
ECOLOGICAL SYSTEM: APPALACHIAN SERPENTINE WOODLAND

Summary: This system consists of distinct vegetation associated with ultramafic rock substrates in the Piedmont and Blue Ridge of the eastern United States. Most examples are open woodlands with *Pinus rigida* (pitch pine) and/or *Quercus alba* (white oak) and *Quercus stellata* (post oak) in the often stunted canopy. Extreme edaphic conditions lead to locally xerophytic growing conditions that contribute to relatively open canopies and often grassy ground cover. Unusual and extreme soil chemistry is the primary ecological factor, but fire is an important factor in determining vegetation structure and dynamics.

High-ranked Species: *Canis rufus* (G1Q, red wolf), *Coreopsis delphiniifolia* (G3?Q, larkspur tickseed), *Drepanolejeunea appalachiana* (G2?), *Erynnis martialis* (G3G4, mottled duskywing), *Thalictrum macrostylum* (G3G4, small-leaf meadowrue), *Thaspium pinnatifidum* (G2G3, cutleaf meadow-parsnip), *Viola appalachiensis* (G3, Appalachian blue violet), *Virginia valeriae pulchra* (G5T3T4, mountain earth snake).

Range: This system is widely scattered throughout the southern and central Appalachians and Piedmont, from Pennsylvania to Georgia. United States: GA, MD, NC, PA, SC?, VA?

Delaware Estuary Associations:

- Serpentine Emergent Wetland
- Serpentine Indiangrass - Little Bluestem Grassland
- Serpentine Little Bluestem - Prairie Dropseed Grassland
- Serpentine Red Maple - Oak - Catbrier Serpentine Forest
- Serpentine Red Maple - Pine Forest
- Serpentine Red-cedar - Virginia Pine - Catbrier Serpentine Forest
- Virginia Pine Serpentine Forest

CLASSIFIERS FOR APPALACHIAN SERPENTINE WOODLAND

Primary Division: 202

Land Cover Class: Forest and Woodland

Spatial Scale & Pattern: Large patch

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

Diagnostic Classifiers: Forest and Woodland (Treed); Rock Outcrops/Barrens/Glades

SERPENTINE EMERGENT WETLAND

Deschampsia caespitosa - *Vernonia noveboracensis* Herbaceous Vegetation

Range: This community occurs along groundwater seeps in three of the serpentine barrens in Chester County, Pennsylvania.

Environmental Description: This community occurs in groundwater seep areas of low slope (1-3 degrees) and variable aspect. Soils are typically very wet (saturated) clay loams and sapric peats (muck) derived from serpentine bedrock. Soil depth is generally greater than 30 cm and can exceed 60 cm.

Vegetation Description: This community is very open with woody plants limited to occasional trees, typically *Acer rubrum* (red maple)



Photo by Pennsylvania Natural Heritage Program

along the wetland edge and scattered *Alnus serrulata* (smooth alder) within the wetland. The dominant herbaceous species is *Deschampsia caespitosa* (tufted hairgrass). Other important herbaceous species include *Leersia oryzoides* (rice cutgrass), *Sorghastrum nutans* (yellow Indiangrass), *Juncus tenuis* (poverty rush), *Vernonia noveboracensis* (New York ironweed), and *Dichanthelium clandestinum* (deer-tongue witchgrass).

Characteristic Species: *Deschampsia caespitosa* (tufted hairgrass), *Vernonia noveboracensis* (New York ironweed).

Dynamics/Successional Trajectory: This community is driven by fluctuations in groundwater and the serpentine bed rock geology associated with the seep community.

Reference Sites: Nottingham and Chrome serpentine barrens, PA.

Global and State Conservation Ranks and Reasons: GNR (20-Sep-2005). PA: SNR.

VegBank Link for Plot Data: http://vegbank.org/natureserve/element_global.2.787677

References: Eastern Ecology Working Group n.d., Fike 1999, Podniesinski et al. unpubl. data 1999.

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Herb (field)	Graminoid	<i>Deschampsia caespitosa</i> (tufted hairgrass)
Herb (field)	Graminoid	<i>Leersia oryzoides</i> (rice cutgrass)

SERPENTINE INDIANGRASS - LITTLE BLUESTEM GRASSLAND

Sorghastrum nutans - *Schizachyrium scoparium* Serpentine Herbaceous Vegetation

Range: This community occurs in serpentine barrens located within Chester County in Pennsylvania and on Staten Island, New York.

