

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

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CES103.020 BOREAL ASPEN-BIRCH FOREST

Division 103, Forest and Woodland

Spatial Scale & Pattern: Matrix

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Forest and Woodland (Treed), Boreal [Boreal Continental], Intermediate Disturbance Interval

Concept Summary: These early-successional boreal hardwood forests and woodlands are widespread throughout the boreal region of Canada, extending into parts of the Laurentian-Acadian region, but more localized eastward. They originate naturally after fires and blowdowns, but more commonly originate after logging of conifer or mixed conifer-hardwood systems. *Populus tremuloides* and *Betula papyrifera* are the most important tree species. This system is maintained by repeated disturbance within 50 year return intervals and would otherwise succeed to conifer systems. Localized stands of mixed conifer-hardwoods (pines and spruces) can occur in this type, but are more typically part of conifer systems.

Comments: As defined here, these are deciduous forest-dominated systems. Mixed conifer-hardwoods areas will go in the appropriate conifer forest system.

DISTRIBUTION

Range: Upper Great Lakes and southern Canada east to Maine and the Canadian Maritimes.

Ecological Divisions: 103, 201

TNC Ecoregions: 47:, 48:, 63:

Subnations/Nations: MB:, ME:, MI:, MN:, NB:, NH:, NS:, NY:, ON:, PE:, WI:

CONCEPT

Associations:

- *Betula papyrifera* / *Diervilla lonicera* - (*Abies balsamea*) Forest (H, G4?, Paper Birch / Fir Forest, CEG002463)
- *Pinus banksiana* - *Populus tremuloides* / *Diervilla lonicera* Forest (M, G4G5, Jack Pine - Aspen / Bush-honeysuckle Forest, CEG002518)
- *Populus* (*tremuloides*, *balsamifera*) - (*Betula papyrifera*) - *Picea mariana* / *Alnus viridis* Forest (L, G?, Aspen - Birch - Black Spruce / Green Alder Forest, CEG002514)
- *Populus* (*tremuloides*, *grandidentata*) - *Betula* (*populifolia*, *papyrifera*) Woodland (H, G5, Early Successional Woodland/Forest, CEG006303)
- *Populus tremuloides* - *Betula papyrifera* - (*Acer rubrum*, *Populus grandidentata*) Forest (H, G5, Aspen - Birch - Red Maple Forest, CEG002467)
- *Populus tremuloides* - *Betula papyrifera* / (*Abies balsamea*, *Picea glauca*) Forest (L, G5, Aspen - Birch / Boreal Conifer Forest, CEG002466)

SOURCES

References: Eyre 1980

Last updated: 25 Mar 2003

Concept Author: D. Faber-Langendoen

Stakeholders: MCS, ECS, CAN

LeadResp: MCS

CES103.021 BOREAL WHITE SPRUCE-FIR-HARDWOOD FOREST

Division 103, Forest and Woodland

Spatial Scale & Pattern: Matrix

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Lowland, Forest and Woodland (Treed), Mesotrophic Soil, Oligotrophic Soil, *Picea* (*glauca*, *mariana*, *rubens*) - *Abies*

Concept Summary: This system represents the southern edge of the boreal forest, ranging from eastern Alberta to eastern Canada and southward into Minnesota and the Great Lakes region, and possibly northern New England. The low-elevation forests are dominated by *Picea glauca* and *Abies balsamea*. *Picea mariana* is often present, along with occasional *Pinus banksiana*. Codominant boreal hardwoods include *Populus tremuloides* and *Betula papyrifera*. Northern hardwoods are relatively minor. Soils are acidic and usually rocky, and range from well-drained to somewhat poorly drained. This is the matrix forest type of this division. This system may include earlier successional patches in which *Populus* spp. and *Betula* spp. are dominant or mixed with *Picea* and *Abies*, that will develop into spruce-fir forests. Blowdowns with subsequent gap regeneration are the most frequent form of natural disturbance, with large-scale fires important at longer return intervals.

DISTRIBUTION

Range: This system ranges from eastern Alberta to eastern Canada and southward into Minnesota and the Great Lakes region, and possibly northern New England.

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Ecological Divisions: 103, 201, 205?

TNC Ecoregions: 47:C, 48:C, 63:C, 66:?

Subnations/Nations: AB:c, MB:c, ME:?, MI:c, MN:c, NB:?, ON:c, QC:c, SK:c, WI:c

CONCEPT

Associations:

- *Abies balsamea* - *Betula papyrifera* / *Diervilla lonicera* Forest (H, G5, Balsam Fir - Paper Birch Forest, CEGLO02474)
- *Picea glauca* - *Abies balsamea* - *Populus tremuloides* / Mixed Herbs Forest (H, G5, Spruce - Fir - Aspen Forest, CEGLO02475)
- *Picea glauca* - *Abies balsamea* / *Acer spicatum* / *Rubus pubescens* Forest (H, G4G5, Spruce - Fir / Mountain Maple Forest, CEGLO02446)
- *Picea mariana* - *Populus tremuloides* / Mixed Herbs Forest (M, G4G5, Black Spruce - Aspen Rich Forest, CEGLO02516)
- *Picea mariana* / *Pleurozium schreberi* Forest (M, G5, Black Spruce / Feathermoss Forest, CEGLO02447)

SOURCES

Last updated: 25 Mar 2003

Concept Author: D. Faber-Langendoen

Stakeholders: MCS, ECS, CAN

LeadResp: MCS

CES201.565 ACADIAN LOWLAND SPRUCE-FIR-HARDWOOD FOREST

Division 201, Forest and Woodland

Spatial Scale & Pattern: Matrix

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Lowland, Forest and Woodland (Treed), Mesotrophic Soil, Oligotrophic Soil, *Picea* (*glauca*, *mariana*, *rubens*) - *Abies*

Non-Diagnostic Classifiers: Sideslope, Toeslope/Valley Bottom, Glaciated, Acidic Soil, Mineral: W/ A-Horizon >10 cm, Sand Soil Texture, Loam Soil Texture, Udic, Long Disturbance Interval, W-Patch/Medium Intensity, Needle-Leaved Tree, Moderate (100-500 yrs) Persistence

Concept Summary: This system represents the Acadian and northern Appalachian red spruce-fir forest that extends to the southern boreal region of southeastern Canada. The low- to mid-elevation forests are dominated by *Picea rubens* and *Abies balsamea*. *Picea mariana* and *Picea glauca* are often present. *Betula alleghaniensis* is the most common codominant, and *Acer rubrum*, *Acer saccharum*, and *Fagus grandifolia* are often present. Soils are acidic and usually rocky, and range from well-drained to somewhat poorly drained. This is the matrix forest type in the lowland northern portions of this division. This system may include earlier successional patches in which *Populus* spp. and *Betula* spp. are dominant or mixed with *Picea* and *Abies*, that will develop into spruce-fir forests. Blowdowns with subsequent gap regeneration are the most frequent form of natural disturbance, with large-scale fires important at longer return intervals.

Comments: An east-west separation may be warranted between the white spruce-balsam-northern hardwoods in the Laurentian region, and the red spruce-balsam fir-northern hardwoods to the east (though white spruce is also common in parts of the east). But the hardwoods component is essentially similar (though beech drops out in the most western part of this System). Further review is needed, and should be done in conjunction with the similar northern hardwood system, Laurentian-Acadian Northern Hardwoods Forest (CES201.564).

DISTRIBUTION

Range: Northern New England and northern New York and adjacent Canada; occasional southwards.

Ecological Divisions: 201, 202

TNC Ecoregions: 61:C, 63:C

Subnations/Nations: ME:c, NB:?, NH:c, NY:c, QC:?, VT:c

CONCEPT

Associations:

- *Picea mariana* - *Populus tremuloides* / Mixed Herbs Forest (L, G4G5, Black Spruce - Aspen Rich Forest, CEGLO02516)
- *Picea mariana* / *Pleurozium schreberi* Forest (L, G5, Black Spruce / Feathermoss Forest, CEGLO02447)
- *Picea rubens* - *Abies balsamea* - *Betula papyrifera* Forest (H, G?, Low-Elevation Spruce - Fir Forest, CEGLO06273)
- *Picea rubens* - *Abies balsamea* - *Betula* spp. - *Acer rubrum* Forest (H, G?, Successional Spruce - Fir Forest, CEGLO06505)
- *Picea rubens* - *Picea glauca* Forest (H, G4G5, Maritime Spruce - Fir Forest, CEGLO06151)

SOURCES

References: Lorimer 1977

Last updated: 24 Mar 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

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CES201.566 ACADIAN MONTANE SPRUCE-FIR-HARDWOOD FOREST

Division 201, Forest and Woodland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Montane, Forest and Woodland (Treed), Ridge/Summit/Upper Slope, *Picea* (*glauca*, *mariana*, *rubens*) - *Abies*

Non-Diagnostic Classifiers: Glaciated, Mesotrophic Soil, Oligotrophic Soil, Acidic Soil, Mineral: W/ A-Horizon >10 cm, Loam Soil Texture, Udic, Long Disturbance Interval, W-Patch/Medium Intensity, Needle-Leaved Tree, Broad-Leaved Tree, Moderate (100-500 yrs) Persistence

Concept Summary: This is the matrix forest system in the montane spruce-fir region of the northern Appalachian Mountains, extending east through the Canadian Maritimes. It occurs mostly upwards of 1500 feet and is restricted to progressively higher elevations southward. Northward, it is often contiguous with Acadian Lowland Spruce-Fir-Hardwood Forest (CES201.565). These systems often are a mosaic of strongly coniferous patches and mixed patches, with occasional smaller inclusions of northern hardwoods. *Picea rubens* and *Abies balsamea* are the dominant conifers. Gaps formed by wind, snow, ice, and harvesting are the major replacement vectors; fires may be important but only over a long return interval.

DISTRIBUTION

Range: Higher elevations of northern New England and the Adirondacks, extending north along the mountains and higher hills into Canada.

Ecological Divisions: 201, 202

TNC Ecoregions: 60:P, 61:C, 63:C

Subnations/Nations: MA:c, ME:c, NH:c, NY:c, VT:c

CONCEPT

Associations:

- *Abies balsamea* - (*Betula papyrifera* var. *cordifolia*) Forest (G?, Montane Fir - Birch Forest, CEGL006112)
- *Picea rubens* - *Abies balsamea* - *Betula* spp. - *Acer rubrum* Forest (G?, Successional Spruce - Fir Forest, CEGL006505)
- *Picea rubens* - *Abies balsamea* / *Sorbus americana* Forest (G3G5, Montane Spruce - Fir Forest, CEGL006128)
- *Picea rubens* - *Betula alleghaniensis* / *Dryopteris campyloptera* Forest (G?, Red Spruce - Hardwoods Forest, CEGL006267)

SOURCES

Last updated: 14 Mar 2003

Concept Author: S.C. Gawler

Stakeholders: ECS

LeadResp: ECS

CES201.571 LAURENTIAN-ACADIAN ACIDIC ROCKY OUTCROP

Division 201, Forest and Woodland

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Lowland, Ridge/Summit/Upper Slope, Rock Outcrops/Barrens/Glades, Glaciated, Acidic Soil

Non-Diagnostic Classifiers: Forest and Woodland (Treed), Oligotrophic Soil, Very Shallow Soil, Mineral: W/ A-Horizon >10 cm, Mineral: W/ A-Horizon <10 cm, Sand Soil Texture, Loam Soil Texture, Udic, Consolidated, Long Disturbance Interval, F-Patch/Low Intensity, W-Landscape/Medium Intensity, Needle-Leaved Tree, Broad-Leaved Deciduous Tree, Broad-Leaved Shrub, Dwarf-Shrub, Graminoid, Nonvascular

Concept Summary: This outcrop system ranges across New England and the upper Great Lakes region and adjacent Canada, where it is found on ridges or summits of resistant acidic bedrock at low to mid elevations. The vegetation is patchy, often a mosaic of woodlands and open glades. *Quercus rubra*, *Quercus ellipsoidalis*, and various conifers including *Pinus banksiana* in the west and *Pinus rigida* or *Pinus strobus* in the east are characteristic trees, and low heath shrubs are often present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open.

DISTRIBUTION

Range: New England and adjacent Canada west to the Great Lakes and northern Minnesota.

Ecological Divisions: 201

TNC Ecoregions: 47:C, 48:C, 60:P, 63:C, 64:P

Subnations/Nations: ME:c, MI:c, MN:c, NH:c, NY:c, VT:c, WI:c

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CONCEPT

Associations:

- (Pinus strobus, Quercus rubra) / Danthonia spicata Acid Bedrock Wooded Herbaceous Vegetation (G3G4, White Pine - Red Oak Bedrock Glade, CEGl005101)
- Danthonia spicata - Poa compressa Granite Herbaceous Vegetation (G?, Poverty Grass Granite Barrens, CEGl005157)
- Juniperus communis - (Quercus rubra) / Juniperus horizontalis - Arctostaphylos uva-ursi Shrubland (G3G4, Common Juniper Rocky Krummholz, CEGl005065)
- Picea rubens / Vaccinium angustifolium / Sibbaldiopsis tridentata Woodland (G3G5, Spruce - Fir Rocky Ridge, CEGl006053)
- Pinus banksiana - Pinus strobus - (Quercus rubra) / Cladina spp. Nonvascular Vegetation (M, G3G5, Mixed Pine - (Oak) Igneous - Metamorphic Rock Outcrop, CEGl002491)
- Pinus banksiana / (Quercus rubra, Quercus ellipsoidalis) Forest (M, G4?, Jack Pine / Scrub Oak Forest, CEGl002440)
- Pinus banksiana / Kalmia angustifolia - Vaccinium spp. Woodland (G3G5, Jack Pine Heath Barren, CEGl006041)
- Pinus resinosa / Gaylussacia baccata - Vaccinium angustifolium Woodland (G3G5, Red Pine Woodland, cegl006010)
- Pinus rigida - Quercus (coccinea, velutina) / Schizachyrium scoparium Woodland (M, G3G5, CEGl006166)
- Pinus rigida / Corema conradii Woodland (M, G2, Coastal Pitch Pine Rocky Woodland, CEGl006154)
- Pinus rigida / Photinia melanocarpa / Deschampsia flexuosa - Schizachyrium scoparium Woodland (G?, Pitch Pine Rocky Summit, CEGl006116)
- Populus tremuloides - (Populus grandidentata) Rocky Woodland (G?, Mixed Aspen Rocky Woodland, CEGl002487)
- Quercus ellipsoidalis - Quercus macrocarpa - (Pinus banksiana) Rocky Woodland (G?, Boreal Oak - (Pine) Rocky Woodland, CEGl005246)
- Quercus rubra - (Quercus prinus) / Vaccinium spp. / Deschampsia flexuosa Woodland (G3G5, Appalachian Red Oak Woodland (Northern Type), CEGl006134)
- Vaccinium angustifolium - Sorbus americana / Sibbaldiopsis tridentata Dwarf-shrubland (G?, Blueberry Granite Barrens, CEGl005094)

SOURCES

Last updated: 14 Mar 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.564 LAURENTIAN-ACADIAN NORTHERN HARDWOODS FOREST

Division 201, Forest and Woodland

Spatial Scale & Pattern: Matrix

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Montane, Forest and Woodland (Treed), Eutrophic Soil, Mesotrophic Soil, Broad-Leaved Tree, Acer saccharum - Betula spp.

Non-Diagnostic Classifiers: Lowland, Ridge/Summit/Upper Slope, Sideslope, Glaciated, Circumneutral Soil, Acidic Soil, Shallow Soil, Deep Soil, Mineral: W/ A-Horizon >10 cm, Loam Soil Texture, Udic, Long Disturbance Interval, W-Patch/Medium Intensity

Concept Summary: These northern hardwood forests range across New England and adjacent Canada west to Minnesota. They occur in various dry-mesic to wet-mesic settings at low to moderate elevations (generally <2000 feet) throughout the Laurentian-Acadian Division. *Acer saccharum*, *Betula alleghaniensis*, and *Fagus grandifolia* are the dominant trees (the latter only east of Lake Michigan). *Tsuga canadensis* or, in the Northeast, *Picea rubens* are common minor canopy associates. *Ostrya virginiana* is frequent but not dominant. Oak is a minor component, and absent from northern regions. Soils range from moderately nutrient-poor to quite enriched, with associated shifts in the herb flora. Blowdowns or snow and ice loading, with subsequent gap regeneration, are the most frequent form of natural disturbance.

Comments: An east-west separation may be warranted between the Laurentian and Acadian region. But the hardwoods component is essentially similar (though beech drops out in the most western part of this system). Further review is needed, and should be done in conjunction with the similar spruce-fir-northern hardwood system, Acadian Lowland Spruce-Fir-Hardwood Forest (CES201.565).

DISTRIBUTION

Range: Northern New England and northern New York west across the upper Great Lakes to northern Minnesota, and adjacent Canada; occasional southwards.

