs on dry sites near the ocean. Eastern red cedar (*Juniperus virginiana*) is the dominant tree, often forming nearly pure stands. Red cedar is usually present all tree and shrub layers. Other characteristic trees include post oak (*Quercus stellata*) and black cherry (*Prunus serotina*).

Characteristic shrubs and vines include bayberry (*Myrica pensylvanica*), groundsel-tree (*Baccharis halimifolia*), poison ivy (*Toxicodendron radicans*), and Virginia creeper (*Parthenocissus quinquefolia*).

Characteristic herbs include eastern prickly pear (*Opuntia humifusa*), common hairgrass (*Deschampsia flexuosa*), little bluestem (*Schizachyrium scoparium*), switch grass (*Panicum virgatum*), and seaside goldenrod (*Solidago sempervirens*). More data on this community are needed.

Distribution: only known from the Coastal Lowlands ecozone.

Rank: G3G4 S1 *Revised:* 1990

Example: Orient Point, Suffolk County.

Sources: Conard 1935; Greller 1977; Latham 1935; Robichaud and Buell 1983; NYNHP field surveys.

Coastal forests: intended to mean non-maritime areas within the Coastal Plain. Areas on the Coastal Plain generally not in immediate proximity to marine communities. At most lightly influenced by coastal processes including minor salt spray associated with severe storms (e.g., hurricanes), and lacking dune deposition, shifting and overwash processes. Forests generally contain trees of normal stature with uncontorted branches and unwilted leaves plus usually have at most a sparse vine layer.

5. Coastal oak-heath forest: a large patch to matrix low diversity hardwood forest that typically occurs on dry, well-drained, sandy soils of glacial outwash plains or moraines of the Atlantic Coastal Plain.

The forest is usually codominated by two or more species of oaks: scarlet oak (*Quercus coccinea*), white oak (*Q. alba*) and black oak (*Q. velutina*). Chestnut oak

(*Quercus montana*) is also a common associate. Pitch pine (*Pinus rigida*) and trees of other genera, if present, typically occur at less than 1% cover each in the canopy. American chestnut (*Castanea dentata*) may have been a common associate in these forests prior to the chestnut blight; chestnut sprouts are still found in some stands. The shrublayer is well-developed typically with a low nearly continuous cover of dwarf heaths such as blueberries (*Vaccinium pallidum, V. angustifolium*) and black huckleberry (*Gaylussacia baccata*).

The herbaceous layer is very sparse; characteristic species are bracken fern (*Pteridium aquilinum*), wintergreen (Gaultheria procumbens), and Pennsylvania sedge (*Carex pensylvanica*). Herb diversity is greatest in natural and artificial openings with species such as frostweed (*Helianthemum canadense*), false-foxlglove (*Aureolaria* spp.), bearberry (*Arctostaphylos uva-ursi*), goat's-rue (*Tephrosia virginiana*), bush-clovers (*Lespedeza* spp.), and pinweeds (*Lechea* spp.).

Characteristic animals include eastern towhee (*Pipilo erythrophthalamus*) and white-tailed deer (*Odocoileus virginianus*). This community can occur with several types of barrens and woodland communities as part of the broadly defined ecosystem known as the Pine Barrens.

Distribution: Restricted to the interior portions of Coastal Lowlands Ecozone, concentrated on outwash plains and possibly knolls and mid to upper slopes of moraines. Known examples range from Hither Hills and Montauk Mountain west probably to the morainal hills of northwestern Suffolk County. Numerous examples occur in the central portion of this range (the periphery of the Long Island Pine Barrens) south of the Ronkonkoma Moraine (Greller 1977). Occurrences are more sparse in the eastern and western portions of the range. The community range possibly extends westward into eastern Nassau County on the end moraine of western Long Island and has been reported from a narrow strip of outwash on the north shore of Long Island.

Rank: G4 S3 *Revised:* 2001

Examples: Long Pond Greenbelt, Hither Woods, Suffolk County.

Sources: Brodo 1968; Greller 1977; Sneddon et al. 1998; NYNHP field surveys.

6. Coastal oak-hickory forest: a hardwood forest with oaks (*Quercus* spp.) and hickories(*Carya* spp.) codominant that occurs in dry well-drained, loamy sand of knolls, upper slopes, or south-facing slopes of glacial moraines of the Atlantic Coastal Plain. The forest is usually codominated by two or more species of oaks, usually white oak (*Q. alba*), black oak (*Quercus velutina*) and chestnut oak (*Q. montana*). Scarlet oak (*Quercus coccinea*) is also a common associate. Mixed with the oaks, usually at moderate densities, are one or more of the following hickories: pignut (*Carya glabra*), mockernut (*C. tomentosa*), and sweet pignut (*C. ovalis*). These hickories can range from nearly pure stands to as little as about 25% cover. There is typically a subcanopy stratum of small trees and tall shrubs including flowering dogwood (*Cornus florida*) and highbush blueberry (*Vaccinium corymbosum*). The shrublayer and groundlayer flora may be diverse. Common low shrubs include maple-leaf viburnum (*Viburnum acerifolium*), blueberries (*Vaccinium angustifolium, V. pallidum*) and huckleberry (*Gaylussacia baccata*).

Characteristic groundlayer herbs are Swan's sedge (*Carex swanii*), panic grass (Panicum dichotomum), poverty grass (*Danthonia spicata*), cow-wheat (*Melampyrum lineare*), spotted wintergreen (*Chimaphila maculata*), rattlesnake weed (*Hieracium venosum*), white wood aster (*Aster divaricatus*), false Solomon's seal (*Smilacina racemosa*), Pennsylvania sedge (*Carex pensylvanica*), and white goldenrod (*Solidago bicolor*).

Characteristic animals include eastern towhee (*Pipilo erythrophthalamus*), vireos (*Vireo* spp.), woodpeckers, and white-tailed deer (*Odocoileus virginianus*). Two or more topoedaphic variants are possible.

Distribution: Restricted to the interior portions of Coastal Lowlands Ecozone, concentrated on knolls and mid to upper slopes of the moraines. Known examples range from Mashomack west to the morainal hills of northwestern Suffolk County. Numerous examples occur in the western portion of this range while occurrences are sparse in the eastern portion. The community range possibly extends westward into northeastern Nassau County and on the end moraine of western Long Island (Greller 1977).

Rank: G4 S3 *Revised:* 2001

Examples: Mashomack, Wildwood State Park, Caleb Smith State Park, Suffolk County.

Sources: Greller 1977; Rosza and Metzer 1982; Sneddon et al. 1998, NYNHP field surveys.

7. Coastal oak-beech forest: a hardwood forest with oaks (*Quercus* spp.) and beech (*Fagus grandifolia*)

codominant that occurs in dry well-drained, loamy sand of morainal coves of the Atlantic Coastal Plain. Some occurrences are associated with maritime beech forest. Beech can range from nearly pure stands to as little as about 25% cover. The forest is usually codominated by two or more species of oaks usually black oak (*Quercus velutina*) and white oak (*Q. alba*). Scarlet oak (*Quercus coccinea*) and chestnut oak (*Q. montana*) are common associates. Red oak (*Quercus rubra*) may be present at low density and is a key indicator species along with sugar maple (*Acer saccharum*) and paper birch (*Betula papyrifera*).

There are relatively few shrubs and herbs. Characteristic groundlayer species are Swan's sedge (*Carex swanii*), Canada mayflower (*Maianthemum canadense*), white wood aster (*Aster divaricatus*), beech-drops (*Epifagus virginiana*), and false Solomon's seal (*Smilacina racemosa*). Typically there is also an abundance of tree seedlings, especially of beech; beech and oak saplings are often the most abundant 'shrubs' and small trees.

Characteristic fauna include white-tailed deer (*Odocoileus virginianus*).

Distribution: restricted to interior portions of Coastal Lowlands Ecozone, concentrated on north-facing slopes on the moraines. Known examples range from Montauk Point (Brodo 1968) west to the Big Woods along the south shore of Long Island and from Route 48 Southold to Camp Baiting Hollow along the north shore of Long Island. Numerous examples occur in the Riverhead portion of the north shore. The community is also reported from necks of Long Island Sound (Greller 1977). It may occur in small patches farther west on Long Island to western Suffolk, Nassau and eastern Queens Counties (cf. Greller 1977). The community was also apparently reported from New York City by Harper (1917) (cf Brodo 1968).

Rank: G4 S3 *Revised:* 2001

Examples: Mashomack, Friars Head, Wildwood State Park, Suffolk County.

Sources: Brodo 1968; Greller 1977; Rosza and Metzler 1982; Sneddon et al. 1998; Taylor 1923; NYNHP field surveys.

8. Coastal oak-laurel forest: a large patch low diversity hardwood forest with broadleaf canopy and evergreen subcanopy that typically occurs on dry well-drained, sandy and gravelly soils of morainal hills of the Atlantic Coastal Plain. This forest is similar to the chestnut oak forest of the Appalachian Mountains; it is distinguished by lower abundance of chestnut oak (*Quercus montana*) and absence of red oak (*Quercus rubra*), probably correlated with the difference between the sand and gravel of glacial moraines versus the bedrock of mountains.

The dominant tree is typically scarlet oak (*Quercus coccinea*). Common associates are white oak (*Q. alba*), black oak (*Q. velutina*), and chestnut oak.

The shrub layer is well-developed typically with a tall, often nearly continuous cover of the evergreen heath, mountain laurel (*Kalmia latifolia*). Other characteristic shrubs include black huckleberry (*Gaylussacia baccata*) and blueberry (*Vaccinium pallidum*).

The herbaceous layer is very sparse; characteristic species are bracken fern (*Pteridium aquilinum*), wintergreen (*Gaultheria procumbens*), and Pennsylvania sedge (*Carex pensylvanica*).

Characteristic animals include white-tailed deer (*Odocoileus virginianus*). This forest is often associated with coastal oak-heath forest forming a forest complex on morainal hills.