Environmental Description: This serpentine grassland community is associated with soils derived from weathered serpentine bedrock. It occurs over shallow (15-25 cm deep) silt loam to clay loam soils on low to mid slopes with a northerly aspect.

Vegetation Description: The dominant species in this community are *Sorghastrum nutans* (yellow Indiangrass) and *Schizachyrium*



Photo by Pennsylvania Natural Heritage Program

scoparium (little bluestem). Other characteristic herbaceous species may include *Symphotrichum depauperatum* (serpentine American-aster), *Vernonia noveboracensis* (New York ironweed), *Achillea millefolium* (common yarrow), *Deschampsia caespitosa* (tufted hairgrass), *Packera anonyma* (Small's groundsel), *Oenothera fruticosa* ssp. *glauca* (narrowleaf evening-primrose), *Setaria parviflora* (yellow foxtail grass), *Panicum virgatum* (switchgrass), *Danthonia spicata* (poverty oatgrass), *Symphotrichum ericoides* (white heath aster), *Symphotrichum lateriflorum* (calico aster), *Ageratina aromatica* (lesser snakeroot), *Potentilla simplex* (common cinquefoil), and *Asclepias viridiflora* (green comet milkweed). In Pennsylvania, the only important woody species is *Juniperus virginiana* (eastern red-cedar) which may have up to 40% cover in some grasslands. In New York, trees may cover 20-40% and typically include *Betula populifolia* (gray birch), *Quercus velutina* (black oak), *Sassafras albidum* (sassafras), and *Populus tremuloides* (quaking aspen).

Noteworthy Associated Plant and/or Animal Species: *Atrytone arogos* (arogos skipper).

Characteristic Species: *Sorghastrum nutans* (yellow Indiangrass).

Dynamics/Successional Trajectory: This grassland community is adapted to the weathering of serpentine bedrock. It was once thought that the lack of canopy cover was maintained by the unique edaphic features of the chrome series soils, but in the last 20 years many sites have been invaded by dense *Pinus virginiana* (Virginia pine) (Tyndall 1992a). In this community, eastern red-cedar can reach up to 40% in canopy cover. Further establishment and expansion of eastern red-cedar in this grassland community type may alter the light regime and promote substantial soil development (up to 10 cm in 20 years). Under these conditions, an entirely different community develops as the influence of the bedrock is buffered by the soil/litter accumulation. As the canopy closes, the grassland community can succeed into a serpentine woodland or forest, and a dense understory of *Smilax rotundifolia* (roundleaf greenbrier) may become established. Some of the characteristic herbaceous serpentine species apparently may persist in the ground layer as scattered non-flowering individuals; other populations appear to die out but may persist in the seed bank.

Management Concerns: Selective cutting has been effective in restoring degraded sites to their previous composition and structure, but most researchers believe that without regular burning to prevent soil development the herbaceous serpentine plant communities may not persist. There is substantial evidence that most of the existing areas were regularly burned by Native Americans (Marye 1920, 1955a, 1955b, 1955c) and perhaps maintained by grazing after European settlement.

Reference Sites: Chrome and Nottingham Serpentine Barrens, PA; Unionville, Fern Hill, Brintons Quarry (Chester), PA; Pink Hill (Delaware).

Global and State Conservation Ranks and Reasons: G1G2 (21-Sep-2005). PA: SNR. New ranking will need to be developed for each serpentine association.

VegBank Link for Plot Data: http://vegbank.org/natureserve/element_global.2.787695

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Fike 1999, Marye 1920, Marye 1955a, Marye 1955b, Marye 1955c, Podnieszinski et al. unpubl. data 1999, Smith n.d.a, Tyndall 1992a.

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Herb (field)	Graminoid	<i>Sorghastrum nutans</i> (yellow Indiangrass)

SERPENTINE LITTLE BLUESTEM - PRAIRIE DROPSEED GRASSLAND

Schizachyrium scoparium - *Sporobolus heterolepis* Serpentine Herbaceous Vegetation

Range: This community occurs in serpentine barrens located within Chester and Lancaster counties in Pennsylvania and in Cecil County, Maryland.