Ecological Divisions: 201, 202

TNC Ecoregions: 47:C, 48:C, 60:C, 61:C, 63:C, 64:C

Subnations/Nations: MA:c, ME:c, MI:c, MN:c, NB:?, NH:c, NY:c, ON:?, QC:?, VT:c, WI:c

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CONCEPT

Associations:

- *Acer saccharum* - (*Fraxinus americana*) / *Arisaema triphyllum* Forest (G?, Semi-rich Northern Hardwood Forest, CEGL006211)
- *Acer saccharum* - *Betula alleghaniensis* - (*Tilia americana*) Forest (G3G4, Maple - Yellow Birch Northern Hardwoods Forest, CEGL002457)
- *Acer saccharum* - *Betula alleghaniensis* - *Fagus grandifolia* / *Viburnum lantanoides* Forest (G3G5, Northern Hardwood Forest, CEGL006252)
- *Acer saccharum* - *Betula alleghaniensis* - *Prunus serotina* Forest (G4, Central Appalachian Northern Hardwood Forest, CEGL006045)
- *Acer saccharum* - *Fagus grandifolia* - *Betula* spp. / *Maianthemum canadense* Forest (G4G5, Beech - Maple - Northern Hardwoods Forest, CEGL005004)
- *Acer saccharum* - *Fraxinus americana* - *Juglans cinerea* / *Staphylea trifolia* Forest (G4?, CEGL006020)
- *Acer saccharum* - *Fraxinus americana* - *Tilia americana* - *Liriodendron tulipifera* / *Actaea racemosa* Forest (G4?, CEGL006237)
- *Acer saccharum* - *Fraxinus americana* - *Tilia americana* / *Acer spicatum* / *Allium tricoccum* - *Caulophyllum thalictroides* Forest (G4?, Sugar Maple - Ash - Basswood Northern Appalachian Rich Mesic Forest, CEGL005008)
- *Acer saccharum* - *Tilia americana* / *Ostrya virginiana* - *Carpinus caroliniana* Forest (G3G4, North-central Maple - Basswood Forest, CEGL002062)
- *Acer saccharum* - *Tilia americana* / *Ostrya virginiana* / *Lonicera canadensis* Forest (G3?, Northern Maple - Basswood Forest, CEGL002458)
- Clay Seeps Sparse Vegetation (G?, Clay Seeps, CEGL005163)
- *Symplocarpus foetidus* Herbaceous Vegetation (G4?, Skunk Cabbage Seepage Meadow, CEGL002385)
- *Thuja occidentalis* - *Betula alleghaniensis* Forest (G2Q, Northern White-cedar - Yellow Birch Forest, CEGL002450)
- *Thuja occidentalis* / *Abies balsamea* - *Acer spicatum* Forest (G4, White-cedar - Boreal Conifer Mesic Forest, CEGL002449)

SOURCES

References: Comer and Albert 1997, Comer et al. 1995a, Comer et al. 1998

Last updated: 14 Mar 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.563 LAURENTIAN-ACADIAN PINE-HEMLOCK-HARDWOOD FOREST

Division 201, Forest and Woodland

Spatial Scale & Pattern: Matrix

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Lowland, Forest and Woodland (Treed), *Pinus* spp. - *Tsuga canadensis*

Non-Diagnostic Classifiers: Sideslope, Glaciated, Mesotrophic Soil, Acidic Soil, Shallow Soil, Deep Soil, Mineral: W/ A-Horizon >10 cm, Sand Soil Texture, Loam Soil Texture, Udic, Very Long Disturbance Interval, F-Landscape/Medium Intensity, W-Patch/Medium Intensity, Needle-Leaved Tree, Broad-Leaved Deciduous Tree

Concept Summary: This north-temperate forest system ranges from the northeastern U.S. and adjacent Canada west to the Great Lakes and upper Midwest. The mesic to dry-mesic forests usually occur on low-nutrient soils at low elevations, mostly <2000 feet. Canopy dominants include *Pinus strobus*, *Tsuga canadensis*, and *Quercus rubra* in varying percentages. *Acer rubrum* is also quite common. *Quercus velutina* and *Quercus alba* are essentially absent from this system, being more representative of systems in the Central Interior-Appalachian Division to the south. This is a widespread, matrix forest type for the more temperate portions of this division. Gap replacement and infrequent fire are the major natural regeneration modes.

DISTRIBUTION

Range: New England west to the Great Lakes and northern Minnesota.

Ecological Divisions: 201

TNC Ecoregions: 47:C, 48:C, 63:C, 64:P

Subnations/Nations: ME:c, MI:c, MN:c, NH:c, NY:c, PA:c, VT:c, WI:c

CONCEPT

Associations:

- (*Pinus strobus*, *Quercus rubra*) / *Danthonia spicata* Acid Bedrock Wooded Herbaceous Vegetation (G3G4, White Pine - Red Oak Bedrock Glade, CEGL005101)

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- *Acer rubrum* - *Nyssa sylvatica* - *Betula alleghaniensis* / *Sphagnum* spp. Forest (G?, Red Maple - Black Gum Basin Swamp, C EGL006014)
- *Acer saccharum* - *Pinus strobus* / *Acer pensylvanicum* Forest (G?, Northern Hardwood - White Pine Forest, C EGL005005)
- *Betula alleghaniensis* - *Acer rubrum* - (*Tsuga canadensis*, *Abies balsamea*) / *Osmunda cinnamomea* Forest (G4?, Hardwood - Conifer Seepage Forest, C EGL006380)
- Clay Seeps Sparse Vegetation (G?, Clay Seeps, C EGL005163)
- *Pinus strobus* - (*Pinus resinosa*) - *Quercus rubra* Forest (G4G5, White Pine - Red Oak Forest, C EGL002480)
- *Pinus strobus* - *Quercus* (*rubra*, *velutina*) - *Fagus grandifolia* Forest (G5, White Pine - Oak Forest, C EGL006293)
- *Pinus strobus* - *Quercus alba* / (*Corylus americana*, *Gaylussacia baccata*) Forest (G3, White Pine - White Oak Sand Forest, C EGL002481)
- *Pinus strobus* - *Tsuga canadensis* - *Picea rubens* Forest (G?, White Pine - Hemlock - Red Spruce Forest, C EGL006324)
- *Pinus strobus* - *Tsuga canadensis* Great Lakes Forest (G3, Great Lakes White Pine - Hemlock Forest, C EGL002590)
- *Pinus strobus* / *Acer spicatum* - *Corylus cornuta* Forest (G3G4, White Pine / Mountain Maple Mesic Forest, C EGL002445)
- *Quercus rubra* - *Acer rubrum* - *Betula* spp. - *Pinus strobus* Forest (G?, Northern Oak - Pine Forest, C EGL006506)
- *Quercus rubra* - *Acer saccharum* - *Fagus grandifolia* / *Viburnum acerifolium* Forest (G?, Red Oak - Northern Hardwood Forest, C EGL006173)
- *Quercus rubra* - *Acer saccharum* - *Liriodendron tulipifera* Forest (G?, High Allegheny Rich Red Oak - Sugar Maple Forest, C EGL006125)
- *Quercus rubra* - *Acer saccharum* Forest (G4G5, Northern Red Oak - Sugar Maple Forest, C EGL002461)
- *Quercus rubra* - *Quercus alba* - (*Quercus velutina*, *Acer rubrum*) / *Viburnum acerifolium* Forest (G?, Northern Red Oak - White Oak - (Maple) Forest, C EGL002462)
- *Symplocarpus foetidus* Herbaceous Vegetation (G4?, Skunk Cabbage Seepage Meadow, C EGL002385)
- *Thuja occidentalis* - (*Betula alleghaniensis*, *Tsuga canadensis*) Forest (G3?, White-cedar - (Hemlock) Mesic Forest, C EGL002595)
- *Tsuga canadensis* - (*Betula alleghaniensis*) - *Picea rubens* / *Cornus canadensis* Forest (G?, Hemlock - Spruce - Hardwood Forest, C EGL006129)
- *Tsuga canadensis* - (*Betula alleghaniensis*) Forest (G3G4, Hemlock Mesic Forest, C EGL002598)
- *Tsuga canadensis* - *Acer saccharum* - *Betula alleghaniensis* Forest (G4?, North Central Hemlock - Hardwood Forest, C EGL005044)
- *Tsuga canadensis* - *Fagus grandifolia* - (*Acer saccharum*) Great Lakes Forest (G4G5, Great Lakes Hemlock - Beech - Hardwood Forest, C EGL005042)
- *Tsuga canadensis* - *Fagus grandifolia* - *Acer saccharum* / (*Hamamelis virginiana*, *Kalmia latifolia*) Forest (G3?, East-central Hemlock Hardwood Forest, C EGL005043)

SOURCES

References: Comer and Albert 1997, Comer et al. 1995a, Comer et al. 1998, Whitney 1984

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.719 LAURENTIAN-ACADIAN WHITE PINE-RED PINE FOREST

Division 201, Forest and Woodland

Spatial Scale & Pattern: Matrix

Classification Confidence: high

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Forest and Woodland (Treed)

Concept Summary: This pine forest system is found on nutrient-poor to moderately rich soils in a variety of topographic settings. Soils are loamy to sandy, varying from thin soil over bedrock to deeper soils, sometimes sandy. Sites are xeric to subxeric, but less strongly than barrens and sandplains. The dominant fire regime varies from 100-200 years for *Pinus strobus* and *Pinus resinosa*. Other boreal conifers may occasionally be present. Canopy structure is mostly closed-canopy but can be partially open. Conifers typically dominate the canopy, but boreal hardwoods (*Populus tremuloides*, *Betula papyrifera*) or hardwoods (*Acer rubrum*, *Quercus rubra*) may codominate. The shrub and field layers can be somewhat dense to sparse.

Comments: This system is dominated by white and red pine forests, which are found primarily in the Great Lakes and sub-boreal region, but extend eastward to Acadia.

DISTRIBUTION

Ecological Divisions: 201

TNC Ecoregions: 47:, 48:, 60:, 61:?, 63:

Subnations/Nations: MB:, ME:, MI:, MN:, NB:, NH:, NS:, NY:, ON:, PE:, WI:

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

CONCEPT

Associations:

- Pinus resinosa - Populus tremuloides / Diervilla lonicera - Vaccinium spp. Forest (H, G?, Red Pine - Aspen - Birch Forest, CEG L002520)
- Pinus resinosa / Vaccinium spp. Forest (H, G3, Red Pine / Blueberry Dry Forest, CEG L002443)
- Pinus strobus - Populus tremuloides / Corylus cornuta Forest (H, G4?, White Pine - Aspen - Birch Forest, CEG L002479)
- Pinus strobus - Tsuga canadensis - Picea rubens Forest (M, G?, White Pine - Hemlock - Red Spruce Forest, CEG L006324)
- Pinus strobus / Acer spicatum - Corylus cornuta Forest (H, G3G4, White Pine / Mountain Maple Mesic Forest, CEG L002445)
- Pinus strobus / Vaccinium spp. Forest (H, G3G4, White Pine / Blueberry Dry-Mesic Forest, CEG L002444)

SOURCES

References: Comer et al. 1995a, Comer et al. 1998, Frelich 1992, Heinselman 1973, Whitney 1986, Whitney 1987

Last updated: 24 Mar 2003

Stakeholders: MCS, ECS, CAN

Concept Author: D. Faber-Langendoen

LeadResp: MCS

CES201.567 ACADIAN ALPINE BARRENS

Division 201, Shrubland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Alpine/AltiAndino, Shrubland (Shrub-dominated), Moss/Lichen (Nonvascular), Ridge/Summit/Upper Slope

Non-Diagnostic Classifiers: Glaciated, Oligotrophic Soil, Acidic Soil, Very Shallow Soil, Aquic, Udic, Consolidated, Landslide, W-Landscape/High Intensity, Dwarf-Shrub, Graminoid, Lichen, Long (>500 yrs) Persistence

Concept Summary: Restricted to the northern Appalachians and the Gaspé Peninsula, this system encompasses vegetation above treeline on northeastern mountains. Wind, snow, and cloud-cover fog are prominent environmental factors. Most of the cover is dwarf-shrubland, lichen, or sparse vegetation; islands of taller shrubs may occur in protected spots. The dominant plants are ericads (*Vaccinium uliginosum* is diagnostic and often dominant, with several other alpine-restricted ericads such as *Phyllodoce caerulea* and *Loiseleuria procumbens*) and cushion-plants such as *Diapensia lapponica*. *Carex bigelowii* is a characteristic and, in some places, locally dominant sedge. This system includes wetland depressions, small alpine bogs, within the surrounding upland matrix.

DISTRIBUTION

Range: Higher summits of the northern Appalachian mountains, from northern New England and the Adirondacks into the Canadian Gaspé.

Ecological Divisions: 201

TNC Ecoregions: 63:C

Subnations/Nations: ME:c, NH:, NY:, QC:, VT:

CONCEPT

Associations:

- *Carex bigelowii* Herbaceous Vegetation (G2, Bigelow's Sedge Alpine Meadow, CEG L006081)
- *Diapensia lapponica* Dwarf-shrubland (G2G3, Windswept Alpine Ridge, CEG L006322)
- *Empetrum nigrum* - *Vaccinium uliginosum* - *Vaccinium oxycoccos* / *Rubus chamaemorus* Dwarf-shrubland (G?, Black Crowberry Wet Alpine Bog, CEG L006140)
- *Kalmia angustifolia* - *Chamaedaphne calyculata* / *Rubus chamaemorus* / *Cladina* spp. Dwarf-shrubland (G?, CEG L006425)
- Lichen Fellfield Sparse Vegetation [Provisional] (G?, Lichen Fellfield, CEG L006420)
- *Trichophorum caespitosum* - *Calamagrostis pickeringii* Herbaceous Vegetation (G?, CEG L006423)
- *Trichophorum caespitosum* - *Carex scirpoidea* - *Carex bigelowii* Herbaceous Vegetation (G?, CEG L006424)
- *Trichophorum caespitosum* - *Saxifraga (foliolosa, paniculata, rivularis)* Herbaceous Vegetation (G?, Northern Appalachian Alpine Cliff, CEG L006428)
- *Vaccinium uliginosum* - *Harrimanella hypnoides* - *Loiseleuria procumbens* Dwarf-shrubland (G2G3, Alpine Heath Snowbank, CEG L006155)
- *Vaccinium uliginosum* - *Rhododendron lapponicum* / *Juncus trifidus* Dwarf-shrubland (G2G3, Alpine Heath Meadow, CEG L006298)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

SOURCES

References: Bliss 1963, Kimball and Weihrauch 2000, Sperduto and Cogbill 1999

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS

LeadResp: ECS

CES201.568 ACADIAN SUBALPINE WOODLAND AND BARRENS

Division 201, Shrubland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Alpine/AltiAndino, Shrubland (Shrub-dominated), Ridge/Summit/Upper Slope, *Picea (glauca, mariana, rubens)* - *Abies*

Non-Diagnostic Classifiers: Montane, Forest and Woodland (Treed), Moss/Lichen (Nonvascular), Glaciated, Mesotrophic Soil, Oligotrophic Soil, Acidic Soil, Very Shallow Soil, Shallow Soil, Mineral: W/ A-Horizon >10 cm, Mineral: W/ A-Horizon <10 cm, Udic, Consolidated, Intermediate Disturbance Interval, Long Disturbance Interval, F-Patch/Medium Intensity, W-Landscape/High Intensity, Needle-Leaved Tree, Broad-Leaved Shrub, Long (>500 yrs) Persistence

Concept Summary: This system encompasses vegetation of varying physiognomy at upper elevations, near and slightly above treeline, in the northeastern U.S. and adjacent Canada. This system may be a zone between montane spruce-fir forest and alpine systems, or may cover the ridgelines and summits of lower mountains. In the Appalachians it occurs mostly above 2500 feet, but can be at much lower elevations near the Atlantic Coast. The trees become progressively stunted as exposure increases, with *Picea rubens* being replaced by *Picea mariana*. *Abies balsamea* is also a prominent tree species, and may occur as "fir-wave" forests. Vegetation structure ranges from forest to woodland to shrubland to sparsely vegetated dwarf-shrubs and herbs. Forest and woodland are most extensive, and patches of open rock support areas of shrub, dwarf-shrub or sparse vegetation. In the subalpine zone, shrublands may be extensive on the upper slopes, forming krummholz or, in somewhat more protected spots, deciduous shrub thickets. Ericads including *Kalmia angustifolia*, *Ledum groenlandicum*, and *Vaccinium uliginosum*, are the most characteristic shrubs; *Empetrum nigrum* and *Empetrum eamesii ssp. atropurpureum* (= *Empetrum atropurpureum*) are indicative of the subalpine zone. Subalpine fens, restricted to the White Mountains, are included here. These are heath-dominated and graminoid-dominated fens, often occurring in a mosaic surrounded by other subalpine vegetation. They are on gentle slopes (usually ca. 10%), usually at 2400-3000 feet. *Calamagrostis pickeringii* is dominant and characteristic in the graminoid fens, with northern sedges such as *Carex michauxiana*, *Carex wiegandii*, *Carex exilis*, etc. The montane heath fens contain *Alnus viridis ssp. crispa* (= *Alnus crispa*), *Nemopanthus mucronatus*, and ericads. Peat accumulation is in the 10-50 cm range. These are usually ca. 5 acres in size, but range up to about 20 acres.

Comments: Subalpine fens are considered a distinct system by NHHP (the only state where they're currently known from), but because (1) there is little information available on them yet and (2) the alpine system includes alpine wetlands as well as uplands, they are included within this system. This could be reconsidered as more information on their landscape distribution, extent and pattern becomes available.

DISTRIBUTION

Range: Higher summits of the northern Appalachian mountains, from northern New England and the Adirondacks into the Canadian Gaspé, extending south in scattered locations into southern New England.

Ecological Divisions: 201, 202

TNC Ecoregions: 61:C, 63:C

Subnations/Nations: ME:c, NB:, NH:c, NY:c, QC:, VT:c

CONCEPT

Associations:

- *Abies balsamea* - (*Betula papyrifera* var. *cordifolia*) Forest (G?, Montane Fir - Birch Forest, CEG006112)
- *Empetrum nigrum* - *Vaccinium uliginosum* - *Vaccinium oxycoccos* / *Rubus chamaemorus* Dwarf-shrubland (G?, Black Crowberry Wet Alpine Bog, CEG006140)
- *Kalmia angustifolia* - *Chamaedaphne calyculata* / *Rubus chamaemorus* / *Cladina* spp. Dwarf-shrubland (G?, CEG006425)
- *Picea mariana* - *Abies balsamea* / *Sibbaldiopsis tridentata* Shrubland (G?, Black Spruce Krummholz, CEG006038)
- *Picea mariana* / *Kalmia angustifolia* Dwarf-shrubland (G?, Subalpine Summit Heath, CEG006031)
- *Picea mariana* / *Ledum groenlandicum* - *Empetrum nigrum* / *Cladina* spp. Dwarf-shrubland (G3G5, Cold Air Talus Heathland, CEG006268)
- *Picea rubens* / *Vaccinium angustifolium* / *Sibbaldiopsis tridentata* Woodland (G3G5, Spruce - Fir Rocky Ridge, CEG006053)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

SOURCES

References: Sperduto and Cogbill 1999
Last updated: 09 Jan 2003
Concept Author: S.C. Gawler

Stakeholders: ECS
LeadResp: ECS

CES201.573 ACADIAN-NORTH ATLANTIC ROCKY COAST

Division 201, Shrubland

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Shrubland (Shrub-dominated), Moss/Lichen (Nonvascular), Rocks and Derived Substrates of the Immediate Coast

Non-Diagnostic Classifiers: Lowland, Glaciated, Very Shallow Soil, Mineral: W/ A-Horizon <10 cm, Consolidated, Unconsolidated, W-Landscape/Medium Intensity, Moderate (100-500 yrs) Persistence, Long (>500 yrs) Persistence

Concept Summary: This system encompasses non-forested uplands along the immediate Atlantic Coast, from north of Cape Cod to the Canadian maritimes. It is often a narrow zone between the high tide line and the upland forest; this zone becomes wider with increasing maritime influence. The substrate is rock, sometimes with a shallow soil layer, and tree growth is prevented by extreme exposure to wind, salt spray, and fog. Cover is patchy shrubs, dwarf-shrubs and sparse vascular vegetation, sometimes with a few stunted trees. Many coastal islands have graminoid-shrub areas that were maintained by sheep grazing and now persist even after grazing has ceased.