Distribution: Restricted to interior portions of Coastal Lowlands Ecozone, concentrated on knolls and mid to upper slopes of moraines. Known examples range from Hither Hills west possibly to the morainal hill of northwestern Suffolk County. Several examples occur along the eastern half of the Ronkonkoma Moraine. The community range possibly extends westward into eastern Nassau County on the end moraine of western Long Island.

Rank: G3G4 S3 *Revised:* 2001

Examples: Hither Woods, Suffolk County.

Sources: Greller 1977; Sneddon et al. 1998; Thompson 1997; NYNHP field surveys.

9. Coastal oak-holly forest: a semi-deciduous to mixed deciduous-evergreen broadleaf forest that occurs on somewhat moist and moderately well drained silt and sandy loams in low areas on morainal plateaus. The elevation afforded by the raised plateau protects these areas from overwash and salt spray. In New York State this forest is best developed on the narrow peninsulas of eastern Long Island. The trees are usually not stunted, and are far enough removed from the pruning effects of severe salt spray. The canopy of a mature stand is usually up to about 65 ft (20 m) tall.

The dominant canopy trees are black oak (*Quercus velutina*), black gum (*Nyssa sylvatica*), red maple (*Acer rubrum*) and beech (*Fagus grandifolia*). Holly (*Ilex opaca*) is abundant in the subcanopy and tall shrub layers. Other characteristic trees at lower density

include sassafras (*Sassafras albidum*), shadbush (*Amelanchier canadensis*), and white oak (*Quercus alba*).

Shrubs such as highbush blueberry (*Vaccinium corymbosum*), witch hazel (*Hamamelis virginiana*), mountain laurel (*Kalmia latifolia*) and arrowwood (*Viburnum recognitum*) are common in the understory. Vines such as Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), and greenbrier (*Smilax rotundifolia*), sawbrier (*S. glauca*), and grape (*Vitis* spp.) are at very low abundance in the understory, and usually do not grow up into the canopy.

Characteristic groundlayer herbs include New York fern (*Thelypteris noveboracensis*), star flower (*Trientalis borealis*) and Swan's sedge (*Carex swanii*). There may be small, damp depressions that are somewhat boggy; species found in these depressions include black gum (*Nyssa sylvatica*), shadbush, highbush blueberry, and chokeberry (*Aronia melanocarpa*).

Characteristic fauna include white-tailed deer (*Odocoileus virginianus*) and red-eyed vireo (*Vireo olivaceus*).

Distribution: Restricted to eastern extreme of Coastal Lowlands Ecozone, concentrated on Montauk Peninsula, a morainal plateau. Known and suspected examples limited to this peninsula. Very unlikely to be found elsewhere.

Rank: G2 S1 *Revised:* 2001

Examples: Montauk Point, Suffolk County.

Sources: Greller 1977; Sneddon et al. 1998; Taylor 1923; NYNHP field surveys.

10. Pitch pine-oak forest: a mixed forest that typically occurs on well-drained, sandy soils of glacial outwash plains or moraines; it also occurs on thin, rocky soils of ridgetops.

The dominant trees are pitch pine (*Pinus rigida*) mixed with one or more of the following oaks: scarlet oak (*Quercus coccinea*), white oak (*Q. alba*), red oak (*Q. rubra*), or black oak (*Q. velutina*). The relative proportions of pines and oaks are quite variable within this community type. At one extreme are stands in which the pines are widely spaced amidst the oaks, in which case the pines are often emergent above the canopy of oak trees. At the other extreme are stands in which the pines form a nearly pure stand with only a few widely spaced oak trees.

The shrublayer is well-developed with scattered clumps of scrub oak (*Quercus ilicifolia*) and a nearly continuous cover of low heath shrubs such as blueberries (*Vaccinium pallidum, V. angustifolium*) and black huckleberry (*Gaylussacia baccata*).

The herbaceous layer is relatively sparse; characteristic species are bracken fern (*Pteridium aquilinum*), wintergreen (*Gaultheria procumbens*), and Pennsylvania sedge (*Carex pensylvanica*).

Characteristic birds include rufous-sided towhee (*Pipilo erythrophthalmus*), common yellowthroat (*Geothlypis trichas*), field sparrow (*Spizella pusilla*), prairie warbler (*Dendroica discolor*), pine warbler (*Dendroica pinus*), blue jay (*Cyanocitta cristata*), and whip-poor-will (*Caprimulgus vociferus*).

At least two potential regional variants are known or suspected. The typical coastal variant on Long Island and the inland variant of upstate New York. More data on these regional variants are needed. This community combined with several types of barrens and woodland communities make up the broadly defined ecosystem known as the Pine Barrens.

Distribution: known from the Coastal Lowlands and Hudson Valley ecozones.

Rank: G4G5 S4 *Revised:* 2001

Example: Long Island Pine Barrens, Suffolk County.

Sources: Bernard and Seischab 1995; Greller 1977; Kerlinger and Doremus 1981; Olsvig 1979; Reiners 1967; Seischab and Bernard 1996; NYNHP field surveys.

11. Appalachian oak-hickory forest: a hardwood forest that occurs on well-drained sites, usually on ridgetops, upper slopes, or south- and west-facing slopes. The soils are usually loams or sandy loams. This is a broadly defined forest community with several regional and edaphic variants.

The dominant trees include one or more of the following oaks: red oak (*Quercus rubra*), white oak (*Q. alba*), and black oak (*Q. velutina*). Mixed with the oaks, usually at lower densities, are one or more of the following hickories: pignut (*Carya glabra*), shagbark (*C. ovata*), and sweet pignut (*C. ovalis*). Common associates are white ash (*Fraxinus americana*), red maple (*Acer rubrum*), and Eastern hop hornbeam (*Ostrya virginiana*).

There is typically a subcanopy stratum of small trees and tall shrubs including flowering dogwood (*Cornus florida*), witch hazel (*Hamamelis virginiana*), shadbush (*Amelanchier arborea*), and choke cherry (*Prunus virginiana*). Common low shrubs include maple-leaf viburnum (*Viburnum acerifolium*), blueberries (*Vaccinium angustifolium, V. pallidum*),

red raspberry (*Rubus idaeus*), gray dogwood (*Cornus foemina* ssp. *racemosa*), and beaked hazelnut (*Corylus cornuta*). The shrublayer and groundlayer flora may be diverse.

Characteristic groundlayer herbs are wild sarsaparilla (*Aralia nudicaulis*), false Solomon's seal (*Smilacina racemosa*), Pennsylvania sedge (*Carex pensylvanica*), tick-trefoil (*Desmodium glutinosum, D. paniculatum*), black cohosh (*Cimicifuga racemosa*), rattlesnake root (*Prenanthes alba*), white goldenrod (*Solidago bicolor*), and hepatica (*Hepatica americana*).

Characteristic animals include red-bellied woodpecker (*Melanerpes carolinus*), whip-poor-will (*Caprimulgus vociferus*), and wild turkey (*Meleagris gallopavo*).

Distribution: throughout upstate New York north of the Coastal Lowlands ecozone; most common south of the Adirondacks ecozone.

Rank: G4G5 S4 *Revised:* 1990

Examples: Bristol Hills, Ontario County; Finger Lakes National Forest, Schuyler County; Storm King Mountain, Orange County; Long Eddy, Delaware County.

Sources: McIntosh 1972; Ross 1958; NYNHP field surveys.

12. Allegheny oak forest: a hardwood forest that occurs on well-drained sites in the unglaciated portion of southwestern New York. This is a narrowly defined community distinguished by a more diverse canopy and a richer ground flora than other mid to high elevation oak communities in the state. These mixed oak forests are characteristic of the rounded ridgetops and upper south-facing slopes of the unglaciated Allegheny Plateau. In New York, they occur from 1345 to 2313 feet above sea level and grade into rich mesophytic forests that occur directly below them on west-facing, east-facing slopes and sometimes north-facing aspects.

Codominant trees are white oak (*Q. alba*), red oak (*Q. rubra*), chestnut oak (*Q. montana*), black oak (*Q. velutina*) and red maple (*Acer rubrum*). American chestnut (*Castanea dentata*) was a significant canopy codominant prior to the chestnut blight; chestnut sprouts are still very common in the understory. Other common canopy trees are pignut hickory (*Carya glabra*), black birch (*Betula lenta*), black cherry (*Prunus serotina*), and big-tooth aspen (*Populus grandidentata*).

The shrub-layer is a mixed heath with blueberries (*Vaccinium angustifolium, V. pallidum*), black huckleberry (*Gaylussacia baccata*), maple-leaved viburnum (*Viburnum acerifolium*), and occasionally pinkster (*Rhododendron periclymenoides)* and mountain laurel (*Kalmia latifolia*).

Common groundlayer herbs are bracken fern (*Pteridium aquilinum*), Pennsylvania sedge (*Carex pensylvanica*), wintergreen (*Gaultheria procumbens*), wild sarsaparilla (*Aralia nudicaulis*), starflower (*Trientalis borealis*), barren strawberry (*Waldsteinia fragarioides*), flowering wintergreen (*Polygala paucifolia*), rough-leaved rice-grass (*Oryzopsis asperifolia)* and rattlesnake weed (*Hieracium venosum*). The rare, southern *Clintonia umbellulata* is restricted to Allegheny oak forest and rich mesophytic forest communities in New York State.

Allegheny oak forest can be distinguished from rich mesophytic forest by the presence of chestnut oak or the codominance of typically three to four oak species, and by the heath-dominated low shrub layer. It is distinguished from chestnut oak forest by codominance of four to five oak species, in contract to dominance of chestnut oak or codominance of chestnut oak and red maple typical of chestnut oak forests.

Distribution: only known from the Allegany Hills subzone of the Appalachian Plateau ecozone.

Rank: G3G4 S2 *Revised:* 1990

Example: Allegany State Park, Cattaraugus County; Robinson Run Hill, Cattaraugus County.

Sources: Eaton and Schrot 1987; Gordon 1940; NYNHP field surveys.

