A watercolor illustration of a serene landscape. In the foreground, a large blue heron stands in a shallow body of water. To its left, a rocky shoreline leads to a dense thicket of tall, yellow-green reeds. In the middle ground, a two-story yellow house with a brown roof and a small porch is nestled among lush green trees. The background is filled with more trees under a light blue sky. The overall style is soft and artistic, typical of watercolor painting.

The Green Book for the Buffer

An Illustrated Guidebook
for Planting at the Shoreline

Printed September 2012

Prepared by Adkins Arboretum and the Critical Area Commission for the Chesapeake and Atlantic Coastal Bays

Illustrations by Matthew Frey, Wood Ronsaville Harlin, Inc.
Map illustration by Rob Wood, Wood Ronsaville Harlin, Inc.
Book designed by Joanne Shipley



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Adkins Arboretum

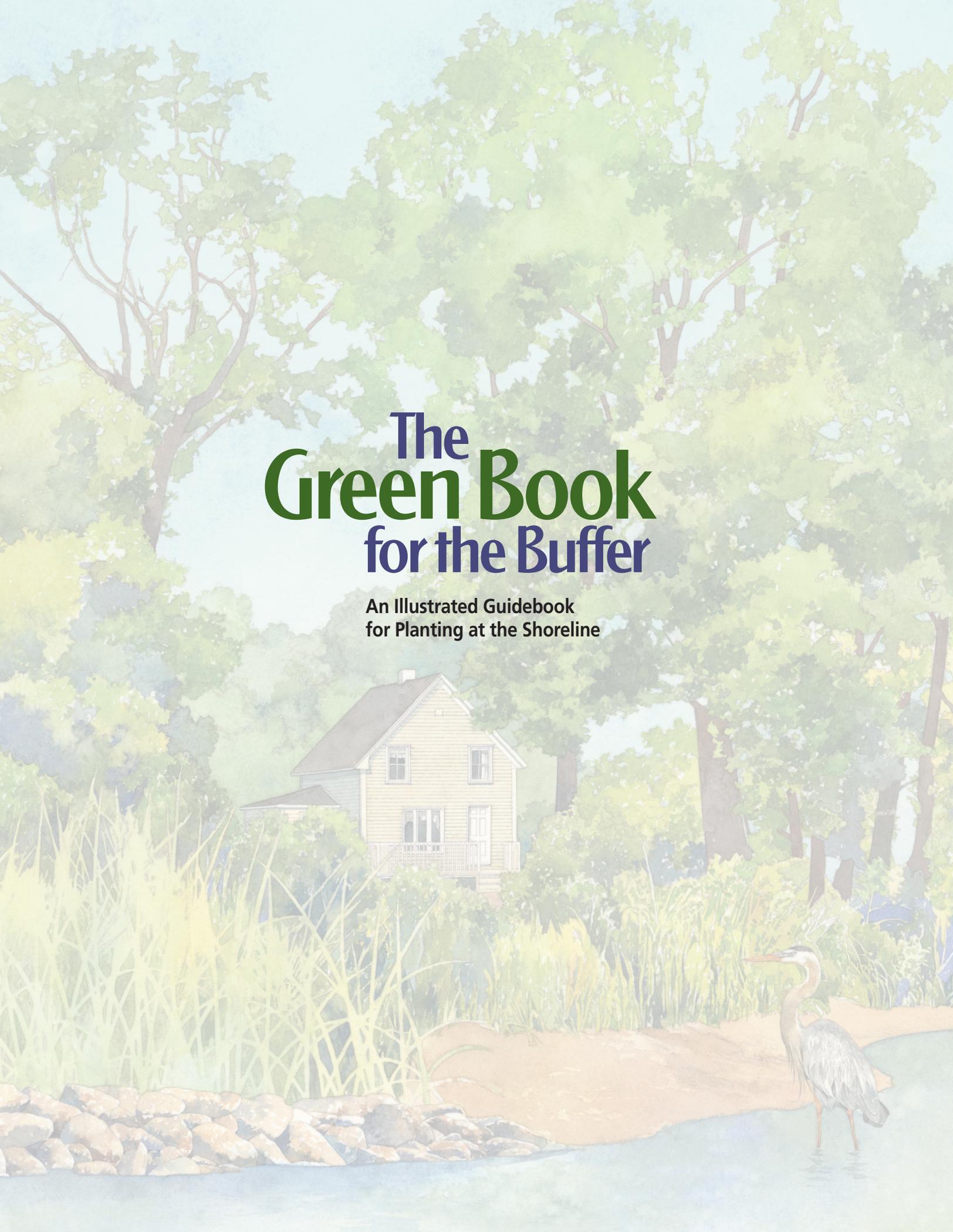
Adkins Arboretum is a 400-acre native garden and preserve on Maryland's Eastern Shore dedicated to promoting the appreciation and conservation of the region's native plants. Four miles of paths along streams, through meadows and native plant gardens, and under the shade of a rich bottomland forest attract nature lovers, gardeners, students, and birders.

The Arboretum offers programs year-round in ecology, horticulture, and natural history for all ages. The grounds feature over 600 species of native shrubs, trees, wildflowers, and grasses. Visit www.adkinsarboretum.org to plan a visit.



Critical Area Commission for the Chesapeake and Atlantic Coastal Bays

The Critical Area Commission is the State agency charged with overseeing the implementation of Maryland's Critical Area Program. Consisting of 29 members that include State and local elected and appointed officials, Secretaries from the affected State agencies, and citizens representing "diverse interests," the Commission is supported by a 16-member staff. The staff is responsible for assisting the Commission in all aspects of its formal decision-making responsibilities. The staff also works closely with local governments to review projects, interpret regulations, and provide technical assistance related to the day-to-day implementation of local Critical Area programs. The Commission staff also works closely with a variety of State and local government agencies, community groups, and non-profit organizations to educate Maryland residents about the Critical Area Program.