DISTRIBUTION

Range: Primary range is Maine eastward into the Canadian Maritimes, with peripheral occurrences southward along the New England rocky coast.

Ecological Divisions: 201, 202

TNC Ecoregions: 62:C, 63:C

Subnations/Nations: CT:?, MA:c, ME:c, NB:, NH:p

CONCEPT

Associations:

- *Cakile edentula* ssp. *edentula* - *Mertensia maritima* Sparse Vegetation (G?, Northern Maritime Beach Strand, CEG006106)
- *Morella pensylvanica* - *Empetrum nigrum* Dwarf-shrubland (G?, Crowberry - Bayberry Maritime Shrubland, CEG006510)
- *Morella pensylvanica* - *Prunus maritima* Shrubland (G4, Northern Bayberry Dune Shrubland, CEG006295)
- *Prunus serotina* - *Rhus typhina* Shrubland (G?, Rocky Headland, CEG006399)
- *Solidago sempervirens* - (*Rhodiola rosea*) - *Juniperus horizontalis* Sparse Vegetation (G?, Northern Maritime Rocky Headlands, CEG006529)

SOURCES

Last updated: 09 Jan 2003
Concept Author: S.C. Gawler

Stakeholders: ECS
LeadResp: ECS

CES201.569 LAURENTIAN-ACADIAN ACIDIC CLIFF AND TALUS

Division 201, Shrubland

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Ridge/Summit/Upper Slope, Cliff (Substrate), Talus (Substrate), Acidic Soil, Landslide

Non-Diagnostic Classifiers: Montane, Lowland, Shrubland (Shrub-dominated), Moss/Lichen (Nonvascular), Glaciated, Very Shallow Soil, Mineral: W/ A-Horizon <10 cm, Intermediate Disturbance Interval [Periodicity/Polycyclic Disturbance], Moderate (100-500 yrs) Persistence

Concept Summary: This cliff system occurs at low to mid elevations, well below treeline, from New England west to the Great Lakes. It consists of vertical or near-vertical cliffs and the talus slopes below, formed on hills of granitic or otherwise acidic bedrock. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. Vegetation in seepage areas tends to be more well-developed and floristically different from the surrounding dry cliffs. The vegetation is patchy and often sparse, punctuated with patches of small trees (e.g., *Betula* and *Picea* spp.). Calciphilic species are absent. This system differs from the more southerly North-Central Appalachian Acidic Cliff and Talus (CES202.601) in the more boreal affinities of its flora, for example *Picea* spp. rather than *Juniperus virginiana*.

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

DISTRIBUTION

Range: New England and adjacent Canada west to the Great Lakes.

Ecological Divisions: 201, 202

TNC Ecoregions: 47:C, 48:C, 61:C, 63:C

Subnations/Nations: MA:?, ME:c, MI:c, MN:c, NH:c, NY:c, VT:c, WI:c

CONCEPT

Associations:

- *Acer spicatum* - *Thuja occidentalis* - *Betula papyrifera* / *Taxus canadensis* Shrubland (G?, Northern (Laurentian) Igneous - Metamorphic Moist Cliff Scrub, CEGL005251)
- Basalt - Diabase Northern Open Talus Sparse Vegetation (G?, Northern Basalt - Diabase Open Talus, CEGL005247)
- *Betula alleghaniensis* - *Quercus rubra* / *Polypodium virginianum* Woodland (G3G5, Northern Hardwood - Oak Talus Slope Woodland, CEGL006320)
- *Betula papyrifera* - *Picea glauca* / *Acer spicatum* - *Alnus viridis* / *Polypodium virginianum* Talus Shrubland [Provisional] (G?, Northern Basalt - Diabase Scrub Talus, CEGL005252)
- *Drosera rotundifolia* - *Viola* spp. Cliff Sparse Vegetation (G?, Northern Appalachian Cliff Seep, CEGL006429)
- Granite - Metamorphic Talus Northern Sparse Vegetation (G4G5, Northern Granite - Metamorphic Talus, CEGL002409)
- Igneous - Metamorphic Northern Dry Cliff Sparse Vegetation (G?, Northern (Laurentian) Igneous - Metamorphic Dry Cliff, CEGL002300)
- *Picea mariana* / *Ledum groenlandicum* - *Empetrum nigrum* / *Cladina* spp. Dwarf-shrubland (G3G5, Cold Air Talus Heathland, CEGL006268)
- *Picea rubens* / *Ribes glandulosum* Woodland (G3G5, Red Spruce Talus Slope Woodland, CEGL006250)
- *Polypodium* (*virginianum*, *appalachianum*) / Lichens Nonvascular Vegetation (G?, Northern Lichen Talus Barrens, CEGL006534)
- Sandstone Dry Cliff Sparse Vegetation (G4G5, Midwest Dry Sandstone Cliff, CEGL002045)
- Sandstone Midwest Moist Cliff Sparse Vegetation (G4G5, Midwest Moist Sandstone Cliff, CEGL002287)

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.580 ACADIAN MARITIME BOG

Division 201, Woody Wetland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Organic Peat (>40 cm), Dwarf-Shrub, Graminoid, Maritime Climate

Non-Diagnostic Classifiers: Shrubland (Shrub-dominated), Bryophyte, Moderate (100-500 yrs) Persistence, Extensive Wet Flat, Depressional, Oligotrophic Water, Acidic Water, Saturated Soil, >180-day hydroperiod

Concept Summary: These ombrotrophic acidic peatlands occur along the north Atlantic Coast from downeast Maine east into the Canadian maritimes. When these form in basins, they develop raised plateaus with undulating sedge and dwarf-shrub vegetation. *Trichophorum caespitosum* may form sedge lawns on the raised plateau. The system may also occur as "blanket bogs" over a sloping rocky substrate in extreme maritime settings; here, dwarf-shrubs and *Sphagnum* are the dominant cover. Species characteristic of this maritime setting include *Empetrum nigrum* and *Rubus chamaemorus*. Typical bog heaths such as *Kalmia angustifolia*, *Kalmia polifolia*, *Gaylussacia baccata*, *Ledum groenlandicum*, and *Gaylussacia dumosa* are also present. Morphological characteristics and certain coastal species distinguish these from more inland raised bogs. The distribution is primarily Canadian, and these peatlands are rare in the U.S.

DISTRIBUTION

Range: Eastern Maine eastward into the Canadian Maritimes, near the coast.

Ecological Divisions: 201

TNC Ecoregions: 63:C

Subnations/Nations: ME:c, NB:

CONCEPT

Associations:

- *Empetrum nigrum* - *Gaylussacia dumosa* - *Rubus chamaemorus* / *Sphagnum* spp. Dwarf-shrubland (G3G5, Maritime Crowberry Bog, CEGL006248)
- *Kalmia angustifolia* - *Chamaedaphne calyculata* - (*Picea mariana*) / *Cladina* spp. Dwarf-shrubland (G5, Raised Dwarf-shrub Bog, CEGL006225)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

- *Picea mariana* / (*Vaccinium corymbosum*, *Gaylussacia baccata*) / *Sphagnum* sp. Woodland (G3G5, Black Spruce Woodland Bog, CEG L006098)
- *Picea mariana* / *Rubus chamaemorus* / *Sphagnum* spp. Woodland (G3G5, Coastal Black Spruce Woodland Bogs, CEG L006082)
- *Trichophorum caespitosum* - *Gaylussacia dumosa* / *Sphagnum* (*fuscum*, *rubellum*, *magellanicum*) Herbaceous Vegetation (G?, Maritime Peatland Sedge Lawn, CEG L006260)

SOURCES

References: Damman and French 1987

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS

LeadResp: ECS

CES201.583 LAURENTIAN-ACADIAN ACIDIC BASIN FEN

Division 201, Woody Wetland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Organic Peat (>40 cm), Broad-Leaved Shrub, Dwarf-Shrub, Graminoid, *Picea mariana* - *Larix laricina*, Extensive Wet Flat, Depressional, Acidic Water

Non-Diagnostic Classifiers: Shrubland (Shrub-dominated), Moderate (100-500 yrs) Persistence, Oligotrophic Water, Shallow (<15 cm) Water

Concept Summary: This peatland system ranges over a broad geographic area across the glaciated northeast to the Great Lakes and upper Midwest. The fens have developed in open or closed, relatively shallow basins with nutrient-poor and acidic conditions. Many occur in association with larger lakes or streams. The substrate is *Sphagnum*, and vegetation typically includes areas of graminoid dominance and dwarf-shrub dominance. *Chamaedaphne calyculata* is usually present and often dominant. Scattered stunted trees may be present. These fens often develop adjacent to open water. They lack the ribbed or reticulate microtopographical patterning of the patterned fen system.

Comments: Need to clarify the conceptual boundaries between this and the boreal fens in central and eastern Canada.

DISTRIBUTION

Range: New England and adjacent Canada west to the Great Lakes and Minnesota, north of the glacial boundary.

Ecological Divisions: 201, 202

TNC Ecoregions: 47:C, 48:P, 61:C, 63:C

Subnations/Nations: MA:c, ME:c, MI:c, MN:c, NB:, NH:c, NY:c, QC:, VT:c, WI:c

CONCEPT

Associations:

- *Carex* (*oligosperma*, *exilis*) - *Chamaedaphne calyculata* Shrub Herbaceous Vegetation (G?, Few-seeded Sedge - Leatherleaf Fen, CEG L006524)
- *Carex lasiocarpa* - *Carex oligosperma* / *Sphagnum* spp. Herbaceous Vegetation (G3G4, Northern Sedge Poor Fen, CEG L002265)
- *Carex oligosperma* - *Carex pauciflora* - *Eriophorum vaginatum* / *Sphagnum* spp. Herbaceous Vegetation (G4G5, Open Graminoid / *Sphagnum* Bog, CEG L005256)
- *Chamaedaphne calyculata* / *Carex oligosperma* / *Sphagnum* spp. Poor Fen Dwarf-shrubland (G5, Leatherleaf Poor Fen, CEG L005277)
- *Larix laricina* / *Chamaedaphne calyculata* / *Carex lasiocarpa* Shrubland (G4G5, Tamarack Scrub Poor Fen, CEG L005226)
- *Myrica gale* - *Chamaedaphne calyculata* / *Carex* (*lasiocarpa*, *utriculata*) - *Utricularia* spp. Shrub Herbaceous Vegetation (G4G5, Medium Fen, CEG L006302)
- *Myrica gale* - *Spiraea alba* - *Chamaedaphne calyculata* Shrubland (G?, Sweetgale Mixed Shrub Fen, CEG L006512)
- *Picea mariana* / *Chamaedaphne calyculata* / *Sphagnum* spp. Dwarf-shrubland (G4G5, Black Spruce / Leatherleaf Semi-treed Bog, CEG L005218)
- *Vaccinium corymbosum* / *Sphagnum* spp. Shrubland (G3G5, Highbush Blueberry Bog Thicket, CEG L006190)

SOURCES

References: Damman and French 1987

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

CES201.574 LAURENTIAN-ACADIAN ACIDIC SWAMP

Division 201, Woody Wetland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: *Picea* (*rubens*, *mariana*) - *Acer rubrum*, Extensive Wet Flat, Acidic Water

Non-Diagnostic Classifiers: Forest and Woodland (Treed), Mineral: W/ A-Horizon <10 cm, Needle-Leaved Tree, Broad-Leaved Deciduous Tree, Moderate (100-500 yrs) Persistence, Mesotrophic Water, Oligotrophic Water, Saturated Soil, Intermittent Flooding [Intermittent interval, Irregular Flooding], Intermittent Flooding [Intermittent interval, Spring Flooding]

Concept Summary: These forested wetlands are found in temperate northeastern and north-central U.S., primarily in glaciated regions in the Laurentian-Acadian region. They occur on mineral soils that are nutrient-poor. There may be an organic epipedon, but the substrate is not deep peat. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. *Acer rubrum*, *Fraxinus* spp., *Picea rubens* (rarely *Picea mariana*), and *Abies balsamea* are the most typical trees. The herbaceous and shrub layers tend to be fairly species-poor. *Nemopanthus mucronatus* and *Osmunda* spp. are typical shrub and herb species.

Comments: Acadian Near-Boreal Spruce Flat (CES201.562) is related but is more northern and occurs on imperfectly drained but not persistently saturated soils. *Picea rubens* in the east vs. *Picea mariana* in the west and north might be a split in future with more careful scrutiny.

DISTRIBUTION

Range: New England and adjacent Canada west to the Great Lakes and northern Minnesota.

Ecological Divisions: 201

TNC Ecoregions: 47:P, 48:C, 60:P, 63:C

Subnations/Nations: ME:c, MI:c, MN:p, NB:, NH:c, NY:c, ON:, VT:c, WI:c

CONCEPT

Associations:

- *Acer rubrum* - *Fraxinus* spp. - *Betula papyrifera* / *Cornus canadensis* Forest (L, G4, Red Maple - Ash - Birch Swamp Forest, CEG002071)
- *Acer rubrum* - *Fraxinus* spp. / *Nemopanthus mucronatus* - *Vaccinium corymbosum* Forest (G?, Northern Red Maple - Ash Swamp, CEG006220)
- *Acer rubrum* / *Carex stricta* - *Onoclea sensibilis* Woodland (L, G3G5, Red Maple - Tussock Sedge Wooded Marsh, CEG006119)
- *Betula alleghaniensis* - *Acer rubrum* - (*Tsuga canadensis*, *Abies balsamea*) / *Osmunda cinnamomea* Forest (G4?, Hardwood - Conifer Seepage Forest, CEG006380)
- *Picea mariana* / *Alnus incana* / *Sphagnum* spp. Forest (L, G5, Black Spruce / Alder Swamp, CEG002452)
- *Picea rubens* - *Abies balsamea* / *Gaultheria hispidula* / *Osmunda cinnamomea* / *Sphagnum* spp. Forest (G?, Northern Appalachian Spruce - Fir Swamp, CEG006312)
- *Picea rubens* - *Acer rubrum* / *Nemopanthus mucronatus* Forest (G?, Red Maple - Conifer Acidic Swamp, CEG006198)

SOURCES

References: Comer and Albert 1997, Comer et al. 1995a, Comer et al. 1998

Last updated: 23 Mar 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.585 LAURENTIAN-ACADIAN ALKALINE FEN

Division 201, Woody Wetland

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Organic Peat (>40 cm), Mesotrophic Water, Alkaline Water, Circumneutral Water

Non-Diagnostic Classifiers: Shrubland (Shrub-dominated), Broad-Leaved Shrub, Dwarf-Shrub, Graminoid, Moderate (100-500 yrs) Persistence, Extensive Wet Flat, Depressional, Shallow (<15 cm) Water, Saturated Soil

Concept Summary: These fens, distributed across glaciated eastern and central North America, develop in open basins where bedrock or other substrate influence creates circumneutral to calcareous conditions. They are most abundant in areas of limestone bedrock, and widely scattered in areas where calcareous substrates are scarce. The vegetation may be graminoid-dominated, shrub-dominated, or a patchwork of the two; *Dasiphora fruticosa ssp. floribunda* is a common

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

diagnostic shrub. The herbaceous flora is usually species-rich, and includes calciphilic graminoids and forbs. *Sphagnum* dominates the substrate; *Campylium stellatum* is an indicator bryophyte. The edge of the basin may be shallow to deep peat over a sloping substrate, where seepage waters provide nutrients.

Comments: Need to clarify the conceptual boundaries between this and the boreal fens in central and eastern Canada.

DISTRIBUTION

Range: Scattered locations from New England and adjacent Canada west to the Great Lakes and northern Minnesota.

Ecological Divisions: 201, 202

TNC Ecoregions: 47:C, 48:C, 61:C, 63:C, 64:P

Subnations/Nations: ME:c, MI:c, MN:c, NB:, NH:c, NY:c, VT:c, WI:c

CONCEPT

Associations:

- *Betula pumila* - *Dasiphora fruticosa* ssp. *floribunda* / *Carex lasiocarpa* - *Trichophorum alpinum* Shrubland (G3G5, Bog Birch - Shrubby-cinquefoil Rich Boreal Fen, CEGL002495)
- *Betula pumila* / *Chamaedaphne calyculata* / *Carex lasiocarpa* Shrubland (G4G5, Bog Birch - Leatherleaf Rich Fen, CEGL002494)
- *Carex* (interior, *hystericina*, *flava*) - *Trichophorum alpinum* / *Campylium stellatum* Shrub Herbaceous Vegetation (G2G3, Northern Sloping Fen, CEGL006331)
- *Carex lasiocarpa* - (*Carex rostrata*) - *Equisetum fluviatile* Herbaceous Vegetation (G?, Wiregrass Sedge Shore Fen, CEGL005229)
- *Carex lasiocarpa* - *Calamagrostis* spp. - (*Eleocharis rostellata*) Herbaceous Vegetation (G3G4, Prairie Transition Rich Fen, CEGL002383)
- *Carex lasiocarpa* - *Carex buxbaumii* - *Trichophorum caespitosum* Boreal Herbaceous Vegetation (G4G5, Boreal Sedge Rich Fen, CEGL002500)
- *Chamaedaphne calyculata* - *Myrica gale* / *Carex lasiocarpa* Dwarf-shrubland (G4G5, Leatherleaf - Sweet Gale Shore Fen, CEGL005228)
- *Dasiphora fruticosa* ssp. *floribunda* / *Carex* (*sterilis*, *hystericina*, *flava*) Shrub Herbaceous Vegetation (G2, Lower New England Sloping Fen, CEGL006326)
- *Dasiphora fruticosa* ssp. *floribunda* / *Carex lasiocarpa* / *Campylium stellatum* Shrub Herbaceous Vegetation (G?, Northern Shrubby-cinquefoil Alkaline Fen, CEGL006525)
- *Myrica gale* - *Dasiphora fruticosa* ssp. *floribunda* / *Carex lasiocarpa* - *Cladium mariscoides* Shrub Herbaceous Vegetation (G2G3, CEGL006068)
- *Myrica gale* / *Carex lasiocarpa* - *Lobelia kalmii* - *Trichophorum alpinum* Shrub Herbaceous Vegetation [Provisional] (G3G4, Rhizomatous Sedge - Sweet Gale Peatland Fen, CEGL006160)
- *Thuja occidentalis* - (*Myrica gale*) / *Trichophorum alpinum* / *Drepanocladus* spp. Shrubland (G?, White-cedar - Sweet Gale Scrub Fen, CEGL005193)
- *Thuja occidentalis* - *Abies balsamea* / *Ledum groenlandicum* / *Carex trisperma* Woodland (G?, Northern White-cedar Wooded Fen, CEGL006507)

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.575 LAURENTIAN-ACADIAN ALKALINE SWAMP

Division 201, Woody Wetland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: *Thuja occidentalis* - *Fraxinus nigra*, Depressional, Mesotrophic Water, Circumneutral Water

Non-Diagnostic Classifiers: Forest and Woodland (Treed), Mineral: W/ A-Horizon >10 cm, Mineral: W/ A-Horizon <10 cm, Needle-Leaved Tree, Broad-Leaved Deciduous Tree, Moderate (100-500 yrs) Persistence, Saturated Soil

Concept Summary: These forested wetlands are found across northern New England and the upper Midwest and eastern to south-central Canada in basins where higher pH and/or nutrient levels are associated with a rich flora. The substrate may be mineral soil or peat; often, there is an organic epipedon over mineral soil. *Thuja occidentalis* is a diagnostic canopy species, and may dominate the canopy or be mixed with other conifers or with deciduous trees, most commonly *Acer rubrum* or *Fraxinus nigra*. *Cornus sericea* is a common shrub. The herb layer tends to be more diverse than in acidic swamps. Small open fenny areas may occur within the wetland. Seepage may influence parts of the wetland, but the hydrology is dominated by the basin setting.