Environmental Description: This serpentine grassland community is associated with soils derived from weathered serpentine bedrock. It typically occurs on mid to upper slopes on very shallow (0-10 cm deep) stony or gravelly sand or silt loam soils. Exposed bedrock and bare ground are common at some locations. Soils are typically very dry, reflecting well-drained to excessively well-drained soil conditions and



Photo by Pennsylvania Natural Heritage Program

shallow depth to bedrock. Slope aspect is variable but is rarely due east. The slope angle ranges from 1-16 degrees and is most often between 3 and 6 degrees. A subtype of this community occurs on gravel barrens in Pennsylvania and Maryland. These barrens have the same species composition; however, they typically have less than 60% vegetation cover and exposed serpentine bedrock and gravel as the dominant cover type. Gravel barrens occur at mid-slope positions with a steep slope (>6 degrees and as much as 16 degrees). Gravel barrens are also more likely to have a southern aspect.

Vegetation Description: The dominant species in this community are the grasses *Schizachyrium scoparium* (little bluestem) and *Sporobolus heterolepis* (prairie dropseed). Other characteristic herbaceous species may include *Symphotrichum depauperatum* (serpentine American-aster), *Scleria pauciflora* (papillose nutrush), *Cerastium arvense* var. *villosum* (field chickweed), *Solidago nemoralis* (gray goldenrod), *Packera anonyma* (Small's groundsel), *Dichanthelium sphaerocarpon* (round-fruit witchgrass), and *Arabis lyrata* (lyrate rockcress). Woody plants are rare and usually include *Juniperus virginiana* (eastern red-cedar) or pine seedlings and saplings of *Pinus rigida* (pitch pine) and/or *Pinus virginiana* (Virginia pine).

Noteworthy Associated Plant and/or Animal Species: *Talinum teretifolium* (eastern fameflower).

Characteristic Species: *Schizachyrium scoparium* (little bluestem), *Sporobolus heterolepis* (prairie dropseed), *Symphotrichum depauperatum* (serpentine American-aster).

Dynamics/Successional Trajectory: This grassland community is adapted to the weathering of serpentine bedrock. It was once thought that the lack of canopy cover was maintained by the unique edaphic features of the chrome series soils, but in the last 20 years, many sites have been invaded by dense *Pinus virginiana* (Virginia pine) (Tyndall 1992a). Selective cutting has been effective in restoring degraded sites to their previous composition and structure, but most researchers believe that without regular burning to prevent soil development the herbaceous serpentine plant communities may not persist. There is substantial evidence that most of the existing areas were regularly burned by Native Americans (Marye 1920, 1955a, 1955b, 1955c) and perhaps maintained by grazing after European settlement.

Management Concerns: Selective cutting has been effective in restoring degraded sites to their previous composition and structure, but most researchers believe that without regular burning to prevent soil development the herbaceous serpentine plant communities may not persist. There is substantial evidence that most of the existing areas were regularly burned by Native Americans (Marye 1920, 1955a, 1955b, 1955c) and perhaps maintained by grazing after European settlement.

Reference Sites: Nottingham, Chrome, Goat Hill, New Texas and Rock Springs Serpentine barrens, PA.

Global and State Conservation Ranks and Reasons: G1G2 (21-Sep-2005). PA: SNR. New ranking will need to be developed for each serpentine association.

VegBank Link for Plot Data: http://vegbank.org/natureserve/element_global.2.787699

References: Eastern Ecology Working Group n.d., Fike 1999, Harrison 2004, Marye 1920, Marye 1955a, Marye 1955b, Marye 1955c, Podnieszinski et al. unpubl. data 1999, Smith n.d.a, Tyndall 1992a, Tyndall 1992b, Tyndall and Farr 1990.

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Herb (field)	Graminoid	<i>Schizachyrium scoparium</i> (little bluestem)

SERPENTINE RED MAPLE - OAK - CATBRIER SERPENTINE FOREST

Acer rubrum - *Quercus* spp. / *Smilax* spp. Serpentine Forest

Range: This community occurs in serpentine barrens located within Chester and Lancaster counties in Pennsylvania and on Staten Island, New York.

