

Community Forest Master Plan

Town of Betterton, MD



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Introduction

The Town of Betterton is located in Kent County, MD. It is situated at the head of the Chesapeake Bay, and it overlooks the confluence of the Sassafras, Elk and Susquehanna Rivers . It has a land area of 0.88 sq. mi. (2.23 km²) and a population of approximately 700. In 2008, the Washington College Center for Environment and Society (WC-CES) developed the Urban Greening Initiative, which is part of the Mayor of Chestertown's project Mayor's Climate Protection Agreement (MCPA). The project is designed to help Chestertown and neighboring towns increase environmental awareness and promote sound environmental management. The "Betterton Urban and Community Forest Master Plan" was undertaken as part of this project to develop a method for renewing and sustaining Betterton's urban tree resources. This effort was made possible through a grant awarded from the Chesapeake Bay Trust for an "urban greening" initiative. In this context, WC-CES performed an analysis of the Town's street tree population using the U.S. Forest Service "i-Tree" software package (USDA-FS, 2008), and the American Forests organization CITYgreen methodology . Street tree inventory data were collected and analyzed in the spring of 2009.

Additionally, the Town of Betterton tree ordinance entitled "Chesapeake Bay Critical Area. Questions and Answers for the Homeowner and/or Homebuilder for the Town of Betterton" is being reviewed to provide a basis for implementing this Master Plan. The evaluation of this tree ordinance is based on a review of the: 1) Chestertown "Tree Ordinance 156"; 2) recently updated Easton "Forest Conservation Ordinance" and the Gaithersburg "Tree and Vegetation – Public Lands City Code"; 3) Society of American Foresters Forestry Handbook, Chapter 16, Urban Forestry "Basic Components of Urban Forestry Ordinances"; 4) Code of Maryland (COMAR) Regulation Title 08., Department of Natural Resources, Subtitle 19., Forest Conservation, and the Maryland Code, Natural Resources Article, Title 5. Forests and Parks; and 5) the Maryland Critical Area Act (COMAR 27.01.09.01 and COMAR 27.01.02.04).

Trees as Indicators of a Communities Ecological Health

Urban ecology is more complex than tree cover. Trees, which make up the majority of the green in green infrastructure, are good indicators of the health of an urban ecosystem. When trees are large and healthy, the ecological systems that support them including soils, air and water systems are also healthy. In turn, healthy trees provide valuable environmental benefits. There is a large difference in the ecological health and characteristics of areas within this region that have more tree cover than other areas. Comparing the amount of tree cover to impervious surface cover is another important indicator. The greater the canopy cover, the less impervious surface there is and the more environmental benefits. This report focuses on the benefits that can be calculated for their

“bottom line” contributions: energy conservation, carbon sequestration, stormwater management, improving air quality, and aesthetic benefits.