13. Chestnut oak forest: a hardwood forest that occurs on well-drained sites in glaciated portions of the Appalachians, and on the coastal plain. This forest is similar to the Allegheny oak forest; it is distinguished by fewer canopy dominants and a less diverse shrublayer and groundlayer flora.

Dominant trees are typically chestnut oak (*Quercus montana*) and red oak (*Q. rubra*). Common associates are white oak (*Q. alba*), black oak (*Q. velutina*), and red maple (*Acer rubrum*). American chestnut (*Castanea dentata*) was a common associate in these forests prior to the chestnut blight; chestnut sprouts are still found in some stands.

The shrublayer is predominantly ericaceous; characteristic shrubs are black huckleberry (*Gaylussacia baccata*), mountain laurel (*Kalmia latifolia*), and blueberry (*Vaccinium pallidum*). Common groundlayer plants are Pennsylvania sedge (*Carex pensylvanica*), wild sarsaparilla (*Aralia*

nudicaulis), wintergreen (*Gaultheria procumbens*), and cushions of the moss *Leucobryum glaucum*.

At least three edaphic variants with different understory dominants are known: 1) a tall shrub-dominated understory with 60-90% mountain laurel, 2) a short shrub-dominated understory with dense dwarf heaths, such as black huckleberry, and 3) a herb-dominated understory with Pennsylvania sedge.

Distribution: most common on mid-elevation slopes of the Hudson Highlands ecozone, also occurs in the Manhattan Hills and Coastal Lowlands ecozones, and in the southeastern portion of the Appalachian Plateau ecozone.

Rank: G3G4 S4 *Revised:* 2001

Example: Hudson Highlands, Orange and Rockland Counties; Northern Shawangunk Mountains, Ulster County.

Sources: Cain 1936; Conard 1935; Eyre 1980; Greller 1977; McIntosh 1972; McVaugh 1958; Ross 1958; NYNHP field surveys.

14. Oak-tulip tree forest: a mesophytic hardwood forest that occurs on moist, well-drained sites in southeastern New York. The dominant trees include a mixture of five or more of the following: red oak (*Quercus rubra*), tulip tree (*Liriodendron tulipifera*), beech (*Fagus grandifolia*), black birch (*Betula lenta*), red maple (*Acer rubrum*), scarlet oak (*Quercus coccinea*), black oak (*Q. velutina*), and white oak (*Q. alba*).

There is typically a subcanopy stratum of small trees and tall shrubs dominated by flowering dogwood (*Cornus florida*); common associates include witch-hazel (*Hamamelis virginiana*), sassafras (*Sassafras albidum*), red maple, and black cherry (*Prunus serotina*). Common low shrubs include maple-leaf viburnum (*Viburnum acerifolium*), northern blackberry (*Rubus allegheniensis*), and blueberries (*Vaccinium angustifolium, V. pallidum*). The shrublayer and groundlayer flora may be diverse.

Characteristic groundlayer herbs are white wood aster (*Aster divaricatus*), New York fern (*Thelypteris noveboracensis*), Virginia creeper (*Parthenocissus quinquefolia*), jack-in-the-pulpit (*Arisaema triphyllum*), wild geranium (*Geranium maculatum*), Solomon's-seal (*Polygonatum biflorum*), and false Solomon's-seal (*Smilacina racemosa*).

Distribution: most common on the northern half of Long Island in the Coastal Lowlands ecozone, probably also occurs in the Manhattan Hills, Hudson Highlands, and Triassic Lowlands ecozones.

Rank: G4 S2S3 *Revised:* 1990

Examples: Black Rock Forest, Orange County; Breakneck-Scofield-Fishkill Ridge, Dutchess and Putnam Counties; Staten Island Greenbelt, Richmond County.

Source: Greller 1977; Rosza and Metzler 1982; NYNHP field surveys.

15. Appalachian oak-pine forest: a mixed forest that occurs on sandy soils, sandy ravines in pine barrens, or on slopes with rocky soils that are well-drained.

The canopy is dominated by a mixture of oaks and pines. The oaks include one or more of the following: black oak (*Quercus velutina*), chestnut oak (*Q. montana*), red oak (*Q. rubra*), white oak (*Q. alba*), and scarlet oak (*Q. coccinea*). The pines are either white pine (*Pinus strobus*) or pitch pine (*P. rigida*); in some stands both pines are present. Red maple (*Acer rubrum*), hemlock (*Tsuga canadensis*), beech (*Fagus grandifolia*), and black cherry (*Prunus serotina*) are common associates occurring at low densities.

The shrublayer is predominantly ericaceous, usually with blueberries (*Vaccinium angustifolium, V. pallidum*) and black huckleberry (*Gaylussacia baccata*). The groundlayer is relatively sparse, and species diversity is low.

Although Appalachian oak-pine forest currently includes white pine forests of the Coastal Lowlands, the latter may be distinctive enough to be designated as "coastal white pine-oak forest." Appalachian oak-pine forest would be distinguished from a “coastal white pine-oak forest” by the presence of bedrock and large rocks (instead of sand and gravel), and by the presence and dominance of red oak instead of dominance by scarlet oak (*Quercus coccinea*) with red oak lacking. More data on the coastal variant and characteristic animals are needed.

Distribution: occurs in the Appalachian Plateau, Hudson Valley, and Taconic Highlands ecozones.

Rank: G4G5 S4 *Revised:* 2001

Example: Tongue Mountain, Warren County; Steege Hill, Chemung County; Catskill Escarpment, Greene County; Rome Sand Plains, Oneida County.

Sources: McVaugh 1958; NYNHP field surveys.

16. Rich mesophytic forest: A hardwood or mixed forest that resembles the mixed mesophytic forests of the Allegheny Plateau south of New York but is less diverse. It occurs on rich, fine-textured, well-drained soils that are favorable for the dominance of a wide variety of tree species. A canopy with a relatively large number of codominant trees characterizes this forest.

Canopy codominants include five or more of the following species: red oak (*Quercus rubra*), red maple (*Acer rubrum*), white ash (*Fraxinus americana),* American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum),* black cherry (*Prunus serotina*), cucumber tree (*Magnolia acuminata*), and black birch (*Betula lenta).* American chestnut (*Castanea dentata*) was a characteristic tree before it was eliminated by chestnut blight. Less common in the canopy and subcanopy are tulip tree), (*Liriodendron tulipifera*), white oak (*Quercus alba),* white pine (*Pinus strobus*), basswood (*Tilia americana*), bitternut hickory (*Carya cordiformis*), Black oak (*Quercus velutina*), Eastern hop hornbeam (*Ostrya virginiana*), and striped maple (*Acer pensylvanicum*).

This forest has a well-developed shrublayer with a variety of characteristic species including musclewood (*Carpinus caroliniana*), arrow-wood (*Viburnum acerifolium*), witch hazel (*Hamamelis virginiana*), pinkster (*Rhododendron periclymenoides*), red-berried elderberry (*Sambucus pubens*), American fly-honeysuckle (*Lonicera canadensis*), round-leaved dogwood (*Cornus rugosa*), alternate-leaved dogwood (*C. alternifolia*), smooth service-berry (*Amelanchier laevis*), and blueberry (*Vaccinium pallidum*).

The groundlayer is fairly rich in species. Characteristic herbs are interrupted fern (*Osmunda claytoniana*), yellow mandarin (*Disporum lanuginosum*), white baneberry (*Actaea pachypoda*), jack-in-the-pulpit (*Arisaema triphyllum*), early meadow rue (*Thalictrum dioicum*), princess pine (*Lycopodium obscurum* var. *obscurum*), partridge berry (*Mitchella repens*), round-leaf violet (*Viola rotundifolia*), black cohosh (*Cimicifuga racemosa*), stoneroot (*Collinsonia canadensis*), black snakeroot (*Sanicula marilandica*), large-leaf aster (*Aster macrophyllus*), blue-stem goldenrod (*Solidago caesia*), and tall rattlesnake root (*Prenanthes trifoliolata*), and the grass *Brachyelytrum erectum*. The rare, southern *Clintonia umbellulata* is restricted to rich mesophytic forest and Allegheny oak forest communities in New York State.

In New York, rich mesophytic forests are best developed in the unglaciated portions of the Allegheny Plateau. In Cattaraugus County, this forest typically occurs at mid- to upper elevations between Allegheny oak forest on upper slopes and hemlock-northern hardwood forest on lower slopes and in ravines. The rich mesophytic forest can be distinguished from Allegheny oak forest by the lack of chestnut oak and lack of, or only very rarely present, black oak. The short shrub layer of Allegheny oak forest is typically dominated by heaths such as blueberry (*Vaccinium pallidum*), whereas the shrub layer of rich mesophytic forest is a mix of tree seedlings and saplings and tall shrub species such as red-berried elder (*Sambucus pubens*) and maple-leaved viburnum (*Viburnum acerifolium*). Rich mesophytic forest can be distinguished from maple-basswood rich mesic forest by the presence of rich herbs that include *Hydrophyllum canadense*, *Euonymus obovatus*, *Disporum lanuginosum* and *Cimicifuga racemosa*. It can be distinguished from beech-maple mesic forest by the predominance of rich herbs such as those listed above, and a soil pH range of about 4.5 to 5.0, in contrast to the generally more acidic soils of beech-maple mesic forest. Rich mesophytic forest soil typically contains more clay than other hardwood types, such as clay loam and silty clay loam.

Distribution: only known from the western part of the Appalachian Plateau ecozone, primarily in the Allegany Hills and Finger Lakes Highlands subzones.

Rank: G4 S2S3 *Revised:* 2001

Example: Allegany State Park, Cattaraugus County.

Sources: Braun 1950; Gordon 1940; Shanks 1966; NYNHP field surveys.

17. Beech-maple mesic forest: a hardwood forest with sugar maple (*Acer saccharum*) and beech (*Fagus grandifolia*) codominant. This is a broadly defined community type with several regional and edaphic variants. These forests occur on moist, well-drained, usually acid soils. Common associates are yellow birch (*Betula alleghaniensis*), white ash (*Fraxinus americana*), eastern hop hornbeam (*Ostrya virginiana*), and red maple (*Acer rubrum*). There are relatively few shrubs and herbs.