Environmental Description: This serpentine plant community is associated with soils derived from weathered serpentine bedrock. It typically occurs on upper slopes and interfluves with a southerly aspect. Soils are silt loams, greater than 30 cm deep.



Photo by Pennsylvania Natural Heritage Program

Vegetation Description: In Pennsylvania serpentine barrens, the forest or woodland canopy is dominated by *Acer rubrum* (red maple) and *Quercus alba* (white oak), as well as other oak species, including *Quercus falcata* (southern red oak), *Quercus rubra* (northern red oak), and *Quercus velutina* (black oak). On Staten Island, New York, the canopy includes *Betula populifolia* (gray birch) and *Populus tremuloides* (quaking aspen) in addition to *Quercus velutina* (black oak) and *Sassafras albidum* (sassafras). The subcanopy is characterized by *Acer rubrum* (red maple), *Quercus alba* (white oak), *Nyssa sylvatica* (blackgum), and *Prunus serotina* (black cherry). The shrub layer is dominated by *Smilax rotundifolia* (roundleaf greenbrier) and/or *Smilax glauca* (whiteleaf greenbrier). *Vaccinium pallidum* (hillside blueberry), *Rubus allegheniensis* (Allegheny blackberry), *Gaylussacia baccata* (black huckleberry), *Prunus serotina* (black cherry), *Morella pensylvanica* (northern bayberry), *Rhus copallinum* (winged sumac), and/or *Viburnum recognitum* (northern arrow-wood) may also be present in the shrub layer. The herbaceous layer under the canopy cover is depauperate and typically dominated by *Smilax rotundifolia* (roundleaf greenbrier), *Smilax glauca* (whiteleaf greenbrier), and *Microstegium vimineum* (Japanese stiltgrass). Other typical herbaceous species include *Danthonia spicata* (poverty oatgrass), *Carex glaucoidea* (blue sedge), and *Lonicera japonica* (Japanese honeysuckle).

Noteworthy Associated Plant and/or Animal Species: *Atrytone arogos* (arogos skipper).

Characteristic Species: *Acer rubrum* (red maple), *Quercus alba* (white oak), *Smilax rotundifolia* (roundleaf greenbrier)

Dynamics/Successional Trajectory: This plant community is adapted to the weathering of serpentine bedrock. It was once thought that the lack of canopy cover was maintained by the unique edaphic features of the chrome series soils, but in the last 20 years, many sites have been invaded by dense *Pinus virginiana* (Virginia pine) (Tyndall 1992a). In Pennsylvania, red maple and white oak are the canopy dominants of this type; while in New York, dominant canopy species include black oak, sassafras, and gray birch. This phenomenon dramatically alters the light regime and promotes substantial soil development (up to 10 cm in 20 years). Under these conditions, an entirely different community develops as the influence of the bedrock is buffered by the soil/litter accumulation. This closed-canopy serpentine forest typically exhibits a dense understory of *Smilax rotundifolia* (roundleaf greenbrier).

Management Concerns: Exotic plants such as *Lonicera japonica* (Japanese honeysuckle) occur in this community. Some of the characteristic herbaceous serpentine species apparently persist in the ground layer as scattered non-flowering individuals; other populations appear to die out but may persist in the seed bank. Selective cutting has been effective in restoring degraded sites to their previous composition and structure, but most researchers believe that without regular burning to prevent soil development the

serpentine plant communities will not persist. There is substantial evidence that most of the existing areas were regularly burned by Native Americans (Marye 1920, 1955a, 1955b, 1955c) and perhaps maintained by grazing after European settlement.

Reference Sites: Chrome, Goat Hill, New Texas, and Rock Springs Serpentine barrens, PA.

Global and State Conservation Ranks and Reasons: G1G2 (20-Sep-2005). PA: SNR. New ranking will need to be developed for each Pennsylvania serpentine association.

VegBank Link for Plot Data: http://vegbank.org/natureserve/element_global.2.787680

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Fike 1999, Marye 1920, Marye 1955a, Marye 1955b, Marye 1955c, Podniesinski et al. unpubl. data 1999, Smith n.d.a, Tyndall 1992a.