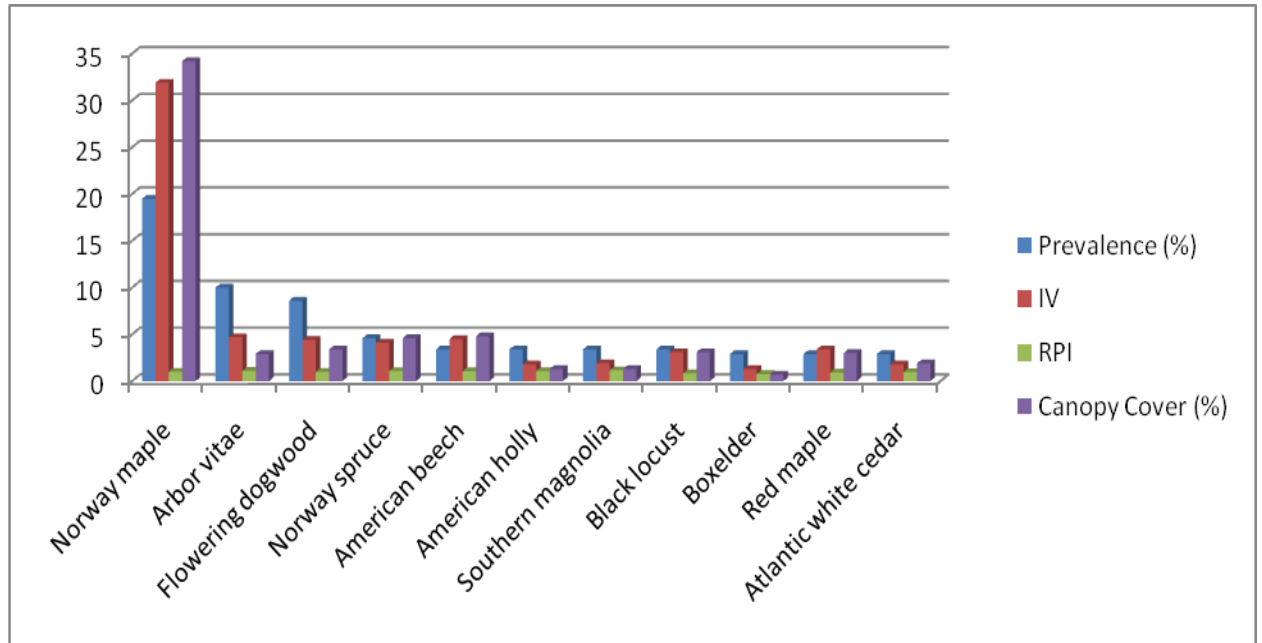
Findings

Based on satellite imagery obtained and analyzed by the Washington College Geographic Information Systems (GIS) Laboratory, it was determined that Betterton currently has a 39% canopy cover. According to recommendations made by American Forests for the Chesapeake Bay watershed, a specific tree cover target for Betterton is a 45% tree canopy over all, which is considered essential for growth, development and maintenance of a healthy environment. This translates to a 13.2 % increase in the tree canopy. Based on information collected for this study, there are approximately 730 trees currently in Betterton, and an increase of 13.2% would mean that an additional 101 trees should be planted.

Species Distribution

The tree population has considerable diversity. Norway maple is the most prevalent tree species, having nearly 20% of the total tree population and over 34% of the canopy cover. American beech, and southern magnolia are the next most important large species, and they are significant contributors to the canopy cover. Norway spruce is the most important large conifer, and Arbor vitae (Northern white cedar) is the most important medium-size conifer. Black locust, box elder and red maple are the most dominant medium-size deciduous trees. The two most common ornamental species are flowering dogwood and American holly.

Summary of Population Characteristics for the Most Prevalent Tree Species



IV – *Importance Value* – The mean of three relative values (percent of total trees, percent of total leaf area, and percent of canopy cover). An IV of 100 suggests a total reliance on one species, and an IV of 0 suggests no reliance.
 RPI – *Relative Performance Index* – Index values relating each species overall condition to all other species in Town. Species with average conditions compared to all other species have an RPI of 1; above average > 1; below average < 1

Findings

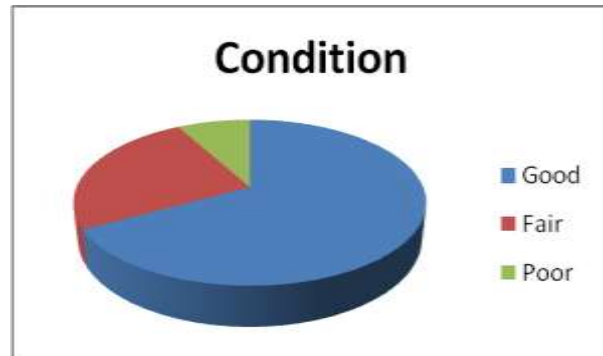
Betterton Tree Inventory Results. Ecosystem Service Annual Benefits (\$)

| | | |
|---|----------------------------|-----------------|
| 1 | Energy avoidance | \$9,073 |
| 2 | Carbon sequestration | \$2,295 |
| 3 | Air quality improvement | \$2,803 |
| 4 | Storm water management | \$25,180 |
| 5 | Aesthetic benefits | <u>\$26,397</u> |
| 6 | Total annual benefits | \$65,748 |
| 7 | Annual benefits per tree | \$90.06 |
| 8 | Annual benefits per capita | \$93.92 |

The cost: benefit ratio for town street trees is 1.56. This compares favorably with the ratios found in certain other U.S. towns and cities.

Condition Assessment:

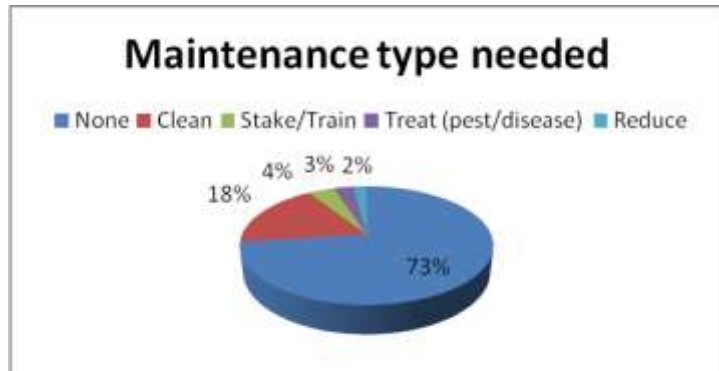
Existing trees are reasonably well managed given the limited budget available. No maintenance or routine maintenance was recommended for approximately 67% of trees. Few critical safety concerns were observed, and only 8% trees had immediate management needs. The treatment recommended for a majority of other trees was no treatment or the cleaning of deadwood.



Findings

Management Needs:

The following outlines the specific management needs of the street trees of Betterton, as found in the sample survey. For those trees requiring maintenance, the representative percentages of the maintenance classes are shown below:



Planting Location:

There is a large forested area in the western part of Town (Figure 1.) that has a great number of large trees, which contribute significantly to the Ecosystem Service Annual Benefits (see previous page) of Betterton. Nonetheless, there are important areas where trees will need to be replaced, most notably the embankment bordering the Chesapeake Bay and Sassafras River. The cutting of trees in this area has resulted in an alarming amount of erosion that will require immediate attention in order to avoid damage to Bayside Boulevard.