Characteristic small trees or tall shrubs are hobblebush (*Viburnum lantanoides*), American hornbeam (*Carpinus caroliniana*), striped maple (*Acer pensylvanicum*), witch hazel (*Hamamelis virginiana*), and alternate-leaved dogwood (*Cornus alternifolia*).

Dominant groundlayer species are star flower (*Trientalis borealis*), common wood-sorrel (*Oxalis montana*), Canada mayflower (*Maianthemum canadense*), painted trillium (*Trillium undulatum*), purple trillium (*T. erectum*), shining clubmoss (*Lycopodium lucidulum*) and intermediate wood fern (*Dryopteris intermedia*). Associated herbs include Christmas fern (*Polystichum acrostichoides*), jack-in-the-pulpit (*Arisaema triphyllum*) and false

Solomon's seal (*Smilacina racemosa*). There are many spring ephemerals which bloom before the canopy trees leaf out. Typically there is also an abundance of tree seedlings, especially of sugar maple; beech and sugar maple saplings are often the most abundant "shrubs" and small trees. Hemlock (*Tsuga canadensis*) may be present at a low density. In the Adirondacks a few red spruce (*Picea rubens*) may also be present.

Characteristic birds include American redstart (*Setophaga ruticilla*), red-eyed vireo (*Vireo olivaceus*), ovenbird (*Seiurus aurocapillus*), black-throated blue warbler (*Dendroica caerulescens*), least flycatcher (*Empidonax minimus*), Acadian flycatcher (*Empidonax virescens*), and red-bellied woodpecker (*Melanerpes carolinus*).

Within extensive areas of beech-maple mesic forest, there are often associated small patches of hemlock-northern hardwood forest in steep ravines and gullies where hemlock is locally dominant.

Distribution: throughout New York State.

Rank: G4 S4 *Revised:* 2001

Examples: Five Ponds Wilderness Area, Herkimer and Hamilton Counties; West Canada Lakes Wilderness Area, Herkimer and Hamilton Counties; Central Tug Hill Forest, Lewis and Oswego Counties; Slide Mountain, Sullivan and Ulster Counties.

Sources: Eyre 1980; Gordon 1940; Heimburger 1934; Holmes et al. 1986; Leopold et al. 1988; McIntosh 1972; Shanks 1966; NYNHP field surveys.

18. Maple-basswood rich mesic forest: a species rich hardwood forest that typically occurs on well-drained, moist soils of circumneutral pH. Rich herbs are predominant in the ground layer and are usually correlated with calcareous bedrock, although bedrock does not have to be exposed. Where bedrock outcrops are lacking, surficial features such as seeps are often present.

The dominant trees are sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and white ash (*Fraxinus americana*). Associate tree species can include ironwood (*Ostrya virginiana*), yellow birch (*Betula alleghaniensis*), red oak (*Quercus rubra*), American beech (*Fagus grandifolia*), bitternut hickory (*Carya cordiformis*), shagbark hickory (*Carya ovata*), tulip tree (*Liriodendron tulipifera*), butternut (*Juglans cinerea*), and American hornbeam (*Carpinus caroliniana*).

Characteristic tall shrubs are alternate-leaved dogwood (*Cornus alternifolia*), mountain maple (*Acer spicatum*), and witch hazel (*Hamamelis virginiana*); the shrub layer is typically patchy and can be quite sparse in herb rich areas.

Spring ephemerals are usually abundant in the groundlayer. Characteristic species are *wild leek (Allium tricoccum),* troutlily (*Erythronium americanum*), dutchman's breeches (*Dicentra cucullaria*), squirrel-corn (*Dicentra canadensis*), purple trillium (*Trillium erectum),* nodding trillium *(Trillium cernuum),* spring beauty (*Claytonia virginica),* maidenhair fern *(Adiantum pedatum),* bulbet fern (*Cystopteris bulbifera*), Goldie's fern (*Dryopteris goldiana*), lady fern (*Athyrium filix-femina*), silvery glade fern (*Athyrium thelypteroides*), glade fern (*Athyrium pyncnocarpon*), blue cohosh *(Caulophyllum thalicteroides*), Herb Robert (*Geranium robertianum*), wild ginger (*Asarum canadense*), early meadow-rue (*Thalictrum dioicum*), false Solomon's seal (*Maianthemum racemsoum*), white baneberry (*Actaea pachypoda*),), eastern waterleaf (*Hydrophyllum virginianum*), toothwort (*Dentaria diphylla*), bloodroot (*Sanguinaria canadensis*), foam flower (*Tiarella cordifolia*), and the sedges *Carex plantaginea, Carex platyphylla* and *Carex albursina*.

Maple-basswood rich mesic forest can be distinguished from beech-maple mesic forest by the predominance of rich herbs in the herbaceous layer and the high species diversity of this layer, which often supports a variety of fern species and a strong component of spring ephemerals.

Distribution: primarily known from the Great Lakes Plain ecozone.

Rank: G4 S3 *Revised:* 2001

Example: Allegany State Park, Cattaraugus County; Pitcarin Forest, St. Lawrence and Lewis Counties; Great Gully, Cayuga County.

Sources: Braun 1950; Eyre 1980; NYNHP field surveys.

19. Hemlock-northern hardwood forest: a mixed forest that typically occurs on middle to lower slopes of ravines, on cool, mid-elevation slopes, and on moist, well-drained sites at the margins of swamps.

In any one stand, hemlock (*Tsuga canadensis*) is codominant with any one to three of the following: beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), red maple (*A. rubrum*), black cherry (*Prunus serotina*), white pine (*Pinus strobus*), yellow birch (*Betula alleghaniensis*), black birch (*B. lenta*), red oak (*Quercus rubra*), and basswood (*Tilia americana*). The relative cover of hemlock is quite variable, ranging from nearly pure stands in some steep

ravines to as little as 20% of the canopy cover. Striped maple (*Acer pensylvanicum*) is often prominent as a mid-story tree.

The shrublayer may be sparse; characteristic shrubs are hobblebush (*Viburnum lantanoides*), maple-leaf viburnum (*Viburnum acerifolium*), and raspberries (*Rubus* spp.). In some ravines, especially in the southern part of the state, rosebay (*Rhododendron maximum*) forms a dense subcanopy or tall shrublayer. Canopy cover can be quite dense, resulting in low light intensities on the forest floor and hence a relatively sparse groundlayer.

Characteristic groundlayer plants are Indian cucumber-root (*Medeola virginiana*), Canada mayflower (*Maianthemum canadense*), shining clubmoss (*Lycopodium lucidulum*), common wood fern (*Dryopteris intermedia*), mountain wood fern (*Dryopteris campyloptera*), christmas fern (*Polystichum acrostichoides*), star flower (*Trientalis borealis*), bellwort (*Uvularia sessilifolia*), common wood-sorrel (*Oxalis acetosella*), partridge berry (*Mitchella repens*), foamflower (*Tiarella cordifolia*), round-leaf violet (*Viola rotundifolia*), twisted stalk (*Streptopus roseus*), purple trillium (*Trillium erectum*), and the moss *Leucobryum glaucum*. In forests that have beech as a codominant, beech-drops (*Epifagus virginiana*) is a common herb.

Characteristic birds include wild turkey (*Meleagris gallopavo*), pileated woodpecker (*Dryocopus pileatus*), golden-crowned kinglet (*Regulus satrapa*), black-throated green warbler (*Dendroica virens*), and Acadian flycatcher (*Empidonax virescens*).

This is a broadly defined and very widespread community, with many regional and edaphic variants. For example, in the Hudson Valley, hemlock is sometimes codominant with red oak; in the Adirondacks, yellow birch and sugar maple are sometimes codominant, with a relatively small number of hemlocks as well as a few red spruce (*Picea rubens*). More data on the shrublayer and groundlayer composition are needed before these regional variants can be distinguished as separate types.

Distribution: throughout New York State.

Rank: G4G5 S4 *Revised:* 1990

Examples: Ampersand Mountain, Franklin County; Five Ponds Wilderness Area, Herkimer and Hamilton Counties; Slide Mountain, Sullivan and Ulster Counties; Big Basin in Allegany State Park, Cattaraugus County;

Sources: Eyre 1980; Heimburger 1934; Leopold et al. 1988; McIntosh 1972; McVaugh 1958; Ross 1958; Shanks 1966; NYNHP field surveys.

20. Pine-northern hardwood forest: a mixed forest that occurs on gravelly outwash plains, delta sands, eskers, and dry lake sands in the Adirondacks. The dominant trees are white pine (*Pinus strobus*) and red pine (*P. resinosa*); these are mixed with scattered paper birch (*Betula papyrifera*) and quaking aspen (*Populus tremuloides*). In some stands there is an admixture of other northern hardwoods and conifers such as yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), balsam fir (*Abies balsamea*), and red spruce (*Picea rubens*); these are never common in a pine-northern hardwood forest.

Characteristic shrubs are blueberries (*Vaccinium angustifolium, V. myrtilloides*), sheep laurel (*Kalmia angustifolia*), wild raisin (*Viburnum cassinoides*), and shadbush (*Amelanchier canadensis*).

Characteristic herbs are bracken fern (*Pteridium aquilinum*), wintergreen (*Gaultheria procumbens*), trailing arbutus (*Epigaea repens*), cow-wheat (*Melampyrum lineare*), Canada mayflower (*Maianthemum canadense*), bunchberry (*Cornus canadensis*), star flower (*Trientalis borealis*), bluebeads (*Clintonia borealis*), painted trillium (*Trillium undulatum*), spreading ricegrass (*Oryzopsis asperifolia*), and Pennsylvania sedge (*Carex pensylvanica*). Mosses and lichens may be common to abundant, especially the mosses *Pleurozium schreberi*, *Brachythecium* spp., and *Dicranum polysetum*.

