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.

1. Maritime oak-holly forest: a hardwood forest that occurs in low areas on the back portions of maritime dunes; the dunes protect these areas from overwash and salt spray. In New York State this forest is best developed on the narrow peninsulas of eastern Long Island and on the barrier islands off the south shore. The trees are usually stunted and flat-topped because the canopies are pruned by salt spray; the canopy of a mature stand may be only 16 to 23 ft (5 to 7 m) tall. The dominant trees are either holly (*Ilex opaca*), black oak (*Quercus velutina*), or beech (*Fagus grandifolia*). Other characteristic trees include sassafras (*Sassafras albidum*), shadbush (*Amelanchier canadensis*), and post oak (*Quercus stellata*). Vines such as Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), and 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*) 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: only known from the Coastal Lowlands ecozone.

Rank: G2G3 S1

Example: Sunken Forest, Fire Island National Seashore, Suffolk County.

Sources: Art 1976; Greller 1977; NHP field surveys.

2. Maritime oak forest: a hardwood forest that occurs on exposed bluffs near the coast of eastern Long Island. In sites exposed to wind and salt spray, the understory may be a dense shrub thicket dominated by black huckleberry (*Gaylussacia baccata*), with bayberry (*Myrica pensylvanica*) and saplings of black cherry (*Prunus serotina*) as common associates. The sparse groundlayer under this shrub thicket is dominated by poison ivy (*Toxicodendron radicans*). In some stands the understory is a dense thicket of catbrier (*Smilax rotundifolia*). The presence of catbrier thickets is not well understood; they may become established or be favored following disturbances such as insect infestations, heavy browsing by deer, clear-cutting, fires, windthrow, or exposure to salt spray. More data on this community are needed.

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

Rank: G3G4 S2S3

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

Sources: Greller 1977; Rosza and Metzler 1982; Taylor 1923; NHP field surveys.

3. 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. A characteristic groundlayer plant is eastern prickly pear (*Opuntia humifusa*). More data on this community are needed.

Distribution: only known from the Coastal Lowlands ecozone.

Rank: G3G4 S1

Example: Orient Point, Suffolk County.

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

4. 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*).

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

Example: Sears Bellows County Park, Suffolk County.

Sources: Greller 1977; Kerlinger and Doremus 1981; Olsvig 1979; NHP field surveys.

5. 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

Examples: Finger Lakes National Forest, Schuyler County; Long Eddy, Delaware County.

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

6. Allegheny oak forest: a hardwood forest that occurs on well-drained sites in the unglaciated portion of the Allegheny plateau in southwestern New York. This is a narrowly defined community (compared to the preceding) distinguished by a more diverse canopy and a richer groundlayer flora that includes several southern Appalachian species at the northern end of their range. These oak forests are characteristic of ridgetops, upper slopes, and south- and west-facing slopes; they grade into rich mesophytic forests that occur on north- and east-facing slopes as well as on the more protected hollows and middle elevations of hillsides with south and west aspects. Codominant trees are white oak (*Q. alba*), red oak (*Q. rubra*), chestnut oak (*Q. montana*), and black oak (*Q. velutina*). American chestnut (*Castanea dentata*) was a significant canopy codominant prior to the chestnut blight; chestnut sprouts are still common in the understory. Other common canopy trees are white ash (*Fraxinus americana*), red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), black birch (*Betula lenta*), and big-tooth aspen (*Populus grandidentata*). The shrub-layer is a mixed heath with blueberries (*Vaccinium angustifolium, V. pallidum*), pinxter (*Rhododendron*

periclymenoides), black huckleberry (*Gaylussacia baccata*), maple-leaf viburnum (*Viburnum acerifolium*), and mountain laurel (*Kalmia latifolia*). Common groundlayer herbs are black cohosh (*Cimicifuga racemosa*), wintergreen (*Gaultheria procumbens*), bracken fern (*Pteridium aquilinum*), Pennsylvania sedge (*Carex pensylvanica*), wild sarsaparilla (*Aralia nudicaulis*), barren strawberry (*Waldsteinia fragarioides*), white clintonia (*Clintonia umbellulata*), three-lobed violet (*Viola triloba*), and rattlesnake weed (*Hieracium venosum*).

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

Rank: G3G4 S2

Example: Robinson Run Hill, Cattaraugus County.

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

7. 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*.

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

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

8. 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

Source: Greller 1977; Rosza and Metzler 1982.

9. 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.

More data on composition and characteristic animals are needed.

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

Rank: G4G5 S4

Example: Rome Sand Plains, Oneida County.