General observations

- 1 Trees need to be planted along the northern-most part Ericsson Avenue, which is nearly devoid of trees.
- 2 Shrubs, grasses and herbaceous vegetation should be planted to control erosion along the embankment which borders the Chesapeake Bay and Sassafras River north of Bayside Boulevard.
- 3 Trees planted along Howell Point Road next to the Fire Department building are quite stressed, and they will need to be replaced unless measures are not taken (e.g., watering) to protect them.

Budget

FY 2008 Budget

Tree Maintenance

- 1 Contracted - \$
- 2 Town personnel - \$

Tree Planting

- 1 Contracted - \$
- 2 Town personnel - \$

Disposal - \$

Overhead/Insurance - \$

Total - \$

FY 2009 Budget

Tree Maintenance

| | | |
|---|----------------|------------|
| 1 | Contracted | - \$ 1,650 |
| 2 | Town personnel | - \$ |

Tree Planting 1/

| | | |
|---|----------------|----------|
| 1 | Contracted | - \$ |
| 2 | Town personnel | - \$ 600 |

Disposal - \$

Overhead/Insurance - \$

Total - \$ 2,250

FY 2010 Budget (proposed)

Tree Maintenance - \$ 1,650

Tree Planting - \$ 1,000

Disposal - \$

Overhead/Insurance - \$

Total - \$ 2,650

Recommendations

Vision and Goals

The development of an urban and community forest management plan for Betterton should include mission and goals statements. The development of these items should be accomplished in order to fully define the Town's focus and commitment to the urban and community forestry program.

Vision: To the sustain a healthy, safe and appealing public street and park tree population, and to make the tree population a uniform 40% to 45% throughout the Town, in order to enhance the environmental and economic benefits derived from trees in the Town of Betterton.

Goal: To manage the urban and community forest of Betterton in an effective manner

through sound fiscal, personnel and operational management, utilizing in-house and contracted services, as well as volunteers from the community, for the purpose of building a team of effective proponents for the trees in the community.

Tree and Shrub Planting Recommendations

- 4 The recommended season for planting trees is late fall/winter or late winter/early spring of the following year when trees are dormant.
- 5 The recommended size of tree seedlings for planting is a minimum of 1 inch to 3 inches (preferred) diameter (caliper measurement).
- 6 Native tree species or well adapted non-native species are recommended for planting (see Appendix 1).
- 7 Native shrubs, grasses and herbaceous plants are recommended for controlling erosion (see Appendices 2 and 3).

Short-Term Action Items

- 1 Plant shrubs, grasses and herbaceous plants to control erosion along the embankment which borders Bayside Blvd. in the northern part of Town.
- 2 Develop tree seedling planting program (50/yr)
- 3 Remove hazard trees on public right-of-ways
- 4 Perform systematic trimming of trees containing hazardous defects
- 5 Establish a routine systematic trimming cycle for all trees along the Town right-of-ways
- 6 Monitor trees on an annual basis for structural, disease or cultural problems

Recommendations

- 7 Identify potential partners for urban and community forestry programming in the Town

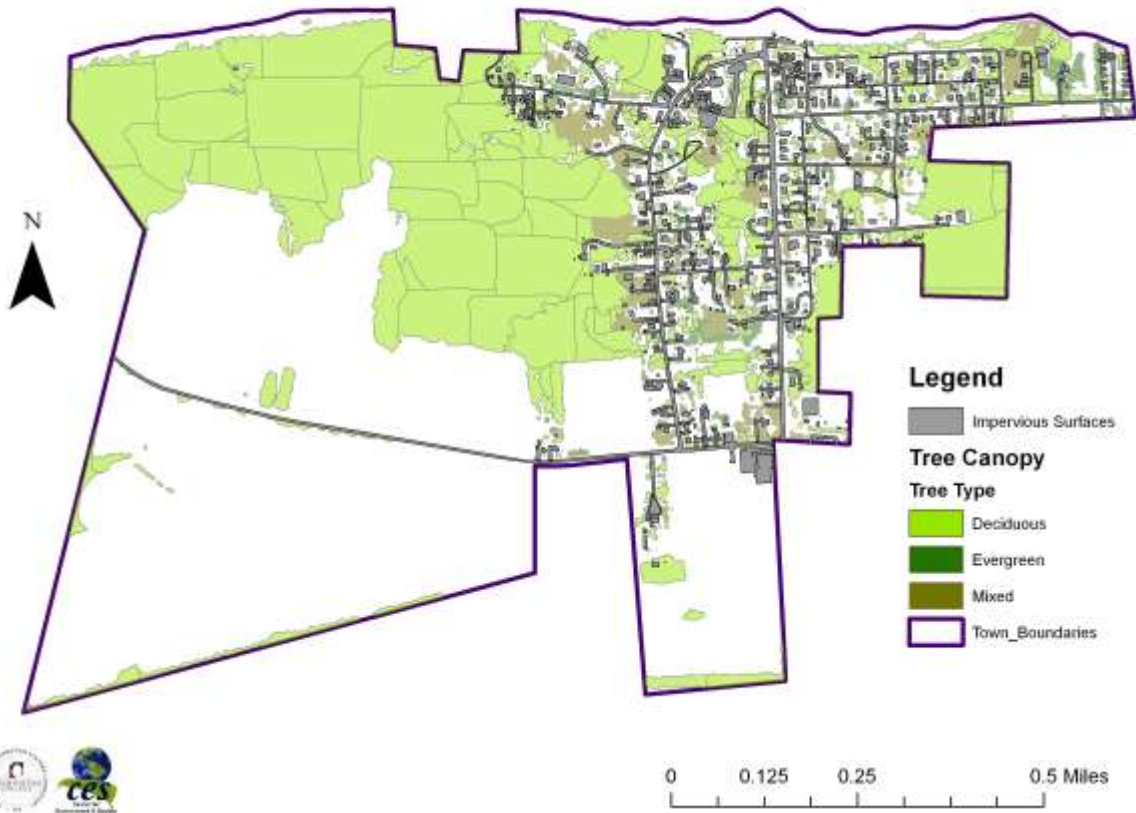
- o Neighborhood associations
 - o Schools
 - o Churches
 - o Nurseries
 - o Sassafras River Association
 - o Washington College
- 8 Inform public of ongoing efforts and long-term strategies