Characteristic animals include pine warbler (*Dendroica pinus*) in mature, well-spaced pines, pileated woodpecker (*Drycopus pileatus*). More data are needed on characteristic animals.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone, more common to the north.

Rank: G4 S4 *Revised:* 1990

Examples: Five Ponds Wilderness Area, Herkimer and Hamilton Counties; Black Brook Forest, Clinton and Essex Counties; Pine Orchard, Hamilton County.

Sources: Eyre 1980; Heimburger 1934; Roman 1980; NYNHP field surveys.

21. Spruce flats: a mixed forest that occurs on moist sites along the borders of swamps and in low flats along lakes and streams in the Adirondacks. Soils are strongly podzolized, loamy to sandy, and seasonally moist, but not saturated and not peaty.

Typically, the dominant trees are red spruce (*Picea rubens*) and red maple (*Acer rubrum*) mixed with smaller numbers of yellow birch (*Betula*

alleghaniensis), black cherry (*Prunus serotina*), and hemlock (*Tsuga canadensis*). Spruce and yellow birch, or sometimes these and hemlock, make up about 75% of the canopy cover. Smaller numbers of other northern hardwoods, such as beech (*Fagus grandifolia*) may also be present. The shrublayer is sparse or patchy.

Characteristic shrubs are sheep laurel (*Kalmia angustifolia*), and blueberries (*Vaccinium angustifolium, V. myrtilloides*).

Typically the groundcover consists of a luxuriant carpet of mosses and herbs, with an abundance of feather mosses. Some common bryophytes are *Pleurozium schreberi, Hylocomium splendens, Ptilium crista-castrensis, Dicranum* spp., and *Bazzania trilobata.*

Characteristic herbs are creeping snowberry (*Gaultheria hispidula*), goldthread (*Coptis trifolia*), dewdrop (*Dalibarda repens*), bunchberry (*Cornus canadensis*), and Canada mayflower (*Maianthemum canadense*).

A characteristic bird is golden-crowned kinglet (*Regulus satrapa*).

A more restricted variant codominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*) and with only low abundance of red spruce is known from dry to moist, well-drained sandy outwash plains of the Adirondacks. White spruce (*P. glauca*) and Labrador tea (*Ledum groenlandicum*) may be characteristic of this variant. This variant apparently develops in association with boreal heath barrens in areas which experience fire or cold air accumulation.

Distribution: primarily known from the Adirondacks ecozone.

Rank: G4? S3S4 *Revised:* 2001

Examples: Five Ponds Wilderness Area, Herkimer and Hamilton Counties; West Canada Lakes Wilderness Area, Herkimer and Hamilton Counties; Moose River Plains, Hamilton County.

Sources: Braun 1950; Eyre 1980; Heimburger 1934; NYNHP field surveys.

22. Balsam flats: a conifer forest that occurs on moist, well-drained soils of low flats adjoining swamps, gentle low ridges, and knolls within swamps.

The dominant tree is balsam fir (*Abies balsamea*), which occurs either in pure stands or in mixed stands with red spruce (*Picea rubens*) or black spruce (*P. mariana*), and possibly a few yellow birch (*Betula allegheniensis*), red maple (*Acer rubrum*), and black cherry (*Prunus serotina*).

The shrublayer is patchy and sparse; characteristic tall shrubs include hobblebush (*Viburnum lantanoides*), wild raisin (*V. cassinoides*), and mountain ash (*Sorbus americana*). The groundlayer is typically a dense carpet of feather mosses, especially *Hylocomium splendens*.

Characteristic herbs include wood sorrel (*Oxalis acetosella*), bunchberry (*Cornus canadensis*), creeping snowberry (*Gaultheria hispidula*), bluebeads (*Clintonia borealis*), wild sarsaparilla (*Aralia nudicaulis*), dewdrop (*Dalibarda repens*), spinulose wood fern (*Dryopteris carthusiana*), and lady fern (*Athyrium asplenioides*). More data on this community are needed.

Distribution: only known from the Adirondacks ecozone.

Rank: G4 S2S3 *Revised:* 1990

Examples: Blue Ridge Wilderness, Hamilton County; Deer Pond Marsh, Franklin County; Cold Brook Plains, Essex County.

Sources: Eyre 1980; Zon 1914; NYNHP field surveys.

23. Spruce-northern hardwood forest: a mixed forest that occurs on lower mountain slopes and upper margins of flats on glacial till, primarily in the Adirondack and Catskill mountains, and in the Tug Hill plateau. This is a broadly defined community with several regional and edaphic variants; it is one of the most common forest types in the Adirondacks.

Codominant trees are red spruce (*Picea rubens*), sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), and red maple (*Acer rubrum*), with scattered balsam fir (*Abies balsamea*). Striped maple (*Acer pensylvanicum*) and mountain maple (*A. spicatum*) are common subcanopy trees.

Characteristic shrubs are hobblebush (*Viburnum lantanoides*), American fly honeysuckle (*Lonicera canadensis*), and Canada yew (*Taxus canadensis*).

Characteristic groundlayer plants are common wood-sorrel (*Oxalis acetosella*), common wood fern (*Dryopteris intermedia*), shining clubmoss (*Lycopodium lucidulum*), wild sarsaparilla (*Aralia nudicaulis*), bluebeads (*Clintonia borealis*), goldthread (*Coptis trifolia*), bunchberry (*Cornus canadensis*), Canada mayflower (*Maianthemum canadense*), Indian cucumber-root (*Medeola virginiana*), and twisted stalk (*Streptopus roseus*).

Characteristic birds include yellow-bellied flycatcher (*Empidonax flaviventris*), white-throated sparrow (*Zonotrichia albicollis*), golden-crowned kinglet (*Regulus satrapa*), pileated woodpecker

(*Dryocopus pileatus*), and gray jay (*Perisoreus canadensis*).

Distribution: primarily known from the Adirondacks ecozone and the Tug Hill Plateau; small examples may also occur in the Catskill Peaks.

Rank: G3G4 S4 *Revised:* 1990

Examples: Five Ponds Wilderness Area, Herkimer and Hamilton Counties; Slide Mountain, Ulter County; Kildare Forest, St. Lawrence County.

Sources: Eyre 1980; Heimburger 1934; Irland, L.C. 1993; Leopold et al. 1988; Roman 1980; Zon 1914; NYNHP field surveys.

24. Mountain spruce-fir forest: a conifer forest that occurs at high elevations in the Catskill and Adirondack mountains, usually at elevations ranging from 3000 to 4000 ft (about 900 to 1200 m). This forest occurs on upper slopes that are somewhat protected from the prevailing westerly winds, usually at elevations above spruce-northern hardwood forests, and below mountain fir forests. Soils are strongly podzolized, and they tend to be highly organic.

The dominant trees are red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*). Common associates are mountain paper birch (*Betula cordifolia*) and yellow birch (*B. alleghaniensis*). Subcanopy trees that are usually present at a low density include mountain ash (*Sorbus americana*), mountain maple (*Acer spicatum*), pin cherry (*Prunus pensylvanica*) and striped maple (*Acer pensylvanicum*). The shrublayer may consist primarily of seedlings and saplings of canopy trees; other shrubs that are present in some stands include red elderberry (*Sambucus racemosa*), mountain holly (*Nemopanthus mucronatus*), American fly honeysuckle (*Lonicera canadensis*), and dwarf raspberry (*Rubus pubescens*). In the Catskills, hobblebush (*Viburnum lantanoides*) and mountain azalea (*Rhododendron prinophyllum*) are also common. Typically there is a dense layer of feather mosses and other bryophytes carpeting the forest floor; common bryophytes include *Pleurozium schreberi, Ptilium crista-castrensis, Bazzania trilobata, Brotherella recurvans, Dicranum scoparium, Hypnum pallescens, Hylocomium splendens,* and *Drepanocladus uncinatus.*

Characteristic herbs are common wood-sorrel (*Oxalis acetosella*), mountain wood fern (*Dryopteris campyloptera*), bluebeads (*Clintonia borealis*), Canada mayflower (*Maianthemum canadense*), bunchberry (*Cornus canadensis*), large-leaf goldenrod (*Solidago macrophylla*), mountain aster (*Aster acuminatus*), goldthread (*Coptis trifolia*), and shining clubmoss (*Lycopodium lucidulum*).

Characteristic birds include white-throated sparrow (*Zonotrichia albicollis*), winter wren (*Troglodytes troglodytes*), golden-crowned kinglet (*Regulus satrapa*), yellow-rumped warbler (*Dendroica coronata*), blackpoll warbler (*Dendroica striata*), Swainson's thrush (*Catharus ustulatus*), boreal chickadee (*Parus hudsonicus*), and yellow-bellied flycatcher (*Empidonax flaviventris*). A rare bird of some mountain spruce-fir forests is Bicknell's Thrush (*Catharus bicknelli*) (Rimmer et al. 2001).

A significant disturbance that is currently affecting mountain spruce-fir forests in the eastern U.S. is spruce decline, a phenomenon that retards the growth of red spruce and eventually kills many trees. The causes of spruce decline have not been substantiated, but atmospheric deposition of pollutants (acid rain) is likely a contributing factor.

Distribution: on high-elevation slopes of the Adirondack High Peaks and the Catskill Peaks.

Rank: G2G3 S2S3 *Revised:* 1990

Examples: Street Mountain, Essex County; Whiteface Mountain, Essex County; Phelps Brook, Essex County; Hunter Mountain, Greene County; Slide Mountain, Ulster County.

Sources: Eyre 1980; Holway and Scott 1969; Leopold et al. 1988; McIntosh and Hurley 1964; McLaughlin et al. 1987; Nicholson 1965; Rimmer et al. 2001; Sabo 1980; Slack 1977; NYNHP field surveys.