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DISTRIBUTION

Range: Scattered locations from New England and adjacent Canada west to the Great Lakes and northern Minnesota.

Ecological Divisions: 201

TNC Ecoregions: 47:C, 48:C, 60:?, 63:C, 64:C

Subnations/Nations: MI:c, MN:c, NY:c, PA:c, VT:c, WI:c

CONCEPT

Associations:

- *Acer rubrum* - *Fraxinus* spp. - *Betula papyrifera* / *Cornus canadensis* Forest (G4, Red Maple - Ash - Birch Swamp Forest, CEGL002071)
- *Fraxinus nigra* - Mixed Hardwoods - Conifers / *Cornus sericea* / *Carex* spp. Forest (G4, Black Ash - Mixed Hardwood Swamp, CEGL002105)
- *Larix laricina* / *Alnus incana* Forest (G4, Northern Tamarack Rich Swamp, CEGL002471)
- *Picea mariana* / *Alnus incana* / *Sphagnum* spp. Forest (L, G5, Black Spruce / Alder Swamp, CEGL002452)
- *Thuja occidentalis* - (*Larix laricina*) Seepage Forest (G3G4, White-cedar Seepage Swamp, CEGL002455)
- *Thuja occidentalis* - (*Picea mariana*, *Abies balsamea*) / *Alnus incana* Forest (G4, White-cedar - (Mixed Conifer) / Alder Swamp, CEGL002456)
- *Thuja occidentalis* - *Acer rubrum* / *Cornus sericea* Forest (G?, Northern White-cedar - Red Maple Enriched Swamp, CEGL006199)
- *Thuja occidentalis* - *Fraxinus nigra* Forest (G?, White-cedar - Black Ash Swamp, CEGL005165)
- *Thuja occidentalis* - *Larix laricina* / *Sphagnum* spp. Forest (G?, White-cedar - Tamarack Peat Swamp, CEGL005225)
- *Thuja occidentalis* / *Sphagnum* (*girgensohnii*, *warnstorffii*) Forest (G?, Northern White-cedar Peatland Swamp, CEGL006007)
- *Tsuga canadensis* - *Betula alleghaniensis* Saturated Forest (L, G3, Hemlock - Yellow Birch Swamp Wet-Mesic Forest, CEGL005003)

SOURCES

References: Comer and Albert 1997, Comer et al. 1995a, Comer et al. 1998

Last updated: 01 Mar 2303

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.578 ACADIAN COASTAL SALT MARSH

Division 201, Herbaceous Wetland

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Graminoid, *Spartina* (*patens*, *alterniflora*), Tidal / Estuarine, Saltwater (Polyhaline)

Non-Diagnostic Classifiers: Herbaceous, Organic Peat (>40 cm), Mineral: W/ A-Horizon >10 cm, Moderate (100-500 yrs) Persistence, Long (>500 yrs) Persistence

Concept Summary: This system covers marshes of the Gulf of Maine and parts of the southern New England coastline, along the immediate ocean shore and near estuary mouths, where salinity regime is polyhaline. Sometimes called "salt meadows," these marshes display strong graminoid dominance, with patchy forbs. *Spartina patens* and *Spartina alterniflora* are the major dominants. These marshes may be extensive where the local topography allows their development: this pattern is more common in the southern portion of the system's range (Merrymeeting Bay, ME, southward). Eastward, where the coastal topography becomes more dissected, they are more commonly seen as a fairly narrow fringe along tidal shorelines. These marshes are typically less extensive and with some different floristic elements than the marshes southward along the Atlantic Coast from Cape Cod to Chesapeake Bay.

DISTRIBUTION

Range: Coastline of the Gulf of Maine, from north of Cape Cod north and east to the Bay of Fundy.

Ecological Divisions: 201, 202

TNC Ecoregions: 62:C, 63:C

Subnations/Nations: CT:c, MA:c, ME:c, NB:, NH:c

CONCEPT

Associations:

- *Ascophyllum nodosum* - *Fucus vesiculosus* Tidal Algal Nonvascular Vegetation (G?, New England Rocky Intertidal Community, CEGL006341)

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- *Ruppia maritima* Acadian/Virginian Zone Temperate Herbaceous Vegetation (G?, Northern Atlantic Coast Beaked Ditch-grass Bed, CEG L006167)
- *Salicornia* (*virginica*, *bigelovii*, *maritima*) - *Spartina alterniflora* Herbaceous Vegetation (G5, Salt Panne, CEG L004308)
- *Spartina alterniflora* / (*Ascophyllum nodosum*) Acadian/Virginian Zone Herbaceous Vegetation (G5, *Spartina* Low Salt Marsh, CEG L004192)
- *Spartina patens* - *Distichlis spicata* - (*Juncus gerardii*) Herbaceous Vegetation (G5, *Spartina* High Salt Marsh, CEG L006006)

SOURCES

Last updated: 09 Jan 2003
Concept Author: S.C. Gawler

Stakeholders: ECS
LeadResp: ECS

CES201.579 ACADIAN ESTUARY MARSH

Division 201, Herbaceous Wetland

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Graminoid, *Spartina* (*patens*, *alterniflora*), Tidal / Estuarine, Brackish (Mesohaline)

Non-Diagnostic Classifiers: Herbaceous, Organic Peat (>40 cm), Mineral: W/ A-Horizon >10 cm, Moderate (100-500 yrs) Persistence

Concept Summary: These marshes are found along mesohaline reaches of estuaries of the Gulf of Maine and parts of the southern New England coastline. Emergent and submergent vegetation characterize this system. Dominance ranges from extensive grasslands (tall *Schoenoplectus* spp., etc.) to sparsely vegetated mudflats, all tidally influenced. These marshes grade into the saltmarsh system at the mouth of estuaries. They are typically less extensive and with some different floristic elements than the marshes southward along the Atlantic Coast to Chesapeake Bay.

Comments: Differences between marshes in Division 202 and Division 201 may be sufficient to distinguish them as separate systems; however, data on estuarine marshes in Division 201 (Laurentian-Acadian) is very sketchy and should be better documented before such a split is made.

DISTRIBUTION

Range: Coastline of the Gulf of Maine, southern New England north and east to the Bay of Fundy, extending upstream in estuaries to the tidal limit.

Ecological Divisions: 201, 202

TNC Ecoregions: 62:C, 63:C

Subnations/Nations: CT:c, MA:c, ME:c, NB:, NH:c

CONCEPT

Associations:

- *Acer rubrum* - *Fraxinus pennsylvanica* / *Polygonum* spp. Woodland (G2, Freshwater Tidal Woodland, CEG L006165)
- *Alnus* (*incana* ssp. *rugosa*, *serrulata*) - *Cornus amomum* Shrubland (G?, North Atlantic Fresh Tidal Shrub Swamp, CEG L006337)
- *Amaranthus cannabinus* Tidal Herbaceous Vegetation (G3G5, CEG L006080)
- *Cladium mariscoides* - *Drosera intermedia* - *Eleocharis rostellata* Herbaceous Vegetation (G1, Sea Level Fen, CEG L006310)
- *Eriocaulon parkeri* - *Polygonum punctatum* Herbaceous Vegetation (G2, Estuary Pipewort Brackish Intertidal Flat, CEG L006352)
- *Impatiens capensis* - *Peltandra virginica* - *Sagittaria latifolia* - (*Typha angustifolia*) Tidal Herbaceous Vegetation (G?, Freshwater Tidal Mixed Forbs High Marsh, CEG L006325)
- *Nuphar lutea* ssp. *advena* Tidal Herbaceous Vegetation (G?, CEG L004472)
- *Peltandra virginica* - *Pontederia cordata* Tidal Herbaceous Vegetation (G3G4, CEG L004706)
- *Stuckenia pectinata* - *Potamogeton perfoliatus* - (*Zannichellia palustris*) Tidal Herbaceous Vegetation (G3G5, CEG L006027)
- *Typha angustifolia* - *Hibiscus moscheutos* Herbaceous Vegetation (G?, Brackish Tidal Marsh (Cattail Type), CEG L004201)
- *Zizania aquatica* Tidal Herbaceous Vegetation (G4?, Atlantic Coast Wild Rice Tidal Marsh, CEG L004202)

SOURCES

Last updated: 09 Jan 2003
Concept Author: S.C. Gawler

Stakeholders: ECS
LeadResp: ECS

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

CES201.577 LAURENTIAN-ACADIAN WET MEADOW-SHRUB SWAMP AND MARSH

Division 201, Herbaceous Wetland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Broad-Leaved Shrub, Graminoid, Depressional [Lakeshore], Riverine / Alluvial, Shallow (<15 cm) Water, >180-day hydroperiod

Non-Diagnostic Classifiers: Herbaceous, Muck, Aquatic Herb, Moderate (100-500 yrs) Persistence, Extensive Wet Flat, Depressional [Pond], Circumneutral Water, Acidic Water

Concept Summary: This system encompasses shrub swamps and herbaceous emergent to submergent mineral-soil wetlands of the Northeast and upper Midwest. They are often associated with lakes and ponds, but are also found along streams, where the water level does not fluctuate greatly. The size of occurrences ranges from small pockets to extensive acreages. The emergent wetlands often have a patchwork of shrub and graminoid dominance; typical species include *Alnus incana*, *Spiraea alba*, *Myrica gale*, *Calamagrostis canadensis*, tall *Carex* spp., and *Juncus effusus*. Trees are generally absent and, if present, are scattered. Submergent wetlands include a variety of macrophytes, often with a border of non-persistent emergent vegetation dominated by *Pontederia cordata*. The submergent vegetation zones may be severely impacted by non-native invasive aquatics including *Myriophyllum spicatum* and others.

DISTRIBUTION

Range: New England and northern New York west across the upper Great Lakes to Minnesota, and adjacent Canada, southward to Pennsylvania and Ohio; mostly north of the glacial boundary.

Ecological Divisions: 201, 202

TNC Ecoregions: 47:C, 48:C, 49:C, 59:C, 61:C, 63:C, 64:C

Subnations/Nations: CT:c, IL:?, IN:?, MA:c, ME:c, MI:c, MN:c, NB:, NH:c, NY:c, OH:?, ON:, PA:c, QC:, VT:c, WI:c

CONCEPT

Associations:

- *Acer rubrum* / *Carex stricta* - *Onoclea sensibilis* Woodland (G3G5, Red Maple - Tussock Sedge Wooded Marsh, CEGLO06119)
- *Alnus incana* - *Cornus sericea* / *Clematis virginiana* Shrubland (G4G5, Alluvial Alder Thicket, CEGLO06062)
- *Alnus incana* Swamp Shrubland (G5?, Speckled Alder Swamp, CEGLO02381)
- *Alnus serrulata* Eastern Shrubland (G4G5, Smooth Alder Swamp, CEGLO05082)
- *Calamagrostis canadensis* - *Phalaris arundinacea* Herbaceous Vegetation (G4G5, Bluejoint Wet Meadow, CEGLO05174)
- *Calamagrostis canadensis* - *Scirpus* spp. - *Dulichium arundinaceum* Herbaceous Vegetation (G?, Seasonally Flooded Mixed Graminoid Meadow, CEGLO06519)
- *Carex lacustris* Herbaceous Vegetation (G4G5, Lake Sedge Wet Meadow, CEGLO02256)
- *Carex rostrata* - *Carex lacustris* - (*Carex vesicaria*) Herbaceous Vegetation (G4G5, Northern Sedge Wet Meadow, CEGLO02257)
- *Carex stricta* - *Carex* spp. Herbaceous Vegetation (G4?, Tussock Sedge Wet Meadow, CEGLO02258)
- *Carex stricta* - *Carex vesicaria* Seasonally Flooded Herbaceous Vegetation (G?, Eastern Tussock Sedge Meadow, CEGLO06412)
- *Cephalanthus occidentalis* / *Carex* spp. Northern Shrubland (G4, Northern Buttonbush Swamp, CEGLO02190)
- *Elodea canadensis* - *Potamogeton* spp. Eastern Herbaceous Vegetation [Placeholder] (G?, CEGLO06431)
- *Equisetum fluviatile* - (*Eleocharis palustris*) Herbaceous Vegetation (G4, Water Horsetail - Spikerush Marsh, CEGLO05258)
- *Juncus balticus* - *Carex stricta* - *Lythrum alatum* var. *alatum* Herbaceous Vegetation (G2Q, Shenandoah Herbaceous Seep, CEGLO06170)
- *Juncus effusus* Seasonally Flooded Herbaceous Vegetation (G5, Rush Marsh, CEGLO04112)
- *Juncus militaris* Herbaceous Vegetation (G?, CEGLO06345)
- *Myrica gale* - *Spiraea alba* - *Chamaedaphne calyculata* Shrubland (G?, Sweetgale Mixed Shrub Fen, CEGLO06512)
- *Nuphar lutea* ssp. *advena* - *Nymphaea odorata* Herbaceous Vegetation (G4G5, Water-lily Aquatic Wetland, CEGLO02386)
- *Nymphaea odorata* - *Nuphar lutea* (ssp. *pumila*, ssp. *variegata*) Herbaceous Vegetation (G5, Northern Water-lily Aquatic Wetland, CEGLO02562)
- *Nymphaea tetragona* - *Nuphar lutea* (ssp. *pumila*, ssp. *variegata*) Herbaceous Vegetation (G4G5, Boreal Water-lily Aquatic Wetland, CEGLO02563)
- *Phalaris arundinacea* Eastern Herbaceous Vegetation (GW, Reed Canary Grass Eastern Marsh, CEGLO06044)
- *Phragmites australis* Eastern North America Temperate Semi-natural Herbaceous Vegetation (GW, Eastern Reed Marsh, CEGLO04141)
- *Pontederia cordata* - *Peltandra virginica* Semipermanently Flooded Herbaceous Vegetation [Placeholder] (G?, Pickerelweed Marsh, CEGLO04291)

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- Potamogeton spp. - Ceratophyllum spp. Midwest Herbaceous Vegetation (G5, Midwest Pondweed Submerged Aquatic Wetland, CEGL002282)
- Schoenoplectus (tabernaemontani, acutus) Eastern Herbaceous Vegetation (G?, Bulrush Deepwater Marsh, CEGL006275)
- Schoenoplectus acutus - (Schoenoplectus fluviatilis) Freshwater Herbaceous Vegetation (G4G5, Freshwater Bulrush Marsh, CEGL002225)
- Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation (G3G4, River Bulrush Marsh, CEGL002221)
- Schoenoplectus tabernaemontani - Typha spp. - (Sparganium spp., Juncus spp.) Herbaceous Vegetation (G4G5, Bulrush - Cattail - Burreed Shallow Marsh, CEGL002026)
- Scirpus cyperinus Seasonally Flooded Herbaceous Vegetation (G?, CEGL006349)
- Typha (angustifolia, latifolia) - (Schoenoplectus spp.) Eastern Herbaceous Vegetation (G5, Eastern Cattail Marsh, CEGL006153)
- Typha latifolia Southern Herbaceous Vegetation (G5, Southern Cattail Marsh, CEGL004150)
- Typha spp. - Schoenoplectus acutus - Mixed Herbs Midwest Herbaceous Vegetation (G4?, Midwest Mixed Emergent Deep Marsh, CEGL002229)
- Typha spp. Midwest Herbaceous Vegetation (G5, Midwest Cattail Deep Marsh, CEGL002233)
- Vallisneria americana - Potamogeton perfoliatus Herbaceous Vegetation (G5, Open Water Marsh with Mixed Submergents/Emergents, CEGL006196)
- Zizania (aquatica, palustris) Herbaceous Vegetation (G3G4, Wild Rice Marsh, CEGL002382)

SOURCES

References: Comer and Albert 1997

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler, D. Faber-Langendoen

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.048 NORTH ATLANTIC ROCKY INTERTIDAL

Division 201, Herbaceous Wetland

Spatial Scale & Pattern: Linear

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Moss/Lichen (Nonvascular), Tidal flat, Lichen, Alga, Saltwater (Polyhaline), <24-hour hydroperiod

Non-Diagnostic Classifiers: Lowland [Lowland], Nonvascular

Concept Summary: This system represents the intertidal zone with solid rock substrates that can experience extremes of exposure to winds, waves, currents, and ice-scour. This encompasses both exposed and partially exposed habitats. Lichens (often *Xantharia* spp., *Verrucaria* spp., and *Vaucheria* spp.) and blue-green algae (*Caliathrix* spp.) are present in the supralittoral and high littoral, respectively. Barnacles, usually *Semibalanus balanoides*, are found in the mid-intertidal zone, usually in crevices that offer some protection from the extreme elements. Mussels are found in the lower intertidal, also appearing mostly in crevices. Diagnostic species include Irish moss (*Chandrus crispus*); rockweed (*Fucus vesiculosus*, *Fucus evanescens*, and *Fucus spiralis*); knotted wrack (*Ascophyllum nodosum*); hollow stemmed kelp (*Laminaria* spp.); blue mussels (*Mytilus edulis*); common periwinkles (*Littorina littorea*); dogwhelks (*Nucella lapillus*); and springtails (*Anurida maritima*). In the low intertidal, small fronds of kelp may be present, but short, torn stipes are often all that remains. Rockweed and knotted wrack which are typically found in less exposed rocky habitats are small, restricted to crevices, or missing. Tidepools are frequently found in these habitats and are inhabited by both intertidal and subtidal species. Tidepools are nurseries for lumpfish, sea snails, and pollock. Many other fish have also been identified in tidepools. Many species of birds are found on these habitats. Purple Sandpipers are found in the winter in these habitats. Ruddy Turnstone and Sanderlings are the main species in spring and fall migrations. Other shorebirds that also use rocky shores include Black-bellied Plovers and Pectoral Sandpipers.