Sources: McVaugh 1958; NHP field surveys.

10. Rich mesophytic forest: a hardwood or mixed forest that resembles the mixed mesophytic forests of the central Appalachians (south of New York), but is less diverse. It occurs on rich, moist, well-drained soils which are favorable for the dominance of a wide variety of tree species. This forest is characterized by a canopy with a relatively large number of codominant trees. The codominants include five or more of the following species: red oak (*Quercus rubra*), beech (*Fagus grandifolia*), red maple (*Acer rubrum*), black birch (*Betula lenta*), white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), cucumber tree (*Magnolia acuminata*), and white oak (*Quercus alba*). 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 pine (*Pinus strobus*), basswood (*Tilia americana*), bitternut hickory (*Carya cordiformis*), sugar maple (*Acer saccharum*), Eastern hop hornbeam (*Ostrya virginiana*), and striped maple (*Acer pensylvanicum*). This forest has a well-developed shrublayer with a variety of characteristic species including arrow-wood (*Viburnum acerifolium*), witch hazel (*Hamamelis virginiana*), pinkster (*Rhododendron periclymenoides*), American fly-honeysuckle (*Lonicera canadensis*), round-leaved dogwood (*Cornus rugosa*), alternate-leaved dogwood (*C. alternifolia*), smooth service-berry (*Amelanchier laevis*), bush honeysuckle (*Diervilla lonicera*), and blueberry (*Vaccinium pallidum*). The groundlayer is fairly rich in species. Characteristic herbs are interrupted fern (*Osmunda claytoniana*), white clintonia (*Clintonia umbellulata*), yellow mandarin (*Disporum lanuginosum*), white baneberry (*Actaea pachypoda*), early meadow rue (*Thalictrum dioicum*), 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*). A characteristic bird is wild turkey (*Meleagris gallopavo*).

In New York, rich mesophytic forests are best developed in the unglaciated portions of the Appalachian Plateau. In Cattaraugus County this forest typically occurs on north- and east-facing slopes, at middle 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, black oak, and big-tooth aspen; and it can be distinguished from hemlock-northern hardwood forest by the lack of yellow birch and American hornbeam.

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

Example: Allegany State Park, Cattaraugus County.

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

11. 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 basswood (*Tilia americana*), American elm (*Ulmus americana*), white ash (*Fraxinus americana*), yellow birch (*Betula alleghaniensis*), Eastern hop hornbeam (*Ostrya virginiana*), and red maple (*Acer rubrum*). There are relatively few shrubs and herbs. Characteristic small trees or tall shrubs are American hornbeam (*Carpinus caroliniana*), striped maple (*Acer pensylvanicum*), witch hazel (*Hamamelis virginiana*), hobblebush (*Viburnum lantanoides*), and alternate-leaved dogwood (*Cornus alternifolia*). Characteristic groundlayer species are blue cohosh (*Caulophyllum thalictroides*), christmas fern (*Polystichum acrostichoides*), jack-in-the-pulpit (*Arisaema triphyllum*), white baneberry (*Actaea pachypoda*), wild leek (*Allium tricoccum*), wild ginger (*Asarum canadense*), false Solomon's seal (*Smilacina racemosa*), and bloodroot (*Sanguinaria canadensis*). 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 steep ravines and gullies where hemlock is locally dominant; these hemlock ravines (actually small patches of hemlock-northern hardwood forest) are here considered a feature or subtype within the broadly defined beech-maple mesic forest.

Distribution: throughout New York State.

Rank: G4 S4

Examples: Smith Woods, Tompkins County; Ampersand Mountain, Franklin County.

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

12. Maple-basswood rich mesic forest: a hardwood forest that typically occurs on middle to lower elevation, concave slopes with north or east aspects (but not in ravines). Soils are rich, moist, well-drained, and usually have a circumneutral pH. The dominant trees are sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and white ash (*Fraxinus americana*). Common associates are bitternut hickory (*Carya cordiformis*), tulip tree (*Liriodendron tulipifera*), and American hornbeam (*Carpinus caroliniana*). Characteristic tall shrubs are alternate-leaved dogwood (*Cornus alternifolia*) and witch hazel (*Hamamelis virginiana*); the shrublayer is usually sparse. Spring ephemerals are usually abundant in the groundlayer. Characteristic species are false Solomon's seal (*Smilacina racemosa*), white baneberry (*Actaea pachypoda*), spring beauty (*Claytonia virginica*), toothwort (*Dentaria diphylla*), dutchman's breeches (*Dicentra cucullaria*), squirrel-corn (*Dicentra canadensis*), trout lily (*Erythronium americanum*), bloodroot (*Sanguinaria canadensis*), foamflower (*Tiarella cordifolia*), and purple trillium (*Trillium erectum*). Hemlock ravines may be present as occasional features of this forest. A characteristic bird is wild turkey (*Meleagris gallopavo*).