25. Mountain fir forest: a conifer forest that occurs at high elevations in the Catskill and Adirondack mountains, usually at elevations ranging from 3500 to 4500 ft (about 1100 to 1400 m). This forest typically occurs on cool upper slopes that are exposed to wind, at elevations above spruce-northern hardwood forests, usually above mountain spruce-fir forest, and below alpine krummholz. Soils are typically thin (less than 20 in or 50 cm), and they tend to be highly organic and strongly acidic. The vegetation typically has a low species diversity; the tree layer is almost entirely balsam fir (*Abies balsamea*), with a small amount of mountain paper birch (*Betula cordifolia*) and occasional individuals of red spruce (*Picea rubens*) and mountain ash (*Sorbus americana*).

The shrublayer is predominantly seedlings and saplings of balsam fir, with occasional individuals of green alder (*Alnus viridis* ssp. *crispa)* and Labrador tea (*Ledum groenlandicum*). Red raspberry (*Rubus idaeus*)

and skunk currant (*Ribes glandulosum*) occur in recently disturbed areas.

Characteristic herbs are common wood-sorrel (*Oxalis acetosella*), bluebeads (*Clintonia borealis*), Canada mayflower (*Maianthemum canadense*), mountain wood fern (*Dryopteris campyloptera*), bunchberry (*Cornus canadensis*), large-leaf goldenrod (*Solidago macrophylla*), mountain aster (*Aster acuminatus*), goldthread (*Coptis trifolia*), and bristly clubmoss (*Lycopodium annotinum*). The forest floor is typically carpeted with mosses, including *Pleurozium schreberi, Dicranum fuscescens, Drepanocladus uncinatus, Polytrichum ohioense, Dicranum scoparium,* and *Plagiothecium laetum.*

Characteristic birds include white-throated sparrow (*Zonotrichia albicollis*), winter wren (*Troglodytes troglodytes*), blackpoll warbler (*Dendroica striata*), yellow-rumped warbler (*Dendroica coronata*), gray-cheeked thrush (*Catharus minimus*), yellow-bellied flycatcher (*Empidonax flaviventris*), magnolia warbler (*Dendroica magnolia*), purple finch (*Carpodacus purpureus*), and Nashville warbler (*Vermivora ruficapilla*). A rare bird of some mountain fir forests is Bicknell's Thrush (*Catharus bicknelli*) (Rimmer et al. 2001).

In certain areas mountain fir forests exhibit a distinctive pattern of disturbance and regrowth that is called "wave- regeneration." From a distance the forest appears to be very patchy, with large areas of green canopy interspersed with roughly crescent-shaped bands of dead trees. The "waves" consist of "troughs" of dead and windthrown trees, grading downhill first into a zone of vigorous fir seedlings, then into a dense stand of fir saplings, and then to a "crest" of mature fir trees that border another band of standing dead and windthrown trees.

Distribution: on high-elevation slopes of the Adirondack High Peaks and Catskill Peaks.

Rank: G3G4 S2S3 *Revised:* 1990

Examples: High Peaks Wilderness Area, Essex County; Whiteface Mountain, Essex County; Slide Mountain, Ulster County; Blackhead Mountains, Greene County.

Sources: McIntosh and Hurley 1964; Nicholson 1965; Rimmer et al. 200; Slack 1977; Sprugel 1976; NYNHP field surveys..

Successional forests: includes forests that develop on sites that have been cleared (for farming, logging, etc.) or otherwise disturbed (by fire, ice scour, wind throw, flooding, etc.). Successional forests generally have the following characteristics: 1) dominated by light-requiring, wind-dispersed species that are well-adapted to establishment following disturbance, 2) lack of reproduction of the canopy species, 3) have tree seedlings and saplings that are more shade-tolerant than the canopy species, 4) shrublayer and groundlayer dominants may include many species characteristic of successional old fields, or they may include species that occurred on or near the site prior to disturbance, 5) have canopy trees with small diameter (generally less than 10 to 15 cm dbh), 6) have canopy trees of young age (generally less than about 25 to 50 years old), 7) have evidence of recent logging (e.g., presence of stumps and brush), and 8) have relatively low canopy height with poor tree diversity and poor development of multiple strata.

26. Successional northern hardwoods: a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed.

Characteristic trees and shrubs include any of the following: quaking aspen (*Populus tremuloides*), big-tooth aspen (*P. grandidentata*), balsam poplar (*P. balsamifera*), paper birch (*Betula papyrifera*), or gray birch (*B. populifolia*), pin cherry (*Prunus pensylvanica*), black cherry (*P. serotina*), red maple (*Acer rubrum*), white pine (*Pinus strobus*), with lesser amounts of white ash (*Fraxinus americana*), green ash (*F. pensylvanica*), and American elm (*Ulmus americana*). Northern indicators include aspens, birches, and pin cherry. This is a broadly defined community and several seral and regional variants are known.

Characteristic birds include chestnut-sided warbler (*Dendroica pensylvanica*), Nashville warbler (*Vermivora ruficapilla*) in young forests with aspen and birch seedlings, and yellow-bellied sapsucker (*Sphyrapicus varius*) in mature aspen forests.

Distribution: throughout upstate New York north of the Coastal Lowlands ecozone.

Rank: G5 S5 *Revised:* 2001

Example: Chase Lake Sandplain, Lewis County.

Source: Mellinger and McNaughton 1975; NYNHP field surveys..

27. Successional southern hardwoods: a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed.

Characteristic trees and shrubs include any of the following: American elm (*Ulmus americana*), slippery

elm (*U. rubra*), white ash (*Fraxinus americana*), red maple (*Acer rubrum*), box elder (*Acer negundo*), silver maple (*A. saccharinum*), sassafras (*Sassafras albidum*), gray birch (*Betula populifolia*), hawthorns (*Crataegus* spp.), eastern red cedar (*Juniperus virginiana*), and choke-cherry (*Prunus virginiana*). Certain introduced species are commonly found in successional forests, including black locust (*Robinia pseudo-acacia*), tree-of-heaven (*Ailanthus altissima*), and buckthorn (*Rhamnus cathartica*). Any of these may be dominant or codominant in a successional southern hardwood forest. Southern indicators include American elm, white ash, red maple, box elder, choke-cherry, and sassafras. This is a broadly defined community and several seral and regional variants are known.

A characteristic bird is chestnut-sided warbler (*Dendroica pensylvanica*).

Distribution: primarily in the southern half of New York, south of the Adirondacks.

Rank: G5 S5 *Revised:* 2001

Example: Chippewa Creek Plains, St. Lawrence County.

Sources: Eyre 1980; NYNHP field surveys.

28. Successional maritime forest: a successional hardwood forest that occurs in low areas near the seacoast. This forest is a variable type that develops after vegetation has burned or land cleared (such as pastureland or farm fields). The trees may be somewhat stunted and flat-topped because the canopies are pruned by salt spray. The forest may be dominated by a single species, or there may be two or three codominants.

Characteristic canopy trees include black oak (*Quercus velutina*), post oak (*Quercus stellata*), shadbush (*Amelanchier canadensis*), white oak (*Quercus alba*), black cherry (*Prunus serotina*), black gum (*Nyssa sylvatica*), sassafras (*Sassafras albidum*), and red maple (*Acer rubrum*). A small number of eastern red cedar (*Juniperus virginiana*) may be present.

Vines that are common in the understory and subcanopy include riverbank grape (*Vitis riparia*), poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and greenbrier (*Smilax* spp.).

Shrublayer and groundlayer dominants are variable. Bayberry (*Myrica pensylvanica*) is a common shrub. Certain introduced species are commonly found in this forest, including black locust (*Robinia pseudoacacia*), privet (*Ligustrum* spp.), Asiatic bittersweet (*Celastrus orbiculatus*), Japanese honey suckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), and wineberry (*Rubus phoenicolasius*). Any of these may be dominant or codominant in a successional maritime forest.

Characteristic animals include gray gatbird (*Dumetella carolinensis*), eastern towhee (*Pipilo erythrophthalamus*) and white-tailed deer (*Odocoileus virginianus*). This forest represents an earlier seral stage of other maritime forests, such as maritime post oak forest, maritime holly forest, maritime red cedar forest, and probably others. Soil and moisture regime will usually determine which forest type succeeds from this community. A few disturbance-climax examples occur, maintained by severe and constant salt spray.

Distribution: in the Coastal Lowlands ecozone, in low areas near the coast of Long Island.

Rank: G4 S3S4 *Revised:* 2001

Example: Montauk Point, Suffolk County; William Floyd Estate (Fire Island National Seashore), Suffolk County.

Sources: Clark 1986b; Greller 1977; NYNHP field surveys.

D. TERRESTRIAL CULTURAL

This subsystem includes communities that are either created and maintained by human activities, or are modified by human influence to such a degree that the physical conformation of the substrate, or the biological composition of the resident community is substantially different from the character of the substrate or community as it existed prior to human influence.

1. Cropland/row crops: an agricultural field planted in row crops such as corn, potatoes, and soybeans. This community includes vegetable gardens in residential areas.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

2. Cropland/field crops: an agricultural field planted in field crops such as alfalfa, wheat, timothy, and oats. This community includes hayfields that are rotated to pasture. Characteristic birds include grasshopper sparrow (*Ammodramus savannarum*), vesper sparrow (*Pooecetes gramineus*), bobolink (*Dolichonys*

oryzivorous), mourning dove (*Zenaida macroura*), and upland sandpiper (*Bartramia longicauda*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

3. Pastureland: agricultural land permanently maintained (or recently abandoned) as a pasture area for livestock. Characteristic birds include grasshopper sparrow (*Ammodramus savannarum*), vesper sparrow (*Pooecetes gramineus*), horned lark (*Eremophila alpestris*), killdeer (*Charadrius vociferus*), and upland sandpiper (*Bartramia longicauda*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

4. Flower/herb garden: residential, commercial, or horticultural land cultivated for the production of ornamental herbs and shrubs. This community includes gardens cultivated for the production of culinary herbs. Characteristic birds include American robin (*Turdus migratorius*) and mourning dove (*Zenaida macroura*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

5. Orchard: a stand of cultivated fruit trees (such as apples, cherries, peaches, pears, etc.), often with grasses as a groundcover. An orchard may be currently under cultivation or recently abandoned. Staghorn sumac (*Rhus typhina*), goldenrods (*Solidago* spp.), and poison ivy (*Toxicodendron radicans*) may be common in abandoned orchards.