DISTRIBUTION

Ecological Divisions: 103, 201, 202?

TNC Ecoregions: 63:C

Subnations/Nations: LB:, MA:, ME:, NB:, NH:, NS:

CONCEPT

SOURCES

References: Brown 1993

Last updated: 18 Apr 2003

Concept Author: S. Gawler, P. Comer

Stakeholders: ECS

LeadResp: ECS

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

CES201.587 LAURENTIAN-ACADIAN FLOODPLAIN FOREST

Division 201, Mixed Upland and Wetland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland, Wetland

Diagnostic Classifiers: Forest and Woodland (Treed), Shrubland (Shrub-dominated), Woody-Herbaceous, Herbaceous, Flood Scouring, Riverine / Alluvial, Short (<5 yrs) Flooding Interval [Short interval, Spring Flooding]

Non-Diagnostic Classifiers: Lowland, Toeslope/Valley Bottom, Glaciated, Eutrophic Soil, Mesotrophic Soil, Circumneutral Soil, Acidic Soil, Deep Soil, Mineral: W/ A-Horizon >10 cm, Silt Soil Texture, Udic, Unconsolidated, Very Short Disturbance Interval, Broad-Leaved Deciduous Tree, Broad-Leaved Shrub, Graminoid, Moderate (100-500 yrs) Persistence, Mesotrophic Water

Concept Summary: This system encompasses north-temperate floodplains in the northeastern and north-central U.S. and adjacent Canada at the northern end of the range of silver maple. They occur along medium to large rivers where topography and process have resulted in the development of a complex of upland and wetland temperate alluvial vegetation on generally flat topography. This complex includes floodplain forests, with *Acer saccharinum* characteristic, as well as herbaceous sloughs and shrub wetlands. Most areas are underwater each spring; microtopography determines how long the various habitats are inundated. Associated trees include *Acer rubrum* and *Carpinus caroliniana*, the latter frequent but never abundant. On terraces or in more calcareous areas, *Acer saccharum* or *Quercus rubra* may be locally prominent, with *Betula alleghaniensis* and *Fraxinus* spp. *Salix nigra* is characteristic of the levees adjacent to the channel. Common shrubs include *Cornus amomum* and *Viburnum* spp. The herb layer in the forested portions often features abundant spring ephemerals, giving way to a fern-dominated understory in many areas by mid-summer. Non-forested wetlands associated with these systems include shrub-dominated and graminoid-herbaceous vegetation.

Comments: These floodplains are similar to those to the south in the Central Interior, North-Central Interior Floodplain (CES202.694) and Appalachian Division, Central Appalachian Floodplain (CES202.608) in having *Acer saccharinum* as a characteristic species; however, they are generally more depauperate and lack certain tree species that characterize central Appalachian floodplains such as *Platanus occidentalis*, *Betula nigra*, and *Quercus palustris*.

DISTRIBUTION

Range: Central and northern New England and adjacent Canada west to the Great Lakes.

Ecological Divisions: 103, 201

TNC Ecoregions: 47:C, 48:C, 61:?, 63:C, 64:C

Subnations/Nations: ME:c, MI:c, MN:c, NB:c, NH:c, NY:c, VT:c, WI:c

CONCEPT

Associations:

- *Acer saccharinum* - (*Populus deltoides*) / *Matteuccia struthiopteris* Forest (G?, Silver Maple Floodplain Levee Forest (Ostrich Fern Type), CEG006147)
- *Acer saccharinum* - *Ulmus americana* - (*Populus deltoides*) Forest (G4?, Silver Maple - Elm - (Cottonwood) Forest, CEG002586)
- *Acer saccharinum* / *Onoclea sensibilis* - *Boehmeria cylindrica* Forest (G?, Silver Maple Floodplain Bottom Forest (Sensitive Fern Type), CEG006176)
- *Acer saccharum* - *Fraxinus* spp. - *Tilia americana* / *Matteuccia struthiopteris* - *Ageratina altissima* Forest (G?, Terrace Hardwood Floodplain Forest, CEG006114)
- *Alnus incana* Swamp Shrubland (G5?, Speckled Alder Swamp, CEG002381)
- *Calamagrostis canadensis* - *Phalaris arundinacea* Herbaceous Vegetation (G4G5, Bluejoint Wet Meadow, CEG005174)
- *Calamagrostis canadensis* - *Scirpus* spp. - *Dulichium arundinaceum* Herbaceous Vegetation (G?, Seasonally Flooded Mixed Graminoid Meadow, CEG006519)
- *Cephalanthus occidentalis* / *Glyceria canadensis* Shrubland (G?, Buttonbush Shrub Swamp, CEG006069)
- *Fraxinus pennsylvanica* - *Ulmus americana* - (*Acer negundo*, *Tilia americana*) Northern Forest (G3G4, Northern Ash - Elm Floodplain Forest, CEG002089)
- River Mud Flats Sparse Vegetation (G?, River Mud Flats, CEG002314)
- Riverine Sand Flats - Bars Sparse Vegetation (G4G5, Riverine Sand Flats, CEG002049)

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, SCS, MCS

LeadResp: ECS

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

CES201.570 LAURENTIAN-ACADIAN CALCAREOUS CLIFF AND TALUS

Division 201, Barren

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland

Diagnostic Classifiers: Ridge/Summit/Upper Slope, Cliff (Substrate), Talus (Substrate), Alkaline Soil, Circumneutral Soil

Non-Diagnostic Classifiers: Montane, Lowland, Glaciated, Very Shallow Soil, Intermediate Disturbance Interval, Landslide, Moderate (100-500 yrs) Persistence

Concept Summary: This cliff system occurs at low to mid elevations, well below treeline, from New England west to the Great Lakes. It consists of vertical or near-vertical cliffs and the talus slopes below, where weathering and/or bedrock chemistry produce circumneutral to calcareous pH and enriched nutrient availability. The vegetation is often sparse, but may include patches of small trees. *Thuja occidentalis* may dominate on some cliffs (and reach very old ages, upwards of 1000 years). *Fraxinus* spp. and *Tilia americana* are woody indicators of the enriched setting.

DISTRIBUTION

Range: Scattered locations from New England and adjacent Canada west to the Great Lakes and possibly northern Minnesota

Ecological Divisions: 201

TNC Ecoregions: 47:?, 48:C, 63:C

Subnations/Nations: ME:c, MI:c, MN:p, NH:c, NY:c, VT:c, WI:c

CONCEPT

Associations:

- *Acer saccharum* - *Tilia americana* - *Fraxinus americana* / *Ostrya virginiana* / *Geranium robertianum* Woodland (G3G5, Rich Northern Hardwood Woodland, CEG005058)-- (peripheral)
- *Carex scirpoidea* Alkaline Cliff Sparse Vegetation (G?, Near-Boreal Alkaline Cliff, CEG006526)
- Limestone - Dolostone Midwest Dry Cliff Sparse Vegetation (G4G5, Midwest Dry Limestone - Dolostone Cliff, CEG002291)
- Limestone - Dolostone Midwest Moist Cliff Sparse Vegetation (G4G5, Midwest Moist Limestone - Dolostone Cliff, CEG002292)
- Limestone - Dolostone Talus Sparse Vegetation (G4G5, Midwest Limestone - Dolostone Talus, CEG002308)
- *Thuja occidentalis* Carbonate Talus Woodland (G3G4, White-cedar Limestone Talus Woodland, CEG005172)
- *Thuja occidentalis* Cliff Woodland (G3, White-cedar Cliff Woodland, CEG002451)

Vegetation: *Thuja occidentalis* may dominate on some cliffs (and reach very old ages, upwards of 1000 years). *Fraxinus* spp. and *Tilia americana* are woody indicators of the enriched setting (Kelly and Larson 1997).

SOURCES

References: Kelly and Larson 1997

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.586 LAURENTIAN-ACADIAN ROCKY LAKESHORE

Division 201, Barren

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland, Wetland

Diagnostic Classifiers: Flood Scouring, Broad-Leaved Shrub, Dwarf-Shrub, Graminoid, Depressional, Short (<5 yrs) Flooding Interval [Short interval, Irregular Flooding]

Non-Diagnostic Classifiers: Lowland, Glaciated, Mesotrophic Soil, Oligotrophic Soil, Mineral: W/ A-Horizon <10 cm, Sand Soil Texture, Very Short Disturbance Interval

Concept Summary: This system encompasses primarily upland vegetation along lakeshores or rivershores in the glaciated Northeast and upper Midwest (not including the Great Lakes). Some areas may be briefly inundated during high water periods. The substrate is sandy to gravelly, sometimes consolidated rock; there may be muddy patches. Ice-scour is not a major influence although it may be locally important. These shores may be narrow zones of shrubs and/or sparse vegetation on rocks or sandy beaches.

Comments: Very little data on these. May not be defensible as a separate system, keep in for now as a placeholder. If it is combined with the surrounding uplands, the associations tagged to this system may become orphans.

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

DISTRIBUTION

Range: Northern New England and northern New York west across the upper Great Lakes to northern Minnesota, and adjacent Canada; occasional southwards.

Ecological Divisions: 201

TNC Ecoregions: 47:C, 48:C, 63:C, 64:C

Subnations/Nations: ME:p, MI:c, MN:c, NH:p, NY:c, VT:c, WI:p

CONCEPT

Associations:

- Eroding Clay Bank Sparse Vegetation (G?, Eroding Clay Bank, CEG002584)
- Igneous - Metamorphic Cobble - Gravel Inland Lake Shore Sparse Vegetation (G4G5, Inland Lake Igneous - Metamorphic Cobble - Gravel Shore, CEG002303)
- Igneous - Metamorphic Cobble - Gravel River Shore Sparse Vegetation (G4G5, Riverine Igneous - Metamorphic Cobble - Gravel Shore, CEG002304)
- Inland Freshwater Strand Beach Sparse Vegetation (G4G5, Inland Freshwater Strand Beach, CEG002310)
- Lake Mud Flats Sparse Vegetation (G?, Lake Mud Flats, CEG002313)
- Sandstone Bedrock River Shore Sparse Vegetation (G?, River Ledge Sandstone Pavement, CEG002302)
- *Spartina pectinata* - *Muhlenbergia richardsonis* - *Sporobolus heterolepis* - *Oligoneuron album* - *Euthamia graminifolia* Sparse Vegetation (G1, River Ledge Limestone Pavement, CEG005233)
- *Spartina pectinata* North Atlantic Coast Herbaceous Vegetation (G?, CEG006095)

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS

LeadResp: ECS

CES201.051 NORTH ATLANTIC COBBLE SHORE

Division 201, Barren

Spatial Scale & Pattern: Linear

Required Classifiers: Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland, Wetland

Non-Diagnostic Classifiers: Lowland [Lowland], Beach (Landform), Boreal [Boreal Hyperoceanic], Salt Spray, <24-hour hydroperiod

Concept Summary: This system encompasses areas of varying exposure that include boulder, cobble, and gravel shores, often adjacent to bedrock shoreline and rocky intertidal areas. Cobble shores may have >75% cobble bottom. Some occurrences are mixed sand and gravel beaches, others have different combinations of particle sizes. These areas have sufficient exposure to winnow out the fine sand-, silt- and clay-sized particles without removing the larger grain sizes. The bottom is usually comprised of cobble and gravel, although shell hash may also be present in various amounts. These areas have low diversity, probably due to insufficient nutrition for and high disturbance of infauna. Diagnostic species include species colonizing from nearby rocky areas if present, e.g., Irish moss (*Chandrus crispus*), rockweed (*Fucus vesiculosus*), knotted wrack (*Ascophyllum nodosum*), coralline algae (*Corallina officinalis*), and kelp (*Laminaria* spp.). Fauna is composed of the following: segmented worms (*Enchytraeus* spp.), collembola (mostly *Anurida maritima*), blue mussels (*Mytilus* spp.), periwinkles (*Littorina littorea*, *Littorina obtusata*, *Littorina saxatilis*), limpets (*Tectura testudinalis*), and barnacles (*Semibalanus balanoides*), among others.

DISTRIBUTION

Ecological Divisions: 103, 201, 202

TNC Ecoregions: 63:C

Subnations/Nations: LB:, MA:, ME:, NB:, NH:, NS:, QC:

CONCEPT

SOURCES

References: Brown 1993

Last updated: 18 Apr 2003

Concept Author: S. Gawler, P. Comer

Stakeholders: ECS

LeadResp: ECS

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

CES201.050 NORTH ATLANTIC INTERTIDAL MUDFLAT

Division 201, Barren

Spatial Scale & Pattern: Linear

Required Classifiers: Natural/Semi-natural, Non-vegetated (<10% vasc.), Wetland

Non-Diagnostic Classifiers: Lowland [Lowland], Herbaceous, <24-hour hydroperiod

Concept Summary: Mudflats are usually located in quiet pockets of bays and protected by headlands. Sand-sized particles are mixed with silt and clay. In the summer, *Enteromorpha intestinalis* can cover these mudflats. Other characteristic species include *Enteromorpha prolifera*, *Rhizoclonium riparium*, *Ruppia maritima*, and *Zostera marina*.

Comments: For classification of these types in Maine (Brown 1993), it has been suggested that northeastern mudflats (east of the Penobscot River) contain somewhat different assemblages of organisms than do southwestern mudflats (west of the Penobscot River). Some factor (perhaps temperature) will be necessary to separate these communities. However, they were left combined until more information is available to make better distinctions.

DISTRIBUTION

Ecological Divisions: 103, 201, 202?

TNC Ecoregions: 63:C

Subnations/Nations: LB:, MA:, ME:, NB:, NH:, NS:, QC:?

CONCEPT

Associations:

- *Zostera marina* Herbaceous Vegetation (G?, Eel-grass Meadow, CEG004336)

SOURCES

References: Brown 1993

Last updated: 18 Apr 2003

Concept Author: S. Gawler, P. Comer

Stakeholders: ECS

LeadResp: ECS

CES201.049 NORTH ATLANTIC TIDAL SAND FLAT

Division 201, Barren

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Non-vegetated (<10% vasc.), Wetland

Diagnostic Classifiers: Boreal [Boreal Hyperoceanic], Unconsolidated, Alga

Non-Diagnostic Classifiers: Lowland [Lowland]

Concept Summary: This system of seagrass beds occurs primarily in the embayed regions of Maine north into Canada. The series of barriers provides area for colonization of hydromorphic herbaceous vegetation in protected sounds and lagoons which are subject to wind tides only. Local habitats range from small guts, shallow tributary creeks, and large marsh pools along freshwater and oligohaline sections of tidal rivers to shallow estuarine bays, tidal creeks, and salt marsh pools. These species are largely replaced by *Zostera marina*. The diversity in these sheltered habitats is higher than that of exposed and partially exposed sandy beaches.

DISTRIBUTION

Ecological Divisions: 103, 201, 202

TNC Ecoregions: 63:

Subnations/Nations: LB:, MA:, ME:, NB:, NH:, NI:, NS:, QC:

CONCEPT

Associations:

- *Zostera marina* Herbaceous Vegetation (G?, Eel-grass Meadow, CEG004336)

SOURCES

References: Brown 1993

Last updated: 18 Apr 2003

Concept Author: S. Gawler, P. Comer

Stakeholders: ECS

LeadResp: ECS

CES202.593 APPALACHIAN HEMLOCK-HARDWOOD FOREST

Division 202, Forest and Woodland

Spatial Scale & Pattern: Matrix

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

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Diagnostic Classifiers: Mesotrophic Soil, Needle-Leaved Tree, Broad-Leaved Deciduous Tree, *Pinus* spp. - *Tsuga canadensis*

Non-Diagnostic Classifiers: Lowland, Forest and Woodland (Treed), Sideslope, Toeslope/Valley Bottom, Temperate, Acidic Soil, Shallow Soil, Deep Soil, Mineral: W/ A-Horizon >10 cm, Ustic, Long Disturbance Interval, Moderate (100-500 yrs) Persistence

Concept Summary: This forested system of the northeastern U.S. ranges from central New England west to Lake Erie and south to Virginia. It is one of the matrix forest types in the northern part of the Central Interior and Appalachian Division, in which *Tsuga canadensis* (or in some cases *Pinus strobus*) is mixed with northern hardwoods such as *Acer saccharum* and *Fagus grandifolia*, as well as with *Quercus* spp. (most commonly *Quercus rubra*), *Liriodendron tulipifera*, *Prunus serotina*, and *Betula lenta* (or other *Betula* spp.).

Comments: Northward this system is replaced by Laurentian-Acadian Pine-Hemlock-Hardwood Forest (CES201.563), but the limits of both are not yet clear in western New York (Allegheny Plateau) and central New England.

DISTRIBUTION

Range: Central New England south to West Virginia and Virginia.