Distribution: primarily known from the Great Lakes Plain ecozone.

Rank: G4 S2S3

Example: Great Gully, Cayuga County.

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

13. 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

Examples: Ampersand Mountain, Essex County; 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; NHP field surveys.

14. 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*), and eastern box turtle (*Terrapene carolina*).

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

Rank: G4 S4

Examples: Five Ponds Wilderness Area, Herkimer County; Pine Orchard, Hamilton County.

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

15. 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, sandy, and seasonally moist, but not saturated and not peaty. The dominant trees are red spruce (*Picea rubens*) or black spruce (*P. mariana*), mixed with smaller numbers of yellow birch (*Betula alleghaniensis*), black cherry (*Prunus serotina*), and hemlock (*Tsuga canadensis*). In some places in the Adirondacks, white spruce (*Picea glauca*) replaces red spruce. 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 red maple (*Acer rubrum*) and beech (*Fagus grandifolia*) may also be present. The shrublayer is sparse or patchy. Characteristic shrubs are Labrador tea (*Ledum groenlandicum*), 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*).

Distribution: primarily known from the Adirondacks ecozone.

Rank: G4? S3S4

Sources: Braun 1950; Eyre 1980; Heimburger 1934;

16. 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

Example: Cold Brook Plains, Essex County.

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

17. 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 S3S4

Example: Five Ponds Wilderness Area, Herkimer County.

Sources: Eyre 1980; Heimburger 1934; Leopold et al. 1988; Roman 1980; Zon 1914; NHP field surveys.

18. 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 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 S1

Examples: Phelps Brook, Essex County; Cornell Mountain, Ulster County.

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

19. 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-cheecked thrush (*Catharus minimus*), yellow-bellied flycatcher (*Empidonax flaviventris*), magnolia warbler (*Dendroica magnolia*), purple finch (*Carpodacus purpureus*), and Nashville warbler (*Vermivora ruficapilla*).

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 uphill 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

Example: Whiteface Mountain, Essex County.

Sources: McIntosh and Hurley 1964; Nicholson 1965; Slack 1977; Sprugel 1976.

20. Successional northern hardwoods: a hardwood or mixed forest that occurs on sites that have been cleared (for farming, logging, etc.)

or otherwise disturbed. The dominant trees are usually any two or more of the following: quaking aspen (*Populus tremuloides*), big-tooth aspen (*P. grandidentata*), balsam poplar (*P. balsamifera*), pin cherry (*Prunus pensylvanica*), black cherry (*P. serotina*), red maple (*Acer rubrum*), white pine (*Pinus strobus*), paper birch (*Betula papyrifera*), gray birch (*B. populifolia*), white ash (*Fraxinus americana*), green ash (*F. pensylvanica*), or American elm (*Ulmus americana*). This is a broadly defined community dominated by light-requiring, wind-dispersed species that are well-adapted to establishment following disturbance. 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.

A characteristic feature of successional forests is the lack of reproduction of the canopy species. Most of the tree seedlings and saplings in a successional forest are species that are more shade-tolerant than the canopy species. 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.

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

Rank: G5 S5

Source: Mellinger and McNaughton 1975.

21. Successional southern hardwoods: a hardwood or mixed forest that occurs on sites that have been cleared (for farming, logging, etc.) or otherwise disturbed. The dominant trees are usually any of the following: gray birch (*Betula populifolia*), hawthorns (*Crataegus* spp.), sassafras (*Sassafras albidum*), box elder (*Acer negundo*), American elm (*Ulmus americana*), slippery elm (*U. rubra*), red maple (*Acer rubrum*), silver maple (*A. saccharinum*), and eastern red cedar (*Juniperus 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. This is a broadly defined community dominated by light-requiring species that are well-adapted to establishment following disturbance. A characteristic bird is chestnut-sided warbler (*Dendroica pensylvanica*).

A characteristic feature of successional forests is the lack of reproduction of the canopy species. Most of the tree seedlings and saplings in a successional forest are species that are more shade-tolerant than the canopy species. 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.

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

Rank: G5 S5

Sources: Eyre 1980; NHP field surveys.

22. 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.). Data on groundlayer composition and characteristic animals are not available.

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

Rank: G4 S3S4

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

Sources: Clark 1986b; Greller 1977.

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