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Acer rubrum</i> (red maple)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus alba</i> (white oak)
Shrub/sapling (tall & short)	Vine/Liana	<i>Smilax rotundifolia</i> (roundleaf greenbrier)
Herb (field)	Graminoid	<i>Danthonia spicata</i> (poverty oatgrass)

SERPENTINE RED MAPLE - PINE FOREST

Acer rubrum - *Pinus virginiana* - *Pinus rigida* / *Microstegium vimineum* - *Smilax* spp. Serpentine Forest

Range: This community occurs in serpentine barrens located within Chester and Lancaster counties in Pennsylvania and Cecil County in Maryland.

Environmental Description: This serpentine plant community is associated with soils derived from weathered serpentine bedrock. It typically occurs on mid to low slopes. Soils are typically silt loams or occasionally clay loam and exceed 50 cm in depth.

Vegetation Description: Dominant canopy trees include *Acer rubrum* (red maple), *Pinus virginiana* (Virginia pine), *Pinus rigida* (pitch pine), and *Juniperus virginiana* (eastern red-cedar). The subcanopy is dominated by *Acer rubrum* (red maple). The shrub layer is characterized by *Lindera benzoin* (northern spicebush) and *Acer rubrum* (red maple). The herbaceous layer is dominated by *Microstegium vimineum* (Japanese stiltgrass), *Smilax rotundifolia* (roundleaf greenbrier), *Smilax glauca* (whiteleaf greenbrier), and *Lonicera japonica* (Japanese honeysuckle).

Characteristic Species: *Acer rubrum* (red maple), *Lindera benzoin* (northern spicebush), *Microstegium vimineum* (Japanese stiltgrass), *Pinus rigida* (pitch pine), *Pinus virginiana* (Virginia pine).

Dynamics/Successional Trajectory: This plant community is adapted to the weathering of serpentine bedrock. It was once thought that the lack of canopy cover was maintained by the unique edaphic features of the chrome series soils, but in the last 20 years, many sites have been invaded by dense *Pinus virginiana* (Virginia pine) (Tyndall 1992a). In this serpentine barren community red maple, Virginia pine and pitch pine are the canopy dominants of this type. This phenomenon dramatically alters the light regime and promotes substantial soil development (up to 10 cm in 20 years). Under these conditions, an entirely different community develops as the influence of the bedrock is buffered by the soil/litter accumulation. This closed-canopy serpentine forest typically exhibits a dense understory of *Smilax rotundifolia* (roundleaf greenbrier).

Management Concerns: Some of the characteristic herbaceous serpentine species apparently persist in the ground layer as scattered non-flowering individuals; other populations appear to die out but may persist in the seed bank. Selective cutting has been effective in restoring degraded sites to their previous composition and structure, but most researchers believe that without regular burning to prevent soil development the serpentine plant communities will not persist. There is substantial evidence that most of

the existing areas were regularly burned by Native Americans (Marye 1920, 1955a, 1955b, 1955c) and perhaps maintained by grazing after European settlement.

Reference Sites: Nottingham, Chrome, Goat Hill, New Texas and Rock Springs Serpentine barrens, PA; Pilot Serpentine Barren, MD.

Global and State Conservation Ranks and Reasons: G1G2 (20-Sep-2005). PA: SNR. New ranking will need to be developed for each Pennsylvania serpentine association.

VegBank Link for Plot Data: http://vegbank.org/natureserve/element_global.2.787687

References: Eastern Ecology Working Group n.d., Fike 1999, Marye 1920, Marye 1955a, Marye 1955b, Marye 1955c, Podniesinski et al. unpubl. data 1999, Smith n.d.a, Tyndall 1992a, Tyndall and Farr 1990.

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Needle-leaved tree	<i>Pinus rigida</i> (pitch pine)
Tree canopy	Needle-leaved tree	<i>Pinus virginiana</i> (Virginia pine)
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	<i>Acer rubrum</i> (red maple)
Herb (field)	Graminoid	<i>Microstegium vimineum</i> (Japanese stiltgrass)

SERPENTINE RED-CEDAR - VIRGINIA PINE - CATBRIER SERPENTINE FOREST

Juniperus virginiana - *Pinus virginiana* / *Smilax rotundifolia* Serpentine Forest

Range: This community occurs in serpentine barrens located within Chester and Lancaster counties in Pennsylvania and Cecil County in Maryland.