Long-Term Action Items:

- 1 Increase public education
- 2 Formally establish a Tree Committee
- 3 Increase fiscal budget
- 4 Develop partnerships with local/regional utility agencies and organizations
- 5 Develop a comprehensive set of specifications for contracted services
- 6 Develop tree seedling planting program (50/yr)
- 7 Develop a planting program for establishing shrubs, grasses and herbaceous plants.
- 8 Provide training for in-house personnel on all phases of urban and community tree, shrub, grass and herbaceous plant care.
- 9 Work with the State of Maryland Critical Area Commission on the development and refinement of standards for controlling erosion on state, public and private property.
- 10 Work with the State of Maryland (MDE, DNR), County and transportation agencies on the development and refinement of standards and criteria for the care of trees on state roadways and public land.

Figure 1.

Betterton Tree Canopy and Impervious Surfaces



Appendix 1. Choose a Tree (Source: Marylanders Plant Trees; Maryland – Smart, Green and Growing. www.trees.maryland.gov)

When selecting a tree to plant, consider:

- Is there enough space for the tree to grow?
- How much space is available for the tree when it reaches its mature height, width and depth?
- Look at nearby buildings, trees, plants, sidewalks and roads that may not allow the tree to grow tall and wide as it matures.
- Check for overhead and underground utilities.
- How much sunlight is available for the new tree? Is the tree shade tolerant or shade intolerant? A tree that is shade tolerant doesn't mind competition from other trees and buildings. A tree that is shade intolerant needs full sunlight to grow properly.
- Do you want a fast growing or slowly growing tree? A fast-growing tree will fill a vacant spot more quickly. A slow-growing tree to replace an older tree when it matures and dies or becomes too big for the site.
- Is there enough water available at the site for the new tree? Once established, native trees are considered more adaptable to Maryland's climate conditions.
- What is the purpose of the tree? Beauty, shade, wildlife habitat, increased property value, reducing erosion? Consider the color of the leaves in the spring and fall, flower shapes, and bark texture.
- **If you plan to use a coupon, is your tree on the eligible list?**

Recommended Tree List for Marylanders Plant Trees

If you plan to use a Marylanders Plant Trees coupon please check if the tree you want to plant is on the eligible list below.

This list may be updated periodically as interest and availability of native tree stock changes.

SMALL TREES

- **SHADBUSH OR SERVICEBERRY (*Amelanchier canadensis*)**
Height: 6'-20', Spread: 10'-15'. Erect stems, often clumped. These small trees have attractive bark, flowers, and fruit. White flower. Beautiful orange to red autumn color. Requires little or no maintenance. Important berry producer during the early summer months. Blue-black fruit is eaten by bluebirds, cardinals, and tanagers. Foliage is used by browsers.
- **ALLEGHENY SERVICEBERRY (*Amelanchier laevis*)**
Height: 30'-40', Spread: 15'-20'. Multiple stems are upright and highly branched forming a dense shrub, or if properly pruned a small tree. The tree is short-lived, has a rapid growth rate, and can be used as a filler plant or to attract birds. The main ornamental feature is the white flowers borne in drooping clusters in mid spring. The purplish black berries are sweet and juicy but are soon eaten by birds. The fall color is yellow to red. It is well adapted for planting beneath power lines due to its small size.
- **FLOWERING DOGWOOD (*Cornus florida*)**
Height: 20', Spread: 15'-20'. Small tree with flat topped crown. Place in well drained soil. Full sun to partial shade. Has character in all four seasons. Excellent as specimen tree or used on the corner of a house. Bright red berries are an important food source for songbirds including evening grosbeak, cardinals, robins and cedar waxwings.
- **SILKY DOGWOOD (*Cornus amomum*)**
Height: 20', Spread: 15'-20'. About 10 feet tall, silky dogwood usually grows in clumps of small stems in moist soils and along stream banks. Its uses include soil erosion control, watershed protection and wildlife cover.
- **ALTERNATE-LEAF/PAGODA DOGWOOD (*Cornus alternifolia*)**
Height: 12'-15', Spread: 10'-12'. Pagoda Dogwood is an excellent small tree or large shrub that can be grown either as a single or multi-trunked specimen. General crown form is oval to round but it

has a unique horizontally layered branching structure which accounts for its common name. It has flat clusters of small white flowers in spring. Fruit are small blue-black berries that are readily eaten by birds. The fall foliage color is a deep burgundy. Does well in either full sun or shade. Does not tolerate hot dry sites.