Ecological Divisions: 202

TNC Ecoregions: 49:P, 50:?, 51:C, 52:P, 59:C, 60:P, 61:C

Subnations/Nations: CT:, GA:c, MA:, MD:, NC:c, NH:, NJ:, NY:c, OH:?, PA:c, SC:c, TN:c, VA:c, VT:, WV:c

CONCEPT

Associations:

- *Acer rubrum* - *Nyssa sylvatica* - *Betula alleghaniensis* / *Sphagnum* spp. Forest (G?, Red Maple - Black Gum Basin Swamp, CEG006014)
- *Acer rubrum* - *Nyssa sylvatica* High Allegheny Plateau, Central Appalachian Forest (G?, Central Appalachian Forested Acid Seep, CEG006132)
- *Acer saccharum* - *Betula alleghaniensis* - *Prunus serotina* Forest (G4, Central Appalachian Northern Hardwood Forest, CEG006045)
- *Acer saccharum* - *Pinus strobus* / *Acer pensylvanicum* Forest (G?, Northern Hardwood - White Pine Forest, CEG005005)
- *Acer saccharum* - *Quercus rubra* / *Hepatica nobilis* var. *obtusata* Forest (G?, CEG006046)
- *Betula alleghaniensis* - (*Tsuga canadensis*) / *Rhododendron maximum* / *Leucothoe fontanesiana* Forest (G3G4Q, Blue Ridge Hemlock - Northern Hardwood Forest, CEG007861)
- *Betula lenta* / *Ilex montana* / *Lycopodium annotinum* Forest (GM, Central Appalachian Northern Hardwood Forest (Sweet Birch / Clubmoss Type), CEG008503)
- *Betula papyrifera* / *Acer saccharum* - Mixed Hardwoods Forest (G4?, Paper Birch / Sugar Maple - Mixed Hardwoods Forest, CEG002464)
- *Chrysosplenium americanum* Herbaceous Vegetation (G3G5, Golden-saxifrage Seep, CEG006193)
- *Deschampsia caespitosa* - *Symplocarpus foetidus* Herbaceous Vegetation (G1, Inland Acidic Seep Community, CEG006101)
- *Liriodendron tulipifera* - *Betula lenta* - *Tsuga canadensis* / *Rhododendron maximum* Forest (G5, Southern Appalachian Acid Cove Forest (Typic Type), CEG007543)
- *Picea rubens* - *Betula alleghaniensis* - *Prunus serotina* Forest (G?, CEG006029)
- *Pinus strobus* - *Tsuga canadensis* / *Acer pensylvanicum* / *Polystichum acrostichoides* Forest (G4?, Central Appalachian White Pine - Eastern Hemlock Forest, CEG006019)
- *Pinus strobus* - *Tsuga canadensis* / *Rhododendron maximum* - (*Leucothoe fontanesiana*) Forest (G4, Southern Appalachian Eastern Hemlock Forest (White Pine Type), CEG007102)
- *Pinus strobus* - *Tsuga canadensis* Lower New England / Northern Piedmont Forest (G5, White Pine - Hemlock Dry-Mesic Coniferous Forest, CEG006328)
- *Pinus strobus* Successional Forest (GD, Eastern White Pine Successional Forest, CEG007944)
- *Quercus bicolor* / *Vaccinium corymbosum* / *Carex stipitata* Forest (G?, Perched Swamp White Oak Swamp, CEG006241)
- *Quercus rubra* - *Acer saccharum* - *Fagus grandifolia* / *Viburnum acerifolium* Forest (G?, Red Oak - Northern Hardwood Forest, CEG006173)
- *Quercus rubra* - *Acer saccharum* - *Liriodendron tulipifera* Forest (G?, High Allegheny Rich Red Oak - Sugar Maple Forest, CEG006125)
- *Rhododendron maximum* Upland Shrubland (G3?Q, Montane Rhododendron Thicket, CEG003819)
- *Thuja occidentalis* - *Pinus strobus* - *Tsuga canadensis* / *Carex eburnea* Forest (G1G2, Southern Appalachian Northern White-cedar Slope Forest, CEG008426)
- *Tsuga canadensis* - (*Betula alleghaniensis*, *Quercus rubra*) / *Ilex montana* / *Rhododendron catawbiense* Forest (G1?, Eastern Hemlock / Catawba Rhododendron Forest, CEG008513)

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- *Tsuga canadensis* - (*Fagus grandifolia*, *Tilia americana* var. *heterophylla*) / *Magnolia tripetala* Forest (G4, Cumberland/Appalachian Hemlock - Hardwood Cove Forest, CEG008407)
- *Tsuga canadensis* - *Betula alleghaniensis* - *Prunus serotina* / *Rhododendron maximum* Forest (G?, Central Appalachian Hemlock - Northern Hardwood Forest, CEG006206)
- *Tsuga canadensis* - *Betula alleghaniensis* / *Veratrum viride* - *Carex scabrata* - *Oclemena acuminata* Forest (G2, High-Elevation Hemlock - Yellow Birch Seepage Swamp, CEG008533)
- *Tsuga canadensis* - *Betula alleghaniensis* Lower New England / Northern Piedmont Forest (G4?, Hemlock - Northern Hardwood Forest, CEG006109)
- *Tsuga canadensis* - *Fagus grandifolia* - *Acer saccharum* / (*Hamamelis virginiana*, *Kalmia latifolia*) Forest (G3?, East-central Hemlock Hardwood Forest, CEG005043)
- *Tsuga canadensis* - *Fagus grandifolia* Forest (G4G5, Hemlock - Beech Forest, CEG006088)
- *Tsuga canadensis* - *Quercus prinus* / *Kalmia latifolia* - *Rhododendron* (*catawbiense*, *maximum*) / *Galax urceolata* Forest (G4, Central Appalachian Acidic Cove Forest, CEG008512)
- *Tsuga canadensis* / *Rhododendron maximum* - (*Clethra acuminata*, *Leucothoe fontanesiana*) Forest (G3G4, Southern Appalachian Eastern Hemlock Forest (Typic Type), CEG007136)
- *Tsuga caroliniana* - (*Tsuga canadensis*) / *Rhododendron maximum* Forest (G1G2, Carolina Hemlock Forest (Mesic Type), CEG007138)

Environment: This system occurs on protected low and mid slopes and valley bottoms. It often occurs between Southern and Central Appalachian Cove Forest (CES202.373) in the lowest areas and Southern and Central Appalachian Oak Forest (CES202.886) on the mid slopes. It is considered a system of intermediate moisture regime.

Vegetation: The canopy is usually dominated by *Tsuga canadensis* but may also contain large amounts of *Pinus strobus* and *Quercus* spp. throughout its range and *Fagus grandifolia* and *Acer saccharum* further north. The understory varies quite a bit, but tends to be dominated by evergreen shrubs and only occasionally by herbs.

Dynamics: This system is currently being devastated in large parts of its range by the hemlock wooly adelgid (*Adelges tsugae* Annand). This sucking insect is continuing to cause close to 100% mortality as it spreads from the north into the southern United States. The insect will most likely cause hemlock communities to more closely resemble Southern and Central Appalachian Oak Forest (CES202.886) as time passes and canopy hemlocks are replaced by other canopy trees.

Historically, this system was probably only subject to occasional fires. Fires that did occur may have been catastrophic and may have lead to even-aged stands of pine and hemlock.

SPATIAL CHARACTERISTICS

Spatial Summary: Large patch

Size: Some examples may be more than 1000 acres, but most are probably less than 50 acres.

Heterogeneity: Within each occurrence, this system is fairly homogenous.

Adjacent Ecological Systems: Southern and Central Appalachian Cove Forest (CES202.373) occurs downslope from these forests in the coves and tend to be more mesic and more species-rich than the hemlock forests. Southern and Central Appalachian Oak Forest (CES202.886) occurs upslope from this system and tend to be drier and even less diverse than hemlock forests. Hemlock forests may grade into Southern Appalachian Low Mountain Pine Forest (CES202.332) in especially dry occurrences of this system.

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler, R. White, R. Evans, M. Pyne

Stakeholders: SCS, MCS, ECS

LeadResp: SCS

CES202.591 CENTRAL APPALACHIAN OAK AND PINE FOREST

Division 202, Forest and Woodland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Forest and Woodland (Treed), Ridge/Summit/Upper Slope, Acidic Soil, *Pinus* (*strobus*, *rigida*, *echinata*, *virginiana*) - *Quercus prinus*

Non-Diagnostic Classifiers: Lowland, Sideslope, Oligotrophic Soil, Mineral: W/ A-Horizon <10 cm, Sand Soil Texture, Loam Soil Texture, Ustic, F-Patch/Medium Intensity, W-Patch/Low Intensity, Needle-Leaved Tree, Broad-Leaved Tree

Concept Summary: These oak-pine forests cover large areas in the low- to mid-elevation central Appalachians and foothills. The topography and landscape position range from rolling hills to steep slopes, with occasional occurrences on

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more level ancient alluvial fans. The soils are coarse and infertile; they may be deep, on glacial deposits, or shallow, on rocky slopes of acidic rock (shale, sandstone, other acidic igneous or metamorphic rock). The well-drained soils and exposure create dry to dry-mesic conditions. The forest is mostly closed-canopy but can include more open woodlands. It is dominated by a variable mixture of dry-site oak and pine species, including *Quercus prinus*, *Pinus virginiana*, and *Pinus strobus*. The system may include areas of pine forest, and mixed oak-pine forest. Heath shrubs such as *Vaccinium pallidum*, *Gaylussacia baccata*, and *Kalmia latifolia* are common in the understory. Within these forests, hillslope pockets with impeded drainage may support small isolated wetlands with *Acer rubrum* and *Nyssa sylvatica* characteristic. Disturbance agents include fire, windthrow, and ice damage.

Comments: Need to clarify the conceptual boundaries between this and the matrix dry oak forest system of Division 202.

DISTRIBUTION

Range: Central New England through Pennsylvania, south to Virginia

Ecological Divisions: 202

TNC Ecoregions: 52:C, 59:C, 60:P, 61:C

Subnations/Nations: CT:, DE:?, MD:, ME:, NH:, NJ:, NY:, OH:?, PA:, RI:, VA:, VT:, WV:

CONCEPT

Associations:

- *Acer rubrum* - *Nyssa sylvatica* High Allegheny Plateau, Central Appalachian Forest (G?, Central Appalachian Forested Acid Seep, CEGL006132)
- *Castanea dentata* - *Quercus prinus* Forest (GH, American Chestnut Forest (Subxeric Type), CEGL007196)
- *Pinus rigida* - *Quercus* (*velutina*, *coccinea*, *pinus*) Forest (G?, CEGL006290)
- *Pinus strobus* - *Pinus resinosa* - *Pinus rigida* Forest (G4G5, CEGL006259)
- *Pinus strobus* - *Quercus* (*rubra*, *velutina*) - *Fagus grandifolia* Forest (G5, White Pine - Oak Forest, CEGL006293)
- *Pinus strobus* - *Quercus alba* - *Quercus coccinea* / *Vaccinium stamineum* Forest (G4, Central Appalachian / Piedmont White Pine - Xeric Oak Forest, CEGL008539)
- *Pinus strobus* - *Quercus rubra* - *Liriodendron tulipifera* Forest (G?, CEGL006304)
- *Pinus strobus* / *Vaccinium pallidum* Forest (G?, White Pine - Blueberry Forest of Low-Elevation Slopes and Hills, CEGL007099)
- *Pinus strobus* Successional Forest (GD, Eastern White Pine Successional Forest, CEGL007944)
- *Pinus virginiana* - *Pinus* (*rigida*, *echinata*) - (*Quercus prinus*) / *Vaccinium pallidum* Forest (G4?, Appalachian Low-Elevation Mixed Pine / Hillside Blueberry Forest, CEGL007119)
- *Pinus virginiana* - *Quercus* (*coccinea*, *pinus*) Forest (G?, Virginia Pine - Oak Forest, CEGL005040)
- *Pinus virginiana* Successional Forest (GD, Virginia Pine Successional Forest, CEGL002591)
- *Quercus* (*pinus*, *coccinea*) / *Kalmia latifolia* / (*Galax urceolata*, *Gaultheria procumbens*) Forest (G5, Chestnut Oak Forest (Xeric Ridge Type), CEGL006271)
- *Quercus prinus* - *Quercus* (*rubra*, *velutina*) / *Gaylussacia baccata* Forest (G5, Northern Appalachian Dry Oak Forest, CEGL006282)
- *Quercus rubra* - (*Quercus prinus*, *Quercus velutina*) / *Rhododendron periclymenoides* / *Lysimachia quadrifolia* - *Hieracium paniculatum* Forest (G2G3, Mixed Oak / Heath Forest (Northern Red Oak / Mixed Herbs Type), CEGL008523)

SPATIAL CHARACTERISTICS

Spatial Summary: Large- patch (at outer range) to matrix (in center of range) system that may cover extensive hillslopes and low ridges.

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, SCS

LeadResp: ECS

CES202.600 CENTRAL APPALACHIAN PINE-OAK ROCKY WOODLAND

Division 202, Forest and Woodland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Forest and Woodland (Treed), Shrubland (Shrub-dominated), Woody-Herbaceous, Ridge/Summit/Upper Slope, Acidic Soil, *Pinus* (*strobus*, *rigida*, *echinata*, *virginiana*) - *Quercus prinus*

Non-Diagnostic Classifiers: Lowland, Temperate, Oligotrophic Soil, Shallow Soil, Ustic, Consolidated, F-Patch/Medium Intensity, Needle-Leaved Tree, Broad-Leaved Deciduous Tree, Moderate (100-500 yrs) Persistence

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Concept Summary: This system of the central Appalachians encompasses open or scantily wooded hilltops and outcrops, or rocky slopes, at lower elevations. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. *Pinus* spp. are diagnostic, and often are mixed with xerophytic *Quercus* spp. Conditions are dry and nutrient-poor, and many if not most sites have a history of fire.

Comments: The northern extent of this system in central New England may overlap with Laurentian-Acadian Acidic Rocky Outcrop (CES201.571).

DISTRIBUTION

Range: Central New England south to Virginia.

Ecological Divisions: 202

TNC Ecoregions: 49:P, 52:?, 59:C, 61:C

Subnations/Nations: CT:, MA:, MD:?, ME:, NH:, NJ:, NY:, PA:, VA:, VT:, WV:

CONCEPT

Associations:

- (*Pinus strobus*, *Quercus rubra*) / *Danthonia spicata* Acid Bedrock Wooded Herbaceous Vegetation (G3G4, White Pine - Red Oak Bedrock Glade, CEGLO05101)
- *Juniperus virginiana* - *Fraxinus americana* / *Danthonia spicata* - *Poa compressa* Woodland (G2G3, Traprock Ridge, CEGLO06002)
- *Paulownia tomentosa* Woodland (GW, Princess-tree Woodland, CEGLO03687)
- *Photinia melanocarpa* - *Gaylussacia baccata* / *Carex pensylvanica* Shrubland (G1?, High-Elevation Outcrop Barren (Black Chokeberry Igneous / Metamorphic Type), CEGLO08508)
- *Picea rubens* / *Vaccinium angustifolium* High Allegheny Plateau Woodland (G3G5, Central Appalachian Red Spruce Woodland, CEGLO06254)
- *Pinus* (*pungens*, *rigida*) / *Quercus ilicifolia* / *Gaylussacia baccata* Woodland (G4, Central Appalachian Table Mountain Pine - Pitch Pine - Heath Woodland, CEGLO04996)
- *Pinus echinata* - *Quercus prinus* - *Quercus stellata* / *Vaccinium pallidum* / *Pityopsis graminifolia* var. *latifolia* Woodland (G2?, Pine-Oak Virginia Shield Barrens, CEGLO04445)
- *Pinus pungens* - *Pinus rigida* - (*Quercus prinus*) / *Kalmia latifolia* - *Vaccinium pallidum* Woodland (G3, Blue Ridge Table Mountain Pine - Pitch Pine Woodland (Typic Type), CEGLO07097)
- *Pinus rigida* - *Quercus* (*coccinea*, *velutina*) / *Schizachyrium scoparium* Woodland (G3G5, CEGLO06166)
- *Pinus rigida* / *Photinia melanocarpa* / *Deschampsia flexuosa* - *Schizachyrium scoparium* Woodland (G?, Pitch Pine Rocky Summit, CEGLO06116)
- *Pinus rigida* / *Quercus ilicifolia* / *Photinia melanocarpa* Woodland (G4G5, High Allegheny Pine Barrens, CEGLO06323)
- *Quercus ilicifolia* - *Prunus pumila* Shrubland (G?, Ridgetop Scrub Oak Barrens, CEGLO06121)
- *Quercus ilicifolia* Shrubland [Placeholder] (G?, CEGLO03883)
- *Quercus prinus* - *Pinus virginiana* - *Quercus* (*marilandica*, *stellata*) / *Dichanthelium depauperatum* Woodland (G2?, Central Appalachian Xeric Sandstone Woodland, CEGLO08540)
- *Quercus prinus* / *Quercus ilicifolia* / *Danthonia spicata* - *Solidago bicolor* Woodland (G3?, Central Appalachian Xeric Shale Woodland (Rock Chestnut Oak / Mixed Herbs Type), CEGLO08526)
- *Quercus rubra* - *Quercus prinus* - *Pinus strobus* / *Penstemon hirsutus* Woodland (G3G5, CEGLO06074)
- *Saxifraga michauxii* Herbaceous Vegetation (G3?, Low-Elevation Rocky Summit (Acidic Type), CEGLO04524)
- *Vaccinium* (*angustifolium*, *myrtilloides*, *pallidum*) High Allegheny Plateau / Central Appalachian Dwarf-shrubland (G?, Central Appalachian Blueberry Shrubland, CEGLO03958)
- *Vaccinium angustifolium* - *Sorbus americana* / *Sibbaldiopsis tridentata* Dwarf-shrubland (G?, Blueberry Granite Barrens, CEGLO05094)

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, SCS

LeadResp: ECS

CES202.592 NORTHEASTERN INTERIOR DRY OAK FOREST

Division 202, Forest and Woodland

Spatial Scale & Pattern: Matrix

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland

Diagnostic Classifiers: Lowland, Forest and Woodland (Treed), Acidic Soil, *Quercus* - *Carya*

Non-Diagnostic Classifiers: Sideslope, Toeslope/Valley Bottom, Mineral: W/ A-Horizon >10 cm, Loam Soil Texture, Ustic, F-Patch/Medium Intensity, Broad-Leaved Deciduous Tree

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

Concept Summary: These oak-dominated forests are one of the matrix forest systems in the northeastern and north-central U.S. Occurring in dry to dry-mesic settings, they grade from closed-canopy forests to patchy-canopy woodlands. They cover large expanses at low to mid elevations, where the topography is flat to gently rolling, occasionally steep. Soils are acidic and relatively infertile, but not strongly xeric. Oak species characteristic of dry-mesic conditions (e.g., *Quercus rubra*, *Quercus alba*, *Quercus velutina*, and *Quercus coccinea*) and *Carya* spp. are dominant in mature stands. *Castanea dentata* was a prominent tree before chestnut blight eradicated it as a canopy constituent. *Acer rubrum*, *Betula lenta*, and *Betula alleghaniensis* may be common associates. Especially on the drier and more acidic sites, heaths, including *Kalmia latifolia*, *Gaylussacia baccata*, and *Vaccinium* spp., may be important shrubs or dwarf-shrubs. With a long history of human habitation, many of the forests are early- to mid-successional, where *Pinus strobus*, *Pinus virginiana*, or *Liriodendron tulipifera* may be dominant or codominant. Within these forests, hillslope pockets with impeded drainage may support small isolated wetlands, including non-forested seeps or forested wetlands with *Acer rubrum*, *Quercus bicolor*, or *Nyssa sylvatica* characteristic.