Characteristic birds include American robin (*Turdus migratorius*), eastern kingbird (*Tyrannus tyrannus*), mourning dove (*Zenaida macroura*), and in mature orchards with a minimum dbh of 10 in (about 25 cm), yellow-bellied sapsucker (*Sphyrapicus varius*).

Distribution: throughout New York State at low elevations.

Rank: G5 S5 *Revised:* 1990

6. Vineyard: a stand of cultivated vines (such as grapes, or raspberries), often with grasses as a groundcover.

Distribution: throughout New York State at low elevations.

Rank: G5 S5 *Revised:* 1990

7. Hardwood plantation: a stand of commercial hardwood species planted for the cultivation and harvest of timber products. These plantations are usually monocultures: more than 90% of the canopy cover consists of one species. Species typically planted in New York are: black cherry (*Prunus serotina*), red oak (*Quercus rubra*), white oak (*Q. alba*), black walnut (*Juglans nigra*), hybrid poplars (*Populus* spp.), and black locust (*Robinia pseudo-acacia*).

Distribution: throughout New York State.

Rank: G5 S3 *Revised:* 1990

8. Pine plantation: a stand of pines planted for the cultivation and harvest of timber products, or to provide wildlife habitat, soil erosion control, windbreaks, or landscaping. These plantations may be monocultures with more than 90% of the canopy cover consisting of one species, or they may be mixed stands with two or more codominant species (in which case more than 50% of the cover consists of one or more species of pine).

Pines that are typically planted in New York include white pine (*Pinus strobus*), red pine (*P. resinosa*), Scotch pine (*P. sylvestris*), pitch pine (*P. rigida*), and jack pine (*P. banksiana*). Groundlayer vegetation is usually sparse, apparently because of the dense accumulation of leaf litter. Speedwell (*Veronica officinalis*) is a characteristic groundlayer plant. More data on this community are needed.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

9. Spruce/fir plantation: a stand of softwoods planted for the cultivation and harvest of timber products, or to provide wildlife habitat, soil erosion control, windbreaks, or landscaping. These plantations may be monocultures with more than 90% of the canopy cover consisting of one species, or they may be mixed stands with two or more codominant species (in which case more than 50% of the cover consists of one or more species of spruce or fir).

Softwoods that are typically planted in New York include Norway spruce (*Picea abies*), white spruce (*P. glauca*), balsam fir (*Abies balsamea*), and Douglas fir

(*Pseudotsuga menziesii*). Groundlayer vegetation is usually sparse, apparently because of the dense accumulation of leaf litter. Speedwell (*Veronica officinalis*) is a characteristic groundlayer plant.

A characteristic bird is golden-crowned kinglet (*Regulus satrapa*). More data on this community are needed.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

10. Conifer plantation: a stand of softwoods planted for the cultivation and harvest of timber products, or to provide wildlife habitat, soil erosion control, windbreaks, or landscaping. This is a broadly defined community that excludes stands in which pine, spruce, or fir are dominant, although they may be present at low densities. These plantations may be monocultures, or they may be mixed stands with two or more codominant species.

Softwoods that are typically planted in these plantations include European larch (*Larix decidua*), Japanese larch (*Larix kaempferi*), and northern white cedar (*Thuja occidentalis*). Groundlayer vegetation is usually sparse, apparently because of the dense accumulation of leaf litter. Speedwell (*Veronica officinalis*) is a characteristic groundlayer plant. More data on this community are needed.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

11. Mowed lawn with trees: residential, recreational, or commercial land in which the groundcover is dominated by clipped grasses and forbs, and it is shaded by at least 30% cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50% cover. The groundcover is maintained by mowing.

Characteristic animals include gray squirrel (*Sciurus carolinensis*), American robin (*Turdus migratorius*), mourning dove (*Zenaida macroura*), and mockingbird (*Mimus polyglottos*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

12. Mowed lawn: residential, recreational, or commercial land, or unpaved airport runways in which the groundcover is dominated by clipped grasses and there is less than 30% cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50% cover. The groundcover is maintained by mowing.

Characteristic birds include American robin (*Turdus migratorius*), upland sandpiper (*Bartramia longicauda*), and killdeer (*Charadrius vociferus*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

13. Mowed roadside/pathway: a narrow strip of mowed vegetation along the side of a road, or a mowed pathway through taller vegetation (e.g., meadows, old fields, woodlands, forests), or along utility right-of-way corridors (e.g., power lines, telephone lines, gas pipelines). The vegetation in these mowed strips and paths may be dominated by grasses, sedges, and rushes; or it may be dominated by forbs, vines, and low shrubs that can tolerate infrequent mowing.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

14. Herbicide-sprayed roadside/pathway: a narrow strip of low-growing vegetation along the side of a road, or along utility right-of-way corridors (e.g., power lines, telephone lines, gas pipelines) that is maintained by spraying herbicides.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

15. Unpaved road/path: a sparsely vegetated road or pathway of gravel, bare soil, or bedrock outcrop. These roads or pathways are maintained by regular trampling or scraping of the land surface. The substrate consists of the soil or parent material at the site, which may be modified by the addition of local organic material (woodchips, logs, etc.) or sand and gravel.

One characteristic plant is path rush (*Juncus tenuis*). A characteristic bird is killdeer (*Charadrius vociferus*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

16. Railroad: a permanent road having a line of steel rails fixed to wood ties and laid on a gravel roadbed that provides a track for cars or equipment drawn by locomotives or propelled by self-contained motors. There may be sparse vegetation rooted in the gravel substrate. The railroad right of way may be maintained by mowing or herbicide spraying.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 2001

17. Paved road/path: a road or pathway that is paved with asphalt, concrete, brick, stone, etc. There may be sparse vegetation rooted in cracks in the paved surface.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

18. Roadcut cliff/slope: a sparsely vegetated cliff or steep slope, along a road, that was created by blasting or digging during road construction.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

19. Riprap/erosion control roadside: a sparsely vegetated slope along a road that is covered with coarse stones, cobbles, or gabions placed for erosion control.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

20. Rock quarry: an excavation in bedrock from which building stone (e.g., limestone, sandstone, slate) has been removed. Vegetation may be sparse; plants may be rooted in crevices in the rock surface.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G5 S5 *Revised:* 1990

21. Gravel mine: an excavation in a gravel deposit from which gravel has been removed. Often these are dug into glacial deposits such as eskers or kames. Vegetation may be sparse if the mine is active; there may be substantial vegetative cover if the mine has been inactive for several years. Near-vertical slopes are used by bank swallows (*Riparia riparia*) for nesting sites.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

22. Sand mine: an excavation in a sand deposit or sand dune from which sand has been removed. Vegetation is usually sparse.

A characteristic bird is bank swallow (*Riparia riparia*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

23. Brushy cleared land: land that has been clearcut or cleared by brush-hog. There may be a lot of woody debris such as branches and slashings from trees that were logged. Vegetation is patchy, with scattered herbs, shrubs, and tree saplings. The amount of vegetative cover probably depends on soil fertility and the length of time since the land was cleared.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

24. Artificial beach: a sand beach constructed on a lake or river shore by depositing sand from outside the site onto the natural substrate; a sandy beach neither created nor maintained by natural lake shore or river processes. These beaches often provide nesting habitat for turtles.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

25. Riprap/artificial lake shore: a lake shore or pond shore that is covered with coarse stones, cobbles, concrete slabs, etc. placed for erosion control. The vegetation is usually sparse.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

26. Dredge spoil lake shore: a lake shore or pond shore that is composed of dredge spoils. The vegetation may be sparse.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

27. Construction/road maintenance spoils: a site where soil from construction work and/or road maintenance materials have been recently deposited. There is little, if any, vegetation.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

28. Dredge spoils: an upland site where dredge spoils have been recently deposited. On sandy dredge spoils along the Hudson River, characteristic species of early successional deposits include winged pigweed (*Cycloloma atriplicifolium*), lovegrass (*Eragrostis pectinacea*), purple sandgrass (*Triplasis purpurea*), tall crabgrass (*Digitaria sanguinalis*), and field sandbur (*Cenchrus longispinus*); cottonwood (*Populus deltoides*) is common on late successional deposits. Maritime dredge spoil islands along the seacoast of Long Island provide nesting habitat for herring gull (*Larus argentatus*), least tern (*Sterna antillarum*), and piping plover (*Charadrius melodus*).

Distribution: throughout New York State, especially near large rivers, lakes, or the ocean.

Rank: G5 S5 *Revised:* 1990

29. Mine spoils: a site where mine spoils have been deposited. These sites may be extensive. Mine spoils may include tailings, crushed rock, and overburden deposits.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G5 S5 *Revised:* 1990

30. Landfill/dump: a site that has been cleared or excavated, where garbage is disposed. The bulk of the material in the landfill or dump is organic and biodegradable; although some inorganic material (plastic, glass, metal, etc.) is usually present.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

31. Junkyard: a site that has been cleared for disposal or storage of primarily inorganic refuse, including discarded automobiles, large appliances, mechanical parts, etc.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

32. Urban vacant lot: an open site in a developed, urban area, that has been cleared either for construction or following the demolition of a building. Vegetation may be sparse, with large areas of exposed soil, and often with rubble or other debris.

Characteristic trees are often naturalized exotic species such as Norway maple (*Acer platanoides*), white mulberry (*Morus alba*), and tree of heaven (*Ailanthus altissima*), a species native to northern China and introduced as an ornamental. Tree of heaven is fast growing and tolerant of the harsh urban environment; it can dominate a vacant lot and form dense stands.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

33. Urban structure exterior: the exterior surfaces of metal, wood, or concrete structures (such as commercial buildings, apartment buildings, houses, bridges) or any structural surface composed of inorganic materials (glass, plastics, etc.) in an urban or densely populated suburban area. These sites may be sparsely vegetated with lichens, mosses, and terrestrial algae; occasionally vascular plants may grow in cracks. Nooks and crannies may provide nesting habitat for birds and insects, and roosting sites for bats.