- **SWEETBAY MAGNOLIA (*Magnolia virginiana*)**
Multistemmed, small tree or open shrub. Likes wet, acid soils. Tolerates shade. Used as specimen tree. White to cream colored flowers that have a strong lemon and rose-scented smell. Wildlife value is low. Seeds are eaten by some mammals and birds. Foliage is used by several birds for nest building.
- **EASTERN REDBUD (*Cercis canadensis*)**
Height: 20'-30', Spread: 25'-30'. Small tree with rounded crown, pink to purplish flowers in early spring. Heart-shaped leaves are reddish at emergence, become dark green, then yellow in the fall. Likes moist, well drained soils. Full sun to light shade. Can be used as a street, yard, or border tree. Requires little pruning after lower branches have been removed for clearance. Limited wildlife value.
- **WHITE FRINGETREE (*Chionanthus virginicus*)**
Height: 12'-20', Spread: same. Slowing-growing tree that prefers moist, fertile soils and full sun. Excellent specimen tree or in groups, borders or near large buildings. Limited wildlife value.
- **WASHINGTON HAWTHORN (*Crataegus phaenopyrum*)**
Height: 25'-30', Spread: 20'-25'. Broadly rounded to oval, dense, thorny tree. Plant in well drained soil in full sun. Excellent specimen tree or for borders and hedges. Tolerates severe urban stresses. Has attractive flowers, fruits, and foliage. Should not be used in high traffic areas. Dense thorns make excellent nesting sites for songbirds. Fruit is used by grouse.
- **WITCHHAZEL (*Hamamelis virginiana*)**
Height: 20'-30', Spread: 20'-25'. A small tree or multistemmed shrub with yellow flowers in winter. Prefers moist soils in full sun or partial shade. Excellent for foundations, hedges, mass plantings and as an accent plant. This is the only fall-blooming tree in Maryland's native flora. Limited wildlife value.
- **AMERICAN HOLLY (*Ilex opaca*)**
Height: 15'-30', Spread: 18'-25'. Dense, pyramidal in youth, opening up with age. Plant in moist, well drained soil. Full sun or partial shade. Use one male for every three females. Use as specimen plant or in groupings. Many cultivars. Used extensively by many songbirds including thrushes, mockingbirds, catbirds, bluebirds and thrashers. Foliage provides cover for songbirds and mammals.
- **PAWPAW (*Asimina triloba*)**
A shrub or small tree that tolerates shade, pawpaw produces a fruit that is readily eaten by wildlife. Flowers open greenish-brown and become deep red.
- **CRABAPPLE SPP. (*Malus spp.*)**
Height: 15'-35', Spread: 10'-25'. Small flowering trees valued for wildlife food and shelter. Produces a small fruit the size of a marble. Can be used in many types of landscape settings as they tolerate urban conditions well.
- **HOPHORNBEAM/IRONWOOD (*Ostrya virginiana*)**
Height: 30'-50', Spread: 25'. Hophornbeam has a lovely yellow fall color, and the small nutlets, which ripen in summer and fall, are used by birds and mammals during the winter. Bark is an attractive orange or grayish brown peeling off in longitudinal strips.
- **AMERICAN PLUM (*Prunus americana*)**
Height: 10'-30', Spread: 10'-25'. A small tree growing from 10 to 30 feet tall, American plum produces fruit an inch in diameter which is a valued wildlife food source.

LARGE TREES

- **RED MAPLE (*Acer rubrum*)**
Height: 40'-60', Spread: same. Medium to fast grower. Excellent tree as specimen for lawn and park settings. Excellent fall color. Good shade tree. Buds, flowers and leaves provide food for many birds and mammals. Chipmunks and squirrels eat seeds and some songbirds use stalks for nest building.
- **SUGAR MAPLE (*Acer saccharinum*)**
Height 60'-70', spread usually 2/3 the height. Leaf color is medium to dark green in summer changing to brilliant yellow, burnt orange and red tones in autumn. It grows best in well-drained

moderately moist, fertile soil. It does not grow well in tight, compacted situations such as in very small lawns or other conditions that restrict root growth. It tolerates shade but does not tolerate air pollution and is susceptible to damage from road salt.