DISTRIBUTION

Range: Central New England west and south through Pennsylvania to North Carolina and Tennessee.

Ecological Divisions: 202

TNC Ecoregions: 49:C, 59:C, 60:C, 61:C, 64:P

Subnations/Nations: CT:, MA:, MD:, ME:, NC:, NH:, NJ:, NY:, OH:, PA:, RI:, TN:, VA:, VT:, WV:

CONCEPT

Associations:

- *Acer rubrum* - *Nyssa sylvatica* - *Betula alleghaniensis* / *Sphagnum* spp. Forest (G?, Red Maple - Black Gum Basin Swamp, CEGLO06014)
- *Acer rubrum* - *Nyssa sylvatica* High Allegheny Plateau, Central Appalachian Forest (G?, Central Appalachian Forested Acid Seep, CEGLO06132)
- *Carya* (*glabra*, *ovata*) - *Fraxinus americana* - *Quercus* spp. Forest (G?, CEGLO06236)
- *Castanea dentata* - *Quercus rubra* Forest (GH, American Chestnut Forest (Mesic Montane Type), CEGLO07286)
- *Deschampsia caespitosa* - *Symplocarpus foetidus* Herbaceous Vegetation (G1, Inland Acidic Seep Community, CEGLO06101)
- *Kalmia latifolia* / *Schizachyrium scoparium* / *Cladonia* spp. Shrub Herbaceous Vegetation (G1, Southern Appalachian High-Elevation Mafic Glade (Flatrock Type), CEGLO04238)
- *Pinus strobus* - *Quercus* (*rubra*, *velutina*) - *Fagus grandifolia* Forest (G5, White Pine - Oak Forest, CEGLO06293)
- *Pinus strobus* Successional Forest (GD, Eastern White Pine Successional Forest, CEGLO07944)
- *Pinus virginiana* Successional Forest (GD, Virginia Pine Successional Forest, CEGLO02591)
- *Quercus* (*alba*, *rubra*, *velutina*) / *Cornus florida* / *Viburnum acerifolium* Forest (G?, Dry Oak-Hickory Forest, CEGLO06336)
- *Quercus* (*velutina*, *alba*) / *Vaccinium pallidum* High Allegheny Plateau, Western Allegheny Plateau Forest (G?, CEGLO06018)
- *Quercus alba* - *Quercus* (*rubra*, *coccinea*) - *Carya* (*alba*, *glabra*) / *Vaccinium pallidum* Piedmont Dry-Mesic Forest (G5?, Piedmont Dry-Mesic Oak - Hickory Forest, CEGLO08475)
- *Quercus alba* - *Quercus prinus* - *Carya glabra* / *Cornus florida* / *Vaccinium pallidum* / *Carex pensylvanica* Forest (G4?, Central Appalachian Acidic Oak - Hickory Forest, CEGLO08515)
- *Quercus alba* - *Quercus rubra* - *Carya* (*alba*, *ovata*) / *Cornus florida* Acid Forest (L, G3, White Oak - Red Oak Dry-Mesic Acid Forest, CEGLO02067)--may be too far west
- *Quercus alba* - *Quercus rubra* - *Carya ovata* Glaciated Forest (L, G4?, Midwestern White Oak - Red Oak Forest, CEGLO02068)--may be too far west
- *Quercus alba* - *Quercus rubra* - *Quercus prinus* - *Acer saccharum* / *Lindera benzoin* Forest (L, G?, White Oak - Chestnut Oak - Maple Acid Forest, CEGLO02059)--may be too far west
- *Quercus bicolor* / *Vaccinium corymbosum* / *Carex stipata* Forest (G?, Perched Swamp White Oak Swamp, CEGLO06241)
- *Quercus coccinea* - *Quercus velutina* - *Quercus alba* / *Amelanchier arborea* / *Gaylussacia baccata* Forest (G3G4, Mixed Oak / Heath Forest (Low-Elevation White Oak - Scarlet Oak - Black Oak Type), CEGLO08521)
- *Quercus prinus* - *Quercus* (*alba*, *coccinea*, *velutina*) / *Viburnum acerifolium* - (*Kalmia latifolia*) Forest (G4?, Appalachian Oak - (Chestnut) Forest, CEGLO05023)
- *Quercus prinus* - *Quercus rubra* - *Carya* (*glabra*, *alba*) / *Gaylussacia baccata* Forest (G5, Central Appalachian Rocky Dry-Mesic Oak Forest, CEGLO06057)
- *Quercus prinus* - *Quercus rubra* - *Carya ovalis* / *Solidago* (*ulmifolia*, *arguta*) - *Galium latifolium* Forest (G3G4, Central Appalachian Basic Oak - Hickory Forest (Montane Type), CEGLO08516)
- *Quercus prinus* - *Quercus velutina* / *Oxydendrum arboreum* - *Cornus florida* Forest (G4?, Mixed Oak / Heath Forest (Rock Chestnut Oak - Black Oak Type), CEGLO08522)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

- *Quercus prinus* / *Rhododendron catawbiense* - *Kalmia latifolia* Forest (G3?, Central Appalachian Rock Chestnut Oak / Catawba *Rhododendron* Forest, CEG008524)
- *Quercus rubra* - (*Quercus prinus*) / *Vaccinium* spp. / *Deschampsia flexuosa* Woodland (G3G5, Appalachian Red Oak Woodland (Northern Type), CEG006134)
- *Quercus rubra* - *Acer rubrum* / *Calycanthus floridus* - *Pyrolaria pubera* / *Thelypteris noveboracensis* Forest (G4?, Appalachian Montane Oak - Hickory Forest (Red Oak Type), CEG006192)
- *Quercus rubra* - *Carya ovata* / *Dennstaedtia punctilobula* - *Eupatorium purpureum* - (*Stachys nuttallii*) Forest (G2, Central Appalachian Montane Oak - Hickory Forest (High-Elevation Northern Red Oak - Shagbark Hickory Type), CEG008520)
- *Quercus rubra* - *Quercus alba* - *Fraxinus americana* - *Carya* (*ovata*, *ovalis*) / *Actaea racemosa* Forest (G3, Central Appalachian Montane Oak - Hickory Forest (Northern Red Oak - White Oak - White Ash Type), CEG008518)
- *Quercus rubra* - *Quercus alba* / *Rhododendron prinophyllum* - *Ilex montana* / *Calamagrostis porteri* Forest (G3?, Northern Red Oak Forest (Early Azalea / Porter Reedgrass Type), CEG008506)
- *Quercus rubra* - *Quercus prinus* / *Deschampsia flexuosa* - *Danthonia compressa* - *Calamagrostis porteri* Woodland (G?, Central Appalachian High-Elevation Red Oak Woodland (Southern Type), CEG004714)
- *Quercus rubra* / *Ilex montana* - *Menziesia pilosa* / *Dennstaedtia punctilobula* Forest (G3?, Northern Red Oak Forest (Minniebush / Hay-scented Fern Type), CEG008505)

SPATIAL CHARACTERISTICS

Spatial Summary: These were historically among the most important matrix forests of the northeast. They cover extensive areas where conditions are not extreme. Upslope they may grade into xeric oak ridge systems or rocky oak - pine forests/woodlands. Mesic cove forest systems may be embedded within this matrix in protected draws. Small pocket wetlands, not discriminated as separate systems, may also occur within these forests.

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS, SCS

LeadResp: ECS

CES202.604 NORTH-CENTRAL APPALACHIAN ACIDIC SWAMP

Division 202, Woody Wetland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Forest and Woodland (Treed), Needle-Leaved Tree, Extensive Wet Flat, 30-180-day hydroperiod

Non-Diagnostic Classifiers: Lowland, Temperate, Organic Peat (>40 cm), Mineral: W/ A-Horizon >10 cm, Broad-Leaved Deciduous Tree, Moderate (100-500 yrs) Persistence, Acidic Water, Shallow (<15 cm) Water

Concept Summary: These swamps are distributed through the Central Appalachians south to Virginia. They are found in basins, or on gently sloping seepage lowlands. The acidic substrate is mineral soil, often with a component of organic muck; if peat is present, it usually forms an organic epipedon over the mineral soil rather than a true peat substrate. *Tsuga canadensis* is usually present and may be dominant. It is often mixed with deciduous wetland trees such as *Acer rubrum* or *Nyssa sylvatica*. *Sphagnum* is an important component of the bryoid layer. Basin swamps tend to be more nutrient-poor and less species-rich than seepage swamps; in some settings, the two occur adjacent to each other with the basin swamp vegetation surrounded by seepage swamp vegetation on its upland periphery.

Comments: This system excludes swamps with *Chamaecyparis thyoides*, a tree more characteristic of the Coastal Plain, but which sometimes occurs inland. See Atlantic Coastal Plain Northern Basin Peat Swamp (CES203.522).

DISTRIBUTION

Range: Central New England south to West Virginia and Virginia.

Ecological Divisions: 202

TNC Ecoregions: 49:P, 52:?, 59:C, 60:P, 61:C

Subnations/Nations: CT:, MA:, MD:, NH:, NJ:, NY:, PA:, RI:, VA:, VT:, WV:

CONCEPT

Associations:

- *Acer rubrum* - *Fraxinus* (*pennsylvanica*, *americana*) / *Lindera benzoin* / *Symplocarpus foetidus* Forest (G4G5, Southern New England Red Maple Seepage Swamp, CEG006406)
- *Acer rubrum* - *Nyssa sylvatica* - (*Pinus rigida*) / *Ilex verticillata* / *Osmunda cinnamomea* Forest (G3G4, CEG007853)
- *Acer rubrum* - *Nyssa sylvatica* - *Betula alleghaniensis* / *Sphagnum* spp. Forest (G?, Red Maple - Black Gum Basin Swamp, CEG006014)
- *Acer rubrum* - *Nyssa sylvatica* - *Magnolia virginiana* Forest (G3?, Southern Red Maple - Black Gum Swamp Forest, CEG006238)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

- *Acer rubrum* - *Nyssa sylvatica* High Allegheny Plateau, Central Appalachian Forest (G?, Central Appalachian Forested Acid Seep, CEGLO06132)
- *Acer rubrum* / *Rhododendron viscosum* - *Clethra alnifolia* Forest (G?, Southern New England Red Maple - Swamp, CEGLO06156)
- *Betula alleghaniensis* - *Acer rubrum* - (*Tsuga canadensis*, *Abies balsamea*) / *Osmunda cinnamomea* Forest (G4?, Hardwood - Conifer Seepage Forest, CEGLO06380)
- *Fraxinus nigra* - *Abies balsamea* / *Rhamnus alnifolia* Forest (G1, Central Appalachian Circumneutral Seepage Swamp, CEGLO06003)
- *Picea rubens* - (*Tsuga canadensis*) / *Rhododendron maximum* Saturated Forest (G2?, Swamp Forest - Bog Complex (Spruce Type), CEGLO06277)
- *Picea rubens* - *Abies balsamea* / *Sphagnum magellanicum* Forest (G?, Lower New England Spruce - Fir Swamp, CEGLO06311)
- *Quercus bicolor* / *Vaccinium corymbosum* / *Carex stipata* Forest (G?, Perched Swamp White Oak Swamp, CEGLO06241)
- *Tsuga canadensis* - *Betula alleghaniensis* / *Ilex verticillata* / *Sphagnum* spp. Forest (G5, Hemlock - Hardwood Swamp, CEGLO06226)
- *Tsuga canadensis* / *Rhododendron maximum* / *Sphagnum* spp. Forest (G?, Eastern Hemlock - Great Laurel Swamp, CEGLO06279)

SOURCES

Last updated: 23 Mar 2003
Concept Author: S.C. Gawler

Stakeholders: ECS, MCS
LeadResp: ECS

CES202.606 NORTH-CENTRAL INTERIOR AND APPALACHIAN ACID PEATLAND

Division 202, Woody Wetland

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Shrubland (Shrub-dominated), Organic Peat (>40 cm), Acidic Water, >180-day hydroperiod

Non-Diagnostic Classifiers: Lowland, Temperate, Unconsolidated, Long (>500 yrs) Persistence, Depressional, Oligotrophic Water

Concept Summary: These *Sphagnum* and shrub peatlands occur in basins south of the Laurentian-Acadian region down to near the glacial boundary in the northeastern and north-central U.S. They are found in colder regions of the division, mostly in areas where glacial stagnation left coarse deposits and glacial depressions (many are "kettleholes"). The basins are generally closed, i.e., without inlets or outlets of surface water. The nutrient-poor substrate and the reduced throughflow of water create oligotrophic conditions fostering the development of *Sphagnum* peat and the growth of peatland vegetation. In deeper basins, the vascular vegetation grows on a *Sphagnum* mat over water, with no mineral soil development. Ericaceous shrubs and dwarf-shrubs (e.g., *Chamaedaphne calyculata*) dominate, with patches of graminoid dominance. Some peatlands may have a sparse tree layer. Although these are often called bogs, in most cases they are technically fens (albeit nutrient-poor ones), as the vegetation remains in contact with the groundwater.

Comments: This system occurs south of the Laurentian-Acadian region, and these acidic peatlands are distinctive and discrete elements of the landscape. They are related to Laurentian-Acadian Acidic Swamp (CES201.574). There are enough differences in landscape setting and more temperate floristic elements to distinguish them. They include treed, shrub, and graminoid associations. In the Midwest, it may be necessary to split off the shrub/graminoid acid peatland (poor fen) types.

DISTRIBUTION

Range: Central New England to the Great Lakes and south-central Minnesota southward, generally associated with the glacial terminus or stagnation zones.

Ecological Divisions: 202

TNC Ecoregions: 45:P, 46:P, 48:P, 49:P, 59:?, 60:P, 61:C, 62:C, 64:P

Subnations/Nations: CT:, IL:c, IN:c, MA:, ME:, MI:c, MN:c, NH:, NJ:, NY:, OH:c, ON:c, PA:, RI:, VT:, WI:c

CONCEPT

Associations:

- *Carex lasiocarpa* - *Carex oligosperma* - (*Lysimachia terrestris*) / *Sphagnum* spp. / *Spiraea tomentosa* Herbaceous Vegetation (G3G4, Midwestern Graminoid Poor Fen, CEGLO05279)
- *Carex oligosperma* - *Carex pauciflora* - *Eriophorum vaginatum* / *Sphagnum* spp. Herbaceous Vegetation (G4G5, Open Graminoid / *Sphagnum* Bog, CEGLO05256)
- *Chamaecyparis thyoides* / *Chamaedaphne calyculata* Woodland (G3G4, CEGLO06321)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

- *Chamaedaphne calyculata* - (*Gaylussacia dumosa*) - *Decodon verticillatus* / *Woodwardia virginica* Dwarf-shrubland (G5, Southern New England Bog, CEG006008)
- *Chamaedaphne calyculata* / *Carex oligosperma* - *Eriophorum virginicum* Dwarf-shrubland (G3G4, Leatherleaf Kettle Bog, CEG005092)
- *Larix laricina* / *Photinia melanocarpa* / *Sphagnum* spp. Forest (G4?, Central Tamarack Poor Swamp, CEG002472)
- *Myrica gale* - *Chamaedaphne calyculata* / *Carex (lasiocarpa, utriculata)* - *Utricularia* spp. Shrub Herbaceous Vegetation (G4G5, Medium Fen, CEG006302)
- *Myrica gale* - *Chamaedaphne calyculata* / *Carex exilis* Shrub Herbaceous Vegetation (G?, Coastal Plain Poor Fen, CEG006392)
- *Myrica gale* - *Dasiphora fruticosa* ssp. *floribunda* / *Carex lasiocarpa* - *Cladium mariscoides* Shrub Herbaceous Vegetation (G2G3, CEG006068)
- *Picea mariana* / (*Vaccinium corymbosum*, *Gaylussacia baccata*) / *Sphagnum* sp. Woodland (G3G5, Black Spruce Woodland Bog, CEG006098)
- *Pinus rigida* / *Chamaedaphne calyculata* / *Sphagnum* spp. Woodland (G3G5, CEG006194)
- *Sphagnum (rubellum, cuspidatum, torreyanum)* - *Vaccinium (oxycoccus, macrocarpon)* Nonvascular Vegetation (G?, Peatland Moss Lawn, CEG006394)
- *Vaccinium corymbosum* - *Gaylussacia baccata* - *Photinia melanocarpa* / *Calla palustris* Shrubland (G2G3, Highbush Blueberry Poor Fen, CEG005085)
- *Vaccinium corymbosum* / *Sphagnum* spp. Shrubland (G3G5, Highbush Blueberry Bog Thicket, CEG006190)

SOURCES

References: Damman and French 1987

Last updated: 23 Mar 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS, SCS

LeadResp: ECS

CES202.605 NORTH-CENTRAL INTERIOR AND APPALACHIAN RICH SWAMP

Division 202, Woody Wetland

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

Diagnostic Classifiers: Temperate, Broad-Leaved Deciduous Tree, Depressional, Mesotrophic Water, Saturated Soil

Non-Diagnostic Classifiers: Lowland, Forest and Woodland (Treed), Mineral: W/ A-Horizon >10 cm, Moderate (100-500 yrs) Persistence, Extensive Wet Flat, Intermittent Flooding

Concept Summary: These forested wetlands are scattered throughout the north-central Midwest (south of the Laurentian region) and the north-central Appalachians at low to mid elevations. They are found in basins where higher pH and/or nutrient levels are associated with a rich flora. Tree species include *Acer rubrum*, *Fraxinus nigra*, as well as calciphilic herbs. Conifers include *Larix laricina*, but typically not *Thuja occidentalis*, which is characteristic of more northern wetland systems. There may be shrubby or herbaceous openings within the primarily wooded cover. The substrate is primarily mineral soil, but there may be some peat development.

Comments: This system occurs south of the Laurentian-Acadian region, and these circumneutral or enriched swamps are often rather distinctive and discrete elements of the landscape. They are related to Laurentian-Acadian Alkaline Swamp (CES201.575) but have more temperate elements and generally lack *Thuja occidentalis*. More alkaline shrub/herb fens are treated as part of the North-Central Interior Shrub-Graminoid Alkaline Fen (CES202.702).

DISTRIBUTION

Range: Central New England to the southern Great Lakes and south-central Minnesota south to northern Illinois, Indiana, Ohio, Pennsylvania, and perhaps West Virginia and Virginia.