Environmental Description: This serpentine plant community is associated with soils derived from weathered serpentine bedrock and typically occurs on the upper portions of moderate to steep slopes (typically 5-25 degrees) commonly with a northerly and/or easterly aspect. Soils are typically well-drained and somewhat moist to dry. Soil texture is characteristically silt loam or clay loam and may be stony to stone-free. Soil depth varies from 4 cm to >30 cm but is typically 10 to 20 cm deep.

Vegetation Description: The dominant canopy trees are *Pinus virginiana* (Virginia pine) and *Juniperus virginiana* (eastern red-cedar). *Sassafras albidum* (sassafras) and *Acer rubrum* (red maple) also are present but are not abundant in the canopy. The low-shrub layer is sparse and consists mainly of occasional hardwood seedlings. The dense shade of the conifer overstory and the accumulation of needle litter have produced a depauperate herbaceous layer. *Smilax rotundifolia* (roundleaf greenbrier) is the dominant species in the herbaceous layer and also acts as a liana, climbing into the conifer canopy and forming an often impenetrable curtain. Characteristic herbaceous species include *Microstegium vimineum* (Japanese stiltgrass), *Danthonia spicata* (poverty oatgrass), and *Polystichum acrostichoides* (Christmas fern).

Characteristic Species: *Juniperus virginiana* (eastern red-cedar), *Pinus virginiana* (Virginia pine).

Dynamics/Successional Trajectory: This plant community is adapted to the weathering of serpentine bedrock. It was once thought that the lack of canopy cover was maintained by the unique edaphic features of the chrome series soils, but in the last 20 years, many sites have been invaded by dense *Pinus virginiana* (Virginia pine) (Tyndall 1992a). In this community, Virginia pine and eastern red-cedar are the canopy dominants. This phenomenon dramatically alters the light regime and promotes substantial soil development (up to 10 cm in 20 years). Under these conditions, an entirely different community develops as the influence of the bedrock is buffered by the soil/litter accumulation. This closed-canopy serpentine forest exhibits a dense understory of *Smilax rotundifolia* (roundleaf greenbrier).

Management Concerns: Some of the characteristic herbaceous serpentine species apparently persist in the ground layer as scattered non-flowering individuals; other populations appear to die out but may persist in the seed bank. Selective cutting has been effective in restoring degraded sites to their previous composition and structure, but most researchers believe that without regular burning to prevent soil development the serpentine plant communities will not persist. There is substantial evidence that most of the existing areas were regularly burned by Native Americans (Marye 1920, 1955a, 1955b, 1955c) and perhaps maintained by grazing after European settlement.

Reference Sites: Chrome, New Texas Serpentine Barrens, PA, and Pilot Serpentine Barren, MD.

Global and State Conservation Ranks and Reasons: G1G2 (20-Sep-2005). PA: SNR. New ranking will need to be developed for each serpentine association.

VegBank Link for Plot Data: http://vegbank.org/natureserve/element_global.2.787691

References: Eastern Ecology Working Group n.d., Fike 1999, Marye 1920, Marye 1955a, Marye 1955b, Marye 1955c, Podniesinski et al. unpubl. data 1999, Smith n.d.a, Tyndall 1989, Tyndall 1992a, Tyndall and Farr 1989.

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Needle-leaved tree	<i>Juniperus virginiana</i> (eastern red-cedar)
Tree canopy	Needle-leaved tree	<i>Pinus virginiana</i> (Virginia pine)

VIRGINIA PINE SERPENTINE FOREST

Pinus virginiana / *Quercus marilandica* Serpentine Forest

Range: This type is currently described from Cecil County in Maryland and Lancaster and Chester counties in Pennsylvania.

Environmental Description: This community type is a successional forest occurring on soils underlain and influenced by serpentine bedrock. It occurs on upper slopes and ridgetops with variable slopes (0-10 degrees) with a west, northwest or north aspect. Soils are somewhat moist to dry silt loams or clay loams.