- **RIVER BIRCH (*Betula nigra*)**
Height: 40'-70', Spread: 40'-60'. Pyramidal in youth and rounded with age. Often grown multistemmed. Best adapted to moist soils. Handsome tree used as specimen in parks and lawns. Catkins are used by redpolls and pine siskins. Foliage is used by browsers.
- **HACKBERRY (*Celtis occidentalis*)**
Height: 40'-60', Spread same. In youth weakly pyramidal; in old age the crown is a broad top of ascending, arching branches. Medium to fast growth. Prefers rich, moist soils, but grows in dry, heavy or sandy, rocky soils; withstands acid or alkaline conditions; moderately wet or very dry areas; tolerates wind; full sun; withstands dirt and grime of cities. Fruit is fleshy, orange to dark purple, ripening in September to October. Leaves are yellow to yellow-green in fall. Good tree for park or large area use. Useful tree for adverse growing conditions. Fruit is popular with winter birds, especially the cedar waxwing, mockingbird, and robin.
- **AMERICAN BEECH (*Fagus grandifolia*)**
Height: 50'-100', Spread: 50'-70'. Often has short trunk with wide spreading crown. Likes moist, well drained soils. Does best in full sun, but tolerates shade. Should be restricted to large area use for parks and estates. Beechnuts are eaten by birds and mammals and are important food for chipmunks and squirrels.
- **HONEYLOCUST (*Gleditsia triacanthos*)**
height: 30'-70', Spread: same. Usually has short trunk with open, oval crown. Transplants readily. Fast grower. Withstands a wide range of conditions but prefers rich, moist soil. Excellent lawn tree under filtered shade. Tolerates salt, heat, drought, compaction, and other adverse urban conditions. Limited wildlife value.
- **BLACK WALNUT (*Juglans nigra*)**
Height: 50'-75', Spread: same. Well formed trunk with oval crown. Prefers rich, moist soils. Difficult to transplant so should be started as a seedling. Roots produce toxins which are poisonous to many plants so do not plant near fruit trees or gardens. Nuts are eaten by woodpeckers, foxes, and squirrels.
- **EASTERN RED CEDAR (*Juniperus virginiana*)**
Height: 40'-50', Spread: 8'-20'. Medium rate of growth. Tolerant of adverse conditions. Prefers deep, moist soils. Will tolerate shade only in youth. Handsome reddish brown bark. Produces small cones. Good ornamental that is also useful for windbreaks, shelter belts, hedges and topiary work. Twigs and foliage are eaten by browsers. Seeds are eaten most extensively by cedar waxwings. Evergreen foliage provides nesting and roosting cover for sparrows, robins, mockingbirds, juncos, and warblers.
- **AMERICAN SWEETGUM (*Liquidambar styraciflua*)**
Height: 60'-80', Spread: 2/3 height. Pyramidal in youth, rounded crown at maturity. Likes deep, moist, acid soils. Occurs naturally on bottomlands. Excellent for lawn or park area. Gumballs can be a problem in lawn settings. Goldfinches and purple finches eat winged seeds.
- **TULIP POPLAR (*Liriodendron tulipifera*)**
Height: 70'-120', Spread: 30'-50'. Long, straight trunk with a narrow canopy. Fast grower. Plant in full sun and a well drained loam. Use in large areas. Can be used where a very large tree is desired, such as a broad boulevard, wide tree lawns near tall buildings, or in parks. Moderate wildlife importance. The purple finch and cardinal are principal users.
- **BLACK GUM (*Nyssa sylvatica*)**
Height: 30'-70', Spread: 30'-45'. Pyramidal in youth and irregularly crowned at maturity. Prefers moist, well drained, acid soils. Full sun or semi-shade. Deep taproot. Spectacular fall colors make it a fine choice as a street tree in residential areas. Tolerates seacoast conditions. Fruit is relished by many songbirds. Users include wood ducks, robins, woodpeckers, thrashers, flickers, and mockingbirds.
- **EASTERN WHITE PINE (*Pinus strobus*)**
Height: 50'-80'+, Spread: 20'-40'. Pyramidal in youth, crown at maturity has several horizontal and ascending branches. Fast grower. Grows best on fertile, well-drained soils, but is very adaptable. A very handsome and ornamental specimen, valuable for lawns, parks, and estates. Provides valuable cover and nesting sites for songbirds and mammals. Needles are used as nesting material.

Seeds are eaten by quail, chickadees, grosbeaks, nuthatches and woodpeckers.