Characteristic birds include common nighthawk (*Chordeiles minor*) on rooftops, American robin (*Turdus migratorius*) on porches or under shelter, and exotic birds such as rock dove (*Columba livia*) and house sparrow (*Passer domesticus*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

34. Rural structure exterior: the exterior surfaces of metal, wood, or concrete structures (such as commercial buildings, barns, houses, bridges) or any structural surface composed of inorganic materials

(glass, plastics, etc.) in a rural or sparsely populated suburban area. These sites may be sparsely vegetated with lichens, mosses, and terrestrial algae; occasionally vascular plants may grow in cracks. Nooks and crannies may provide nesting habitat for birds and insects, and roosting sites for bats.

Characteristic birds include American robin (*Turdus migratorius*) on porches or under shelter, barn swallow (*Hirundo rustica*) under shelter, and exotic birds such as rock dove (*Columba livia*), house sparrow (*Passer domesticus*), and European starling (*Sturnus vulgaris*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

35. Interior of barn/agricultural building: the interior spaces of a barn or other agricultural building which provides shelter for livestock or storage space for agricultural products (hay, straw, silage, etc.).

Characteristic animals besides the livestock are small rodents, bats, cats, native and exotic birds such as barn swallow (*Hirundo rustica*) and rock dove (*Columba livia*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

36. Interior of non-agricultural building: the interior spaces of a house, garage, commercial building, or industrial building that is used primarily by people for living space, work space, or storage space.

A characteristic bird is chimney swift (*Chaetura pelagica*) which nests in chimneys and inner walls of buildings.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

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VII. SUBTERRANEAN SYSTEM

The subterranean system consists of both aquatic and non-aquatic habitats beneath the earth's surface, including air-filled cavities with openings to the surface (caves), water-filled cavities and aquifers, and interstitial habitats in small crevices within an inorganic matrix. Different subterranean communities are distinguished by hydrology and substrate characteristics. The communities are described in terms of three to four light intensity zones. The entrance zone has about 50 to 100% of the light intensity of the subterranean/terrestrial interface and is well lit by direct natural light. This zone often supports a characteristic suite of species including craneflies, microlepidoptera, geometrids, spiders, flies, mosquitoes and endogeans (soil organisms). Bryophytes and lichens may be common in this zone. The twilight zone (or threshold zone), a partially lit area of reflected light, may be divided into two parts: a moderately well-lit outer twilight zone, which has about 10 to 50% of the light intensity of the subterranean/terrestrial interface, and a dim inner twilight zone, which has up to about 10% of the light intensity of the subterranean/terrestrial interface. The dark zone (or deep zone) is an area of complete darkness. This zone contains organisms referred to as troglobites, trogloxes and troglophiles which often include spiders and beetles. Fungi (predominantly mushrooms, molds and mildews) may be common in this zone. There are apparently only few obligate cave species in New York, unlike the diversity found in caves of the Interior Lowlands of the Eastern U.S. and the caves of the Southwest U.S.

Characteristic species have been derived from a combination of comments from the staff of DEC's Endangered Species Unit, based upon their knowledge of bat hibernacula and caves in New York, other subterranean scientists, literature review, and NYNHP field surveys. To date the Heritage Program has conducted preliminary inventory work on caves including 4 plots. Although the Heritage Program has focused inventory work on caves since 1995; we do not currently have in our files sufficient field data for confidently undertaking any major restructuring of the 1990 subterranean classification. However, field work has suggested that this classification works well for representing the coarsest scale distinctions between both biotic and abiotic features of subterranean community types.

Further refinement of the classification, especially to distinguish potential regional variants, will likely be based on additional field surveys and analysis of data collected by various subterranean scientists and agencies statewide. Regional variation in some cave types is evident, but we do not currently have in our files enough information or have undertaken analyses to confidently split these common and widespread types into specific regional variants. A finer scale classification that distinguishes types according to ecoregion is being evaluated. Preliminary conclusions suggest that mammal, reptile and insect assemblages may be strongly correlated with ecoregion boundaries.

A. NATURAL CAVES

This subsystem includes caves and cavities in which the structure and hydrology have not been substantially modified by human activities, and the native biota are dominant.

Aquatic cave community: the aquatic community of a subterranean stream or pond. These caves vary in their water chemistry and substrate type. Well-developed examples contain all four light intensity zones. Habitat features may include riffles, runs and pools. These caves often occur in close association with non-aquatic cave types. Preliminary studies suggest that there are sufficient differences in the biota of subterranean streams and ponds, and a split of this community into riverine cave community (or subterranean stream) and lacustrine cave community (or subterranean pond) is being evaluated.

Characteristic fauna are poorly known; characteristic species may include individuals from adjacent connected above-ground aquatic communities such as crayfish (e.g., Cambarus robustus), mayflies (Ephemeroptera) and amphipods (Amphipoda) in subterranean streams and fish in subterranean lakes. Characteristic terrestrial species associated with subterranean streams may include ground beetles (Carabidae). Four ecoregional variants (Northern Appalachian, Great Lakes, Lower New England, and Alleghany Plateau types) are suspected to differ in biota, substrate type, water chemistry and water temperature. Major watershed may be a secondary factor in distinguishing caves based on biota. More data on this community are needed.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G4 S3S4 *Revised:* 2001

Examples: Burroughs Cave (in part), Essex County; Valcour Island, Clinton County; McFails Cave (in part), Schoharie County; Black River Bay, Jefferson County; Clarksville Cave, Albany County.

Sources: NYNHP surveys.

2. Terrestrial cave community: the terrestrial community of a cave with bedrock walls, including the biota of both solution caves (in limestone) and tectonic caves. Typical examples contain all four light intensity zones. Temperatures are stable in deep caves. Small or shallow caves may have a temperature gradient ranging from cold (below freezing) to cool (up to 50° F). Although many caves have ice on the cave floor in winter, the ceiling is warm enough for a bat hibernaculum. Habitat features may include bare rock, floors of pebble, gravel or soil, piles of terrestrial plant debris, carpets of bat guano, and piles of mammal scat, the latter three substrates which often promote growth of fungal colonies.

Characteristic bats that hibernate in our caves include little brown bat (*Myotis lucifugus*), Keen's bat (*Myotis keenii*), big brown bat (*Eptesicus fuscus*), and Eastern pipistrelle (*Pipistrellus subflavus*). Additional characteristic hibernating bats may include northern Myotis (*Myotis septentrionalis*). Characteristic and dominant invertebrates may include ground beetles (Carabidae), microlepidoptera, crickets, and a diverse array of spiders. Four to five ecoregional variants (including Northern Appalachian, Great Lakes, Lower New England, and Alleghany Plateau types) are suspected. More data on regional variants are needed.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G4 S3S4 *Revised:* 2001

Examples: Norton Range Cave, Franklin County; Burroughs Cave (in part), Essex County; McFails Cave (in part), Schoharie County; Pompeys Cave, Ulster County; Mystery Cave, Sullivan County; Clarksville Cave, Albany County.

Sources: NYNHP surveys. *Revised:* 2001

3. Talus cave community: the community that occurs in small crevices and caves with walls of boulders or cobbles, typically in a talus slope at the base of a cliff. This includes talus slopes that are cool enough to allow winter ice to remain within the talus through all or part of the summer; these are known as ice caves. Most examples are shallow and predominated by twilight zone. They may have small areas of dark zone.

Characteristic animals which may use this community as denning habitat include timber rattlesnake (*Crotalus horridus*), bobcat (Lynx rufus), North American porcupine (Erethizon dorsatum) and small mammals such as rock vole (Microtus chrotorrhinus). Bats may be present in larger examples, but at low abundance. Characteristic and dominant invertebrates may include craneflies (Tipulidae) and a diverse array of spiders. Bryophytes, lichens and fungi may be abundant in these caves. Three to five ecoregional variants (including Northern Appalachian, Lower New England, and Alleghany Plateau types) are suspected to differ in characteristic and dominant mammals, reptiles, insects, lichens, bryophytes and fungi. More data on invertebrates, bryophytes and fungi, as well as regional variants, are needed.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone, usually at high elevations.

Rank: G4 S3S4 *Revised:* 2001

Examples: Indian Pass, Essex County; Wilmington Notch, Essex County; Moss Lake Mountain, Hamilton County; Slide Mountain, Rensselaer County; Shawangunk Mountains, Ulster County.

Sources: NYNHP surveys.

B. SUBTERRANEAN CULTURAL

This subsystem includes communities that are either created and maintained by human activities, or are modified by human influence to such a degree that the physical conformation of the substrate, or the biological composition of the resident community is substantially different from the character of the substrate or community as it existed prior to human influence.

1. Mine/artificial cave community: the biota of an abandoned mine or artificial underground excavation. Abandoned mines that are deep enough to maintain stable winter temperatures are important bat hibernacula. Mines, like natural caves, may be terrestrial or aquatic. Wells are also included here.

Characteristic bats include little brown bat (*Myotis lucifugus*), Keen's bat (*Myotis keenii*), big brown bat (*Eptesicus fuscus*), and Eastern pipistrelle (*Pipistrellus subflavus*).

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G4 S3S4 *Revised:* 2001

2. Sewer: the biota of a subterranean conduit constructed to carry off sewage and sometimes runoff from an urban or developed area. A characteristic rodent is the Norway rat (*Rattus norvegicus*).

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

3. Tunnel: the biota of a subterranean passageway constructed to allow transportation routes to pass through rock or earth obstructions or underground, including tunnels for roads, footpaths, highways, railroads, and subways. Water-filled tunnels, such as aqueducts, and culverts are tentatively included here.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

4. Basement/building foundation: the biota of an underground structure that was built primarily as a support structure for a house, commercial building, or industrial building. This includes foundations of abandoned structures, as well as those that are actively used. Characteristic animals include a wide variety of insects and small vertebrates.

Distribution: throughout New York State.

Rank: G5 S5 *Revised:* 1990

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