Vegetation Description: This serpentine woodland/forest is dominated by *Pinus virginiana* (Virginia pine) with a subcanopy of *Quercus marilandica* (blackjack oak). Other tree associates include *Quercus stellata* (post oak), *Sassafras albidum* (sassafras), *Prunus serotina* (black cherry), *Nyssa sylvatica* (blackgum), *Juniperus virginiana* (eastern red-cedar), and *Robinia pseudoacacia* (black locust). A dense shrub layer dominated by *Smilax rotundifolia* (roundleaf greenbrier) and/or *Smilax glauca* (whiteleaf greenbrier) is characteristic in canopy openings. Other shrubs may include *Vaccinium pallidum* (hillside blueberry), *Vaccinium stamineum* (deerberry), *Gaylussacia baccata* (black huckleberry), *Quercus ilicifolia* (bear oak), and *Quercus prinoides* (dwarf chinquapin oak). Herbs may include *Aralia nudicaulis* (wild sarsaparilla), *Pteridium aquilinum* (bracken fern), *Microstegium vimineum* (Japanese stiltgrass), *Dichanthelium dichotomum* (witchgrass), and *Danthonia spicata* (poverty oatgrass). In some woodlands with less canopy cover and stonier soils, *Schizachyrium scoparium* (little bluestem) and *Sporobolus heterolepis* (prairie dropseed) dominate patches of the herbaceous layer along with scattered individuals of *Symphotrichum depauperatum* (serpentine American-aster), *Scleria pauciflora* (papillose nutrush), *Cerastium arvense* var. *villosum* (field chickweed), *Solidago nemoralis* (gray goldenrod), *Packera anonyma* (Small's groundsel), *Dichanthelium sphaerocarpon* (round-fruit witchgrass), and *Arabis lyrata* (lyrate rockcross).

Characteristic Species: *Pinus virginiana* (Virginia pine), *Quercus marilandica* (blackjack oak), *Smilax glauca* (whiteleaf greenbrier), *Smilax rotundifolia* (roundleaf greenbrier).

Dynamics/Successional Trajectory: This plant community is adapted to the weathering of serpentine bedrock. It was once thought that the lack of canopy cover was maintained by the unique edaphic features of the chrome series soils, but in the last 20 years, many sites have been invaded by dense *Pinus virginiana* (Virginia pine) (Tyndall 1992a). In serpentine barrens in Pennsylvania, Virginia pine and black jack oak are the canopy dominants of this type. This phenomenon dramatically alters the light regime and promotes substantial soil development (up to 10 cm in 20 years). Under these conditions, an entirely different community develops as the influence of the bedrock is buffered by the soil/litter accumulation. This closed-canopy serpentine forest is dominated by red maple and various oaks and typically exhibits a dense understory of *Smilax rotundifolia* (roundleaf greenbrier).

Management Concerns: Some of the characteristic herbaceous serpentine species apparently persist in the ground layer as scattered non-flowering individuals; other populations appear to die out but may persist in the seed bank. Selective cutting has been effective in restoring degraded sites to their previous composition and structure, but most researchers believe that without regular burning to prevent soil development the serpentine plant communities will not persist. There is substantial evidence that most of the existing areas were regularly burned by Native Americans (Marye 1920, 1955a, 1955b, 1955c) and perhaps maintained by grazing after European settlement.

Reference Sites: Nottingham, Chrome, Goat Hill, New Texas and Rock Springs Serpentine barrens, PA; Pilot Serpentine Barren, MD.

Global and State Conservation Ranks and Reasons: GNA (modified/managed) (1-Dec-1997). PA: SNA.

VegBank Link for Plot Data: http://vegbank.org/natureserve/element_global.2.684859

References: Eastern Ecology Working Group n.d., Fike 1999, Marye 1920, Marye 1955a, Marye 1955b, Marye 1955c, Podniesinski et al. unpubl. data 1999, Tyndall 1989, Tyndall 1992a.

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Needle-leaved tree	<i>Pinus virginiana</i> (Virginia pine)
Shrub/sapling (tall & short)	Vine/Liana	<i>Smilax glauca</i> (whiteleaf greenbrier)
Shrub/sapling (tall & short)	Vine/Liana	<i>Smilax rotundifolia</i> (roundleaf greenbrier)
Herb (field)	Graminoid	<i>Danthonia spicata</i> (poverty oatgrass)