- **WHITE OAK (*Quercus alba*)**
Height: 80'-100', Spread: 50'-80'. Classic oak form with strong branches. Pyramidal in youth, becoming broad and rounded with wide spreading branches. Transplant as small tree. Prefers moist, well drained soils. Difficult to obtain from nurseries. Sometimes available as seedling. Worthwhile tree for large areas. Acorns are at the top of the food preference list for wood ducks, pheasants, grackles, jays, nuthatches, thrushes, woodpeckers, rabbits, foxes, squirrels and deer.
- **PIN OAK (*Quercus palustris*)**
Height: 60'-70', Spread: 25'-40'. Strongly pyramidal with ascending branches. One of the faster growing oaks. Full sun. Tolerates wet soils but is adaptable to many soils types. Most widely used oak for landscaping. Used on lawns, parks, golf courses and around commercial buildings. Acorns are at the top of the food preference list for wood ducks, pheasants, grackles, jays, nuthatches, thrushes, woodpeckers, rabbits, foxes, squirrels and deer.
- **RED OAK (*Quercus rubra*)**
Height: 60'-80', Spread: 45'-65'. Habit is round-topped and symmetrical. Full sun. Prefers loamy, well drained soils. Fast growing tree for lawns, parks and estates. Acorns are at the top of the food preference list for wood ducks, pheasants, grackles, jays, nuthatches, thrushes, woodpeckers, rabbits, foxes, squirrels and deer.
- **WILLOW OAK (*Quercus phellos*)**
Height: 50'-100', Spread 30'-70'. Fast growing oak with willow-like foliage. Transplants more successfully than most oaks, and becomes established quickly. Good shade tree. Full sun or semi-shade. Easily grown in wet soils. Acorns are at the top of the food preference list for wood ducks, pheasants, grackles, jays, nuthatches, thrushes, woodpeckers, rabbits, foxes, squirrels and deer.
- **EASTERN HEMLOCK (*Tsuga canadensis*)**
Height: 40'-70', Spread: 25'-35'. Pyramidal in youth, becoming more pendulous with age. Likes moist, well-drained soils. Plant in sheltered area. Tolerates shade. Relatively fast growing. Excellent for screens, hedges, accent plant and foundation plantings. Provides excellent cover for deer and songbirds. Nesting site for several warblers. Seeds are eaten by juncos, chickadees, and siskins.
- **LOBLOLLY PINE (*Pinus taeda*)**
Height: 80'-100', Spread: 25'-35'. Usually has a tall straight trunk free of branches on lower portions of the tree. Often are used as shade trees and for wind and noise barriers.
- **VIRGINIA PINE (*Pinus virginiana*)**
Height: 50'-80', Spread: 25'-35'. Grows in thick stands on dry and sterile soils. Often are used as shade trees and for wind and noise barriers.
- **BLACK CHERRY (*Prunus serotina*)**
Height: 50'-100', Spread: 25'-35'. Black Cherry provides wildlife food and habitat.
- **CHESTNUT OAK (*Quercus prinus*)**
Chestnut oak commonly reaches 60 to 80 feet at maturity and grows better on dry and poor sites than other oaks. Acorn is a favorite food of deer, turkey and squirrels.
- **SWAMP WHITE OAK (*Quercus bicolor*)**
Height: 60'-80', Spread: 50'-80'. Swamp white oak tolerates salt, drought and soil compaction in urban environments. It is transplanted more readily than most other white oaks. The acorns are eaten by a wide variety of wildlife.
- **PERSIMMON (*Diospyros virginiana*)**
Height: 20'-60', Spread: 50'-80'. Produces fruit that is a valued wildlife food.
- **SYCAMORE (*Platanus occidentalis*)**
Height: 80'-130', Spread: 50'-80'. Sycamore is used for watershed protection since it can be planted on wet sites.
- **BLACK LOCUST (*Robinia pseudoacacia*)**
Height: 50'-80', Spread: 20'-35' The upright growth and short, irregular branches form an open canopy and cast light shade below the tree, allowing a lawn to thrive. The leaves are some of the last to appear in spring and often drop early in the autumn. In late spring for a short time the trees have long, dense clusters of extremely fragrant, one-inch white blossoms which are literally "alive" with the bustling activity of visiting bees. The honey which is produced is quite delicious. The dark red to black, leathery seeds pods which follow will persist on the trees throughout the winter.

- **AMERICAN LINDEN (*Tilia americana*)**
Height: 50'-70', Spread: 35'-50'. A fine shade tree for streets, parking lots, and large lawns. Prefers moist, fertile soil but will tolerate drier sites, Transplants readily.
- **BALD CYPRESS (*Taxodium distichum*)**
Height 50'-70', spread 20'-30'. This lofty, deciduous (loses its leaves in the fall) conifer (small round cones at the end of twigs) is very tolerant to typical urban conditions as well as wet areas. Its slender pyramidal form, beautiful leaf texture, attractive bark and fast growing habit make this a worthwhile tree to plant. Bright green spring leaves ½" - ¾" turn soft sage green in summer, and pale orange in autumn before dropping. "Cypress knees" occur only in or near water.
- **AMERICAN ELM (*Ulmus Americana*)**
Height 60'-80', spread 50'-80'. This large, graceful, spreading, medium to fast growing tree can reach to a height of 80 feet. It is well suited to lawns and urban landscapes. It prefers deep, rich soils, but grows well in a variety of conditions and is pH and salt tolerant.

Appendix 2. Native Plants for Erosion Control (proposed by Critical Area Commission)

Woody shrubs and trees

River Birch - *Betula nigra*, good for sandy soils and streamsides, will tolerate sun or shade
Green Ash – *Fraxinus pennsylvanica*, good root architecture for erosion control. Long-lived, tolerant of a wide range of soils
Elderberry – *Sambucus Canadensis*, spreads by underground stems, forming a colony.
Virginia Sweetspire – *Itea virginica*, deciduous shrub, red color in fall, white flowers in summer. Good for moist soils, colonizes through underground stems.
Redosier Dogwood – *Cornus sericea*, good rooting from cuttings, attractive red stems, white flowers and fruit, fast growth rate
Silky Dogwood – *Cornus amomum*, prefers some shade, white flowers with blue berries
Gray Dogwood – *Cornus racemosa*, prefers some shade, fast growing
Arrowwood - *Viburnum dentatum*, wet woods, suckers freely, bluish-black berries
Buttonbush – *Cephalanthus occidentalis*, good for lake and pond edges, fragrant flowers
Silky willow – *Salix sericea*, Grows rapidly, easily from cuttings, live stakes, etc.
Groundsel Tree – *Baccharis halimifolia* – likes full sun, also known as High Tide Bush
Marsh Elder – *Iva frutescens* - likes full sun, often confused with Groundsel tree
Bald Cypress – *Taxodium distichum* – tolerates wet or dry soils, stabilizes saturated soils