Ecological Divisions: 202

TNC Ecoregions: 45:C, 46:C, 48:C, 49:P, 52:P, 59:C, 60:?, 61:C

Subnations/Nations: CT:, IL:c, IN:c, MA:, MI:c, MN:c, NJ:, NY:, OH:c, ON:c, PA:, RI:, VA:p, VT:, WI:c, WV:p

CONCEPT

Associations:

- *Acer (rubrum, saccharinum)* - *Fraxinus* spp. - *Ulmus americana* Forest (L, G4?, Maple - Ash - Elm Swamp Forest, CEG005038)
- *Acer rubrum* - *Larix laricina* / *Rhamnus alnifolia* Woodland (G3G5, Red Maple - Larch Wooded Fen, CEG006118)
- *Fraxinus nigra* - *Acer rubrum* - (*Larix laricina*) / *Rhamnus alnifolia* Forest (G?, Rich Red Maple - Black Ash Swamp, CEG006009)
- *Fraxinus nigra* - *Acer rubrum* / *Carex leptalea* Saturated Forest (G?, Red Maple - Black Ash Swamp, CEG007441)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

- *Fraxinus nigra* - *Liriodendron tulipifera* - *Acer rubrum* / *Caltha palustris* - *Carex bromoides* Forest (G3, Montane Black Ash Seepage Swamp, CEG008416)
- *Larix laricina* - *Acer rubrum* / (*Rhamnus alnifolia*, *Vaccinium corymbosum*) Forest (G2G3, Central Tamarack - Red Maple Rich Swamp, CEG005232)

SOURCES

Last updated: 09 Jan 2003
Concept Author: S.C. Gawler

Stakeholders: ECS, MCS
LeadResp: ECS

CES202.608 CENTRAL APPALACHIAN FLOODPLAIN

Division 202, Mixed Upland and Wetland

Spatial Scale & Pattern: Large Patch

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland, Wetland

Diagnostic Classifiers: Forest and Woodland (Treed), Toeslope/Valley Bottom, Broad-Leaved Deciduous Tree, Riverine / Alluvial, Intermittent Flooding, Short (<5 yrs) Flooding Interval

Non-Diagnostic Classifiers: Lowland, Temperate, Eutrophic Soil, Deep Soil, Mineral: W/ A-Horizon >10 cm, Silt Soil Texture, Udic, Ustic, Unconsolidated, Short Disturbance Interval, Flood Scouring, Moderate (100-500 yrs) Persistence, 1-29-day hydroperiod, 30-180-day hydroperiod

Concept Summary: This system encompasses floodplains from southern New England to Virginia. Mostly forested, these occur on floodplains of medium to large rivers where topography and process have resulted in the development of a relatively flat floodplain with a complex of upland and wetland temperate alluvial vegetation. This complex includes floodplain forests in which *Acer saccharinum*, *Populus deltoides*, and *Platanus occidentalis* are characteristic, as well as herbaceous sloughs and shrub wetlands. Most areas are underwater each spring; microtopography determines how long the various habitats are inundated. Depositional and erosional features may both be present depending on the particular floodplain, although there is a history of deposition in the floodplain formation.

Comments: This system is distinguished from floodplain systems northward (Laurentian-Acadian Floodplain Forest (CES201.587)) and westward (North-Central Interior Floodplain (CES202.694)).

DISTRIBUTION

Range: Southern New England west to Lake Erie and south to Virginia. The James River in Virginia marks the southern extent of this system.

Ecological Divisions: 202

TNC Ecoregions: 49:C, 52:C, 59:C, 60:P, 61:C

Subnations/Nations: CT:c, MA:c, MD:c, NH:c, NJ:?, NY:c, OH:p, PA:c, VA:c, VT:c, WV:c

CONCEPT

Associations:

- *Acer negundo* Forest (G4G5, Box-elder Floodplain Forest, CEG005033)
- *Acer rubrum* - *Fraxinus pennsylvanica* / *Boehmeria cylindrica* Forest [Provisional] (G?, Red Maple - Green Ash Forested Swamp, CEG006548)
- *Acer saccharinum* - (*Populus deltoides*) / *Matteuccia struthiopteris* Forest (G?, Silver Maple Floodplain Levee Forest (Ostrich Fern Type), CEG006147)
- *Acer saccharinum* - *Ulmus americana* - (*Populus deltoides*) Forest (G4?, Silver Maple - Elm - (Cottonwood) Forest, CEG002586)
- *Acer saccharinum* - *Ulmus americana* / *Onoclea sensibilis* Forest (G?, Silver Maple - Elm Floodplain Forest, CEG006001)
- *Acer saccharinum* - *Ulmus americana* / *Physocarpus opulifolius* Forest (G?, CEG006042)
- *Acer saccharinum* / *Onoclea sensibilis* - *Boehmeria cylindrica* Forest (G?, Silver Maple Floodplain Bottom Forest (Sensitive Fern Type), CEG006176)
- *Acer saccharum* - *Fraxinus* spp. - *Tilia americana* / *Matteuccia struthiopteris* - *Ageratina altissima* Forest (G?, Terrace Hardwood Floodplain Forest, CEG006114)
- *Alnus serrulata* - *Physocarpus opulifolius* Shrubland (G5, Allegheny Floodplain Alder Thicket, CEG006251)
- *Alnus serrulata* Eastern Shrubland (G4G5, Smooth Alder Swamp, CEG005082)
- *Arundinaria gigantea* ssp. *gigantea* Shrubland (G2?, Floodplain Canebrake, CEG003836)
- *Betula nigra* - *Platanus occidentalis* / *Impatiens pallida* Forest (G?, CEG006184)
- *Betula nigra* - *Platanus occidentalis* Forest (G5, River Birch - Sycamore Forest, CEG002086)
- *Carex torta* Herbaceous Vegetation (G3G4, Rocky Bar and Shore (Twisted Sedge Type), CEG004103)
- *Cephalanthus occidentalis* / *Carex* spp. - *Lemna* spp. Southern Shrubland (G4, Southern Buttonbush Pond, CEG002191)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

- *Fagus grandifolia* - *Quercus* spp. - *Acer rubrum* - *Juglans nigra* Forest (G2G3, Beech - Mixed Hardwood Floodplain Forest, CEG L005014)
- *Fraxinus pennsylvanica* - *Ulmus* spp. - *Celtis occidentalis* Forest (G3G5, Central Green Ash - Elm - Hackberry Forest, CEG L002014)
- *Justicia americana* Herbaceous Vegetation (G4G5, Water-willow Rocky Bar and Shore, CEG L004286)
- *Liriodendron tulipifera* - *Pinus strobus* - (*Tsuga canadensis*) / *Carpinus caroliniana* / *Amphicarpaea bracteata* Forest (G3, Central Appalachian Small-Stream Montane Floodplain Forest, CEG L008405)
- *Peltandra virginica* - *Saururus cernuus* - *Carex crinita* / *Climacium americanum* Herbaceous Vegetation (G2?, Floodplain Pool, CEG L007696)
- *Platanus occidentalis* - *Acer saccharinum* - *Juglans nigra* - *Ulmus rubra* Forest (G4, Sycamore - Silver Maple Calcareous Floodplain Forest, CEG L007334)
- *Platanus occidentalis* - *Liquidambar styraciflua* / *Asimina triloba* Forest (G5, Sycamore - Sweetgum Piedmont Swamp Forest, CEG L007340)
- *Quercus* (*palustris*, *phellos*) - *Acer rubrum* / *Cinna arundinacea* Forest (G?, CEG L006605)
- *Quercus bicolor* - *Acer rubrum* / *Carpinus caroliniana* Forest (G?, Swamp White Oak Floodplain Forest, CEG L006386)
- *Quercus palustris* - *Acer rubrum* / *Carex grayi* - *Geum canadense* Forest (G?, CEG L006185)
- *Tilia americana* - *Acer saccharum* - *Acer nigrum* / *Laportea canadensis* Forest (G?, Rich Floodplain Forest, CEG L006405)

SOURCES

Last updated: 09 Jan 2003

Concept Author: S.C. Gawler

Stakeholders: ECS, MCS, SCS

LeadResp: ECS

CES202.609 CENTRAL APPALACHIAN RIPARIAN

Division 202, Mixed Upland and Wetland

Spatial Scale & Pattern: Linear

Required Classifiers: Natural/Semi-natural, Vegetated (>10% vasc.), Upland, Wetland

Diagnostic Classifiers: Lowland, Very Short Disturbance Interval, Flood Scouring, Riverine / Alluvial, Intermittent Flooding

Non-Diagnostic Classifiers: Forest and Woodland (Treed), Sideslope, Toeslope/Valley Bottom, Temperate, Mesotrophic Soil, Udic, Ustic, Short (50-100 yrs) Persistence, Short (<5 yrs) Flooding Interval

Concept Summary: This riparian system ranges from southern New England to Virginia. It develops on floodplains and shores along river channels that lack a broad flat floodplain due to steeper sideslopes, higher gradient, or both. Flooding is the major process affecting the vegetation, but compared to flat floodplain areas, the substrate is more rapidly drained, and deposition is less important than erosion. The vegetation is a mosaic of forest, woodlands, shrublands, and herbaceous communities. Common trees include *Betula nigra*, *Platanus occidentalis*, and *Acer negundo*. *Panicum virgatum* and *Andropogon gerardii* are typical of open, flood-scoured rivershore prairies, and *Carex torta* is typical of wetter areas near the channel.

Comments: This is a high-gradient system, unlike the low-gradient system described in Central Appalachian Floodplain (CES202.608).

DISTRIBUTION

Range: Southern New England west to Lake Erie and south to Virginia. The James River in Virginia marks the southern extent of this system.

Ecological Divisions: 202

TNC Ecoregions: 49:C, 52:C, 59:C, 60:?, 61:C

Subnations/Nations: CT:c, MA:c, MD:c, NH:c, NJ:?, NY:c, OH:p, PA:c, VA:c, VT:c, WV:c

CONCEPT

Associations:

- *Alnus serrulata* - *Physocarpus opulifolius* Shrubland (G5, Allegheny Floodplain Alder Thicket, CEG L006251)
- *Andropogon gerardii* - *Campanula rotundifolia* - *Solidago simplex* Herbaceous Vegetation (G2, Northern Riverside Rock Outcrop, CEG L006284)
- *Andropogon gerardii* - *Panicum virgatum* - *Baptisia australis* Herbaceous Vegetation (G2G3, Fall-Line Riverwash Bedrock Prairie, CEG L006283)
- *Andropogon gerardii* - *Phlox subulata* - *Solidago simplex* var. *racemosa* - *Packera paupercula* Herbaceous Vegetation (G2?, Potomac River Basalt Outcrop Scour Prairie, CEG L004284)
- *Betula nigra* - *Salix interior* Shrubland (G4G5, Birch - Willow Riverbank Shrubland, CEG L003896)
- *Carex torta* Herbaceous Vegetation (G3G4, Rocky Bar and Shore (Twisted Sedge Type), CEG L004103)

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

- *Hudsonia tomentosa* - *Paronychia argyrocoma* Dwarf-shrubland (G1, Hudsonia Riverwash Barren, CEGL006232)
- *Justicia americana* Herbaceous Vegetation (G4G5, Water-willow Rocky Bar and Shore, CEGL004286)
- *Panicum virgatum* - *Andropogon gerardii* - *Sorghastrum nutans* Connecticut River High Terrace Herbaceous Vegetation (G1?, Connecticut River Floodplain Terrace Prairie, CEGL004623)
- *Pinus rigida* - *Hudsonia tomentosa* - *Pityopsis falcata* Sparse Vegetation (G?, Inland Dune, CEGL006391)
- *Pinus strobus* - *Betula populifolia* / *Comptonia peregrina* / *Schizachyrium scoparium* Woodland (G2, Dry River Bluff, CEGL006004)
- *Podostemum ceratophyllum* Herbaceous Vegetation (G3G5, Rocky Bar and Shore (Riverweed Type), CEGL004331)
- *Quercus (palustris, phellos)* - *Acer rubrum* / *Cinna arundinacea* Forest (G?, CEGL006605)
- *Salix nigra* Temporarily Flooded Shrubland (G4?, Black Willow Riverbank Shrubland, CEGL003901)
- *Tsuga canadensis* - (*Pinus strobus*) Temporarily Flooded Forest (G3, Montane Alluvial Forest (Small River Type), CEGL007143)

SOURCES

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Concept Author: S.C. Gawler

Stakeholders: ECS, MCS, SCS
LeadResp: ECS
LeadResp: MCS

CES202.601 NORTH-CENTRAL APPALACHIAN ACIDIC CLIFF AND TALUS

Division 202, Barren

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland

Diagnostic Classifiers: Cliff (Substrate), Talus (Substrate), Temperate, Acidic Soil

Non-Diagnostic Classifiers: Lowland, Sideslope, Very Shallow Soil, Ustic, Landslide

Concept Summary: Sparsely vegetated to partially wooded cliffs and talus slopes in the Central Appalachians occurring on rocks of acidic lithology and lacking any indicators of enriched conditions. This cliff system occurs at low to mid elevations from central New England south to Tennessee. It consists of vertical or near-vertical cliffs and the talus slopes below, formed on hills of granitic, sandstone, or otherwise acidic bedrock. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. Vegetation in seepage areas tends to be more well-developed and floristically different from the surrounding dry cliffs. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places. *Juniperus virginiana* is a characteristic tree species, *Toxicodendron radicans* a characteristic woody vine, and *Polypodium virginianum* a characteristic fern.

DISTRIBUTION

Range: Central New England and New York south to Tennessee.

Ecological Divisions: 202

TNC Ecoregions: 49:?, 51:?, 52:?, 59:C, 60:?, 61:C

Subnations/Nations: CT:, MA:, MD:?, NY:, OH:, PA:, TN:, VA:, VT:, WV:

CONCEPT

Associations:

- *Asplenium montanum* Central Appalachian Sandstone Sparse Vegetation (G?, Spleenwort Acidic Cliff, CEGL004391)
- *Betula alleghaniensis* - *Quercus rubra* / *Polypodium virginianum* Woodland (G3G5, Northern Hardwood - Oak Talus Slope Woodland, CEGL006320)
- *Parthenocissus quinquefolia* / *Dicentra eximia* Sparse Vegetation (G2G3Q, Appalachian Talus Slope, CEGL004454)
- *Quercus prinus* - *Betula lenta* / *Parthenocissus quinquefolia* Talus Woodland (G?, Chestnut Oak - Black Birch - Virginia Creeper Wooded Talus Slopes, CEGL006565)
- Sandstone Dry Cliff Sparse Vegetation (G4G5, Midwest Dry Sandstone Cliff, CEGL002045)
- Sandstone Midwest Moist Cliff Sparse Vegetation (G4G5, Midwest Moist Sandstone Cliff, CEGL002287)
- *Umbilicaria mammulata* Nonvascular Vegetation (G4?, Montane Cliff (Carolina Rocktripe Type), CEGL004387)
- *Umbilicaria muehlenbergii* - *Lasallia papulosa* - (*Melanelia stygia*) Nonvascular Vegetation (G2?, Central Appalachian Talus Slope, CEGL004389)

SOURCES

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Concept Author: S.C. Gawler

Stakeholders: ECS, MCS, SCS
LeadResp: ECS

APPENDIX C: Definitions of ecological systems in Northeast Temperate Network Parks

CES202.603 NORTH-CENTRAL APPALACHIAN CIRCUMNEUTRAL CLIFF AND TALUS

Division 202, Barren

Spatial Scale & Pattern: Small Patch

Required Classifiers: Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland

Diagnostic Classifiers: Cliff (Substrate), Talus (Substrate), Temperate, Alkaline Soil

Non-Diagnostic Classifiers: Lowland, Sideslope, Circumneutral Soil, Very Shallow Soil, Ustic, Landslide, Moderate (100-500 yrs) Persistence

Concept Summary: This cliff system occurs at low to mid elevations from central New England south to Virginia. It consists of vertical or near-vertical cliffs and steep talus slopes, where weathering and/or bedrock lithology produce circumneutral to calcareous pH and enriched nutrient availability. Substrates include limestone, dolomite, and other rocks. The vegetation varies from sparse, to patches of small trees, in places forming woodland or even forest vegetation. *Fraxinus* spp., *Tilia americana*, and *Staphylea trifolia* are woody indicators of the enriched setting. The herb layer includes at least some species that are indicators of enriched conditions, e.g., *Impatiens pallida*, *Pellaea atropurpurea*, *Asplenium platyneuron*, or *Woodsia obtusa*.

DISTRIBUTION

Range: Central New England and New York south to Virginia.

Ecological Divisions: 202

TNC Ecoregions: 52:?, 59:P, 60:?, 61:C

Subnations/Nations: MA:, MD:, ME:, NC:?, NH:, NJ:, NY:, OH:, PA:, TN:?, VA:, VT:, WV:

CONCEPT

Associations:

- *Acer saccharum* - *Fraxinus americana* - *Juglans cinerea* / *Staphylea trifolia* Forest (G4?, CEG006020)
- *Acer saccharum* - *Quercus muehlenbergii* Forest (G?, Sugar Maple - Chinquapin Oak Forest, CEG005010)
- *Acer saccharum* - *Tilia americana* - *Fraxinus americana* / *Ostrya virginiana* / *Geranium robertianum* Woodland (G3G5, Rich Northern Hardwood Woodland, CEG005058)
- *Asplenium ruta-muraria* - *Pellaea atropurpurea* Sparse Vegetation (G3G4, Montane Cliff (Calcareous Type), CEG004476)
- *Thuja occidentalis* / *Carex eburnea* - *Pellaea atropurpurea* Woodland (G2G3, Appalachian Cliff White-cedar Woodland, CEG002596)
- *Tilia americana* - *Fraxinus americana* / *Acer pensylvanicum* - *Ostrya virginiana* / *Parthenocissus quinquefolia* - *Impatiens pallida* Woodland (G3, Central Appalachian Basic Boulderfield Forest (Montane Basswood - White Ash Type), CEG008528)
- *Tilia americana* - *Fraxinus americana* / *Cornus florida* Woodland (G3G5, CEG006054)
- *Toxicodendron radicans* / *Heuchera americana* - (*Dichanthelium depauperatum*, *Woodsia obtusa*) Herbaceous Vegetation (G?, Appalachian Mafic Cliff (Low-Elevation Type), CEG004395)

SOURCES

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Concept Author: S.C. Gawler

Stakeholders: ECS, MCS, SCS

LeadResp: ECS