Herbaceous species

St. John's Wort – *Hypericum densiflorum*, yellow flowers in mid-summer, excellent for covering slopes, likes full sun to part shade
Moss Pink or Creeping Phlox – *Phlox subulata*, dense mat of moss-like foliage, covered in spring with pink, purple or white flowers
Maidenhair Fern – *Adiantum pedatum*
Canada Anemone – *Anemone Canadensis*
Pussytoes - *Antennaria neglecta*
Wild Ginger - *Asarum canadense*
Sensitive Fern – *Onoclea sensibilis*
Wild Blue Phlox – *Phlox divaricata*
Jacob's Ladder – *Polemonium reptans*

Native Grasses

Switchgrass – *Panicum virgatum* – Wide range of adaptation from dry uplands to poorly drained sites
Coastal Panicgrass – *Panicum amarum*- drought tolerant, moderately salt tolerant, used extensively for secondary dune stabilization

Appendix 3. Native plants that provide for stabilization on dry, sunny slopes or hillsides. (Source: USFWS. 2005. Native Plants for Wildlife Habitat and Conservation Landscaping. Chesapeake Bay Watershed.

www.nps.gov/plants/pubs/chesapeake).

Solutions for Slopes

Slopes of any kind are prone to erosion from rain, runoff, wave action, stream or river currents, and foot or lawnmower traffic. Plants with deep, spreading root systems help prevent erosion by holding soil in place. Some plants that are particularly well suited to and recommended for holding or stabilizing soils on a dry upland slope or hillsides such as a sloping yard or road embankment are listed below.

However, any plant suited to the site's sun, soil, and moisture conditions that could be planted on a flat surface could be planted on a slope, as long as the slope is accessible. Plants that naturally occur on slopes or hillsides can be found by searching the "habitat" notes provided with each plant in this guide.

For plants to use on a tidal shoreline, see the list of saltmarsh or freshwater marsh plants. For plants to use on a stream, pond or riverbank, see the list of freshwater marsh plants.

Plants That Provide Stabilization on Dry, Sunny Slopes or Hillsides

Grasses & Grasslike Plants

Ammophila breviligulata
Andropogon gerardii
Dichanthelium clandestinum
Elymus canadensis
Panicum virgatum
Panicum amarum
Schizachyrium scoparium

Herbaceous Plants

Any of the herbaceous plants that thrive in a sunny, dry site tend to be deep-rooted and would provide good slope stabilization. See the dry meadow plants list on for additional choices.

Baptisia tinctoria
Lespedeza capitata
Chamaecrista (Cassia) fasciculata

Shrubs

Comptonia peregrina
Ceanothus americanus
Clethra alnifolia
Comus racemosa
Gaylussacia baccata, frondosa

Hypericum densiflorum
Kalmia latifolia
Morella pensylvanica
Physocarpus opulifolius
Rhus aromatica
Rhus copallina
Rhus glabra
Rosa carolina
Rubus allegheniensis
Vaccinium angustifolium
Viburnum acerifolium

Trees

The following are some of the tree species that may occur on slopes. However, for stabilization purposes, practitioners recommend planting herbaceous plants and shrubs, as trees will appear in time through succession.

Acer rubrum, saccharum, spicatum
Amelanchier arborea
Betula lenta
Carya alba (tomentosa), cordiformis, glabra, ovata

Castanea pumila
Celtis occidentalis
Chionanthus virginicus
Cornus alternifolia, florida
Crataegus crus-galli
Fraxinus americana
Juglans nigra
Liquidambar styraciflua
Liriodendron tulipifera
Magnolia acuminata
Morus rubra
Nyssa sylvatica
Ostrya virginiana
Pinus rigida, taeda
Quercus coccinea
Quercus marilandica, michauxii, muehlenbergii, prinus, rubra, velutina
Sorbus (Pyrus) americana
Ulmus rubra

Vines

Campsis radicans
Celastrus scandens
Passiflora incarnata
Parthenocissus quinquefolia

Evergreens

Ferns

Asplenium platyneuron
Dryopteris carthusiana (spinulosa), cristata, intermedia, marginalis
Polystichum acrostichoides

Herbaceous Plants

Asarum canadense
Goodyera pubescens
Heuchera americana
Mitchella repens
Phlox carolina, stolonifera, subulata
Sedum ternatum

Silene caroliniana
Solidago sempervirens
Yucca filamentosa (filaccida)

Shrubs

Gaultheria procumbens
Ilex glabra
Kalmia angustifolia, latifolia
Morella (Myrica) caroliniensis (heterophylla), cerifera
Rhododendron maximum
Vaccinium macrocarpon

Trees

Chamaecyparis thyoides
Ilex opaca
Juniperus virginiana
Magnolia virginiana
Pinus any species in this guide
Thuja occidentalis
Tsuga canadensis

Vines

Bignonia capreolata
Lonicera sempervirens