The background is a watercolor illustration of a serene shoreline. In the foreground, a large blue heron stands in the water on the right. To its left is a sandy bank with a stone retaining wall. Behind the bank are tall, green reeds. In the middle ground, a two-story house with a brown roof and a porch is partially obscured by more reeds and trees. The background is filled with lush green trees under a light blue sky.

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An Illustrated Guidebook
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Maryland Department of Natural Resources
Critical Area Commission for the Chesapeake
and Atlantic Coastal Bays
1804 West Street, Suite 100
Annapolis, Maryland 21401

Martin O'Malley, Governor
John R. Griffin, Secretary
Margaret McHale, Chair, Critical Area Commission
for the Chesapeake and Atlantic Coastal Bays

dnr.Maryland.gov/criticalarea

Toll free in Maryland: 877-620-8DNR ext. 3460
Out of state call: 410-260-3460
TTY users call via the MD Relay

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This book has been prepared by the Critical Area Commission for the Chesapeake and Atlantic Coastal Bays in partnership with Adkins Arboretum as a design guide to help homeowners with planting and maintaining shoreline buffers. Planting areas of native trees, shrubs, vines, flowers, and grasses and maintaining areas of natural vegetation adjacent to tidal waterways, tidal wetlands, and streams is one of the simplest, yet most effective, ways to improve the health of Maryland's Chesapeake Bay and Atlantic Coastal Bays.

This design guide builds on the information in *The Green Book for the Bay, An Illustrated Guidebook for Chesapeake Bay Property Owners Living on Maryland's Eastern Shore*. This book was published by Adkins Arboretum in December 2008 and provides general information about Maryland's Critical Area Program. Based on the simple and extensively illustrated approach used in the first guide, *The Green Book for the Buffer* focuses on "the Critical Area Buffer," the area immediately adjacent to tidal waters, tidal wetlands, and tributary streams. Because of its proximity to tidal waterways and tributaries, protecting and enhancing "the Buffer" is the foundation of the Critical Area Program's land use regulations. It is so important that, in 2010, the Buffer provisions in the Code of Maryland Regulations were substantially amended and expanded. The purpose of this effort was to improve implementation, create greater consistency, and address the latest scientific studies related to using buffers to improve water quality and habitat.

When the regulations were changed, requirements were added for preparing Buffer Management Plans when certain development activities take place on property that includes shoreline, marsh frontage, or a tributary stream. This book is designed to provide a complete resource to help homeowners with understanding the regulations and implementing Buffer Management Plans. The goal of the book is to show that planting in the Buffer can do more than satisfy a permit requirement. It can provide a beautiful garden, attract butterflies and birds, and frame and enhance water views while also demonstrating that restoring Maryland's waterways is a responsibility that all Maryland residents share.

The creation and printing of *The Green Book for the Buffer, An Illustrated Guidebook for Planting at the Shoreline* was made possible by a generous grant from the Coastal Zone Management Program and the cooperation and expertise of the staff of Adkins Arboretum. In addition to this financial and administrative support, Catherine McCall was instrumental in obtaining and administering the grant funds. Ellie Altman's enthusiasm for the project helped make a seed of an idea become a reality. The entire staff of the Critical Area Commission was involved in various aspects of writing, illustrating, and producing this publication, including Shirley Bishop, Dawn Brown, LeeAnne Chandler, Kate Charbonneau, Bob Cicconetti, Jennifer Delve, Lisa Hoerger, Roby Hurley, Vicki Johnston, Nick Kelly, Julie Roberts, Dottie Smith, Danielle Schwarzmann, and Amber Widmayer. Margaret McHale, Commission Chair, and Ren Serey, Executive Director, provided the support, direction, and guidance necessary to complete the project. Special thanks to Jackie Lancaster, Jodie Littleton, Kathy O'Rourke, and David Reed for providing editorial, logistics, and moral support when it was needed most. The efforts and cooperation of all of these dedicated and professional individuals are gratefully acknowledged.

This book is designed for use as a printed reference guide, and is also available online at the Critical Area Commission's website: dnr.state.md.us/criticalarea. This publication is not copyrighted. Readers are encouraged to reproduce it and share it as needed. Additional copies are available from the Critical Area Commission, 1804 West Street, Suite 100, Annapolis, MD 21401 or by calling 410-260-3460.

It is the Commission's sincere hope that you enjoy learning about the functions of buffers, gain a better understanding of why the Critical Area Buffer is so important to restoring Maryland's waterways, and are inspired to plant a native tree, shrub, or maybe an entire garden to enhance the Buffer.

Mary R. Owens, Editor

CRITICAL AREA

Maryland's Critical Area Program addresses land use and resource management within a strip of land, 1,000 feet wide, adjacent to all tidal waters and tidal wetlands. The Buffer is a minimum width of 100 feet and is the area immediately adjacent to these waters and wetlands.



- 1,000 foot critical area
- 100 foot buffer area

The Chesapeake Bay, the Atlantic Coastal Bays, and the rivers, creeks, and streams that feed into them are important parts of Maryland's landscape. These vast and numerous treasured natural resources that seem so vital and full of life are really rather fragile. It is not just the waterways themselves, but the fish, wildlife, and plants that live in and around them that are sensitive and vulnerable to degradation and damage from a variety of sources. This network of living things is greatly affected by not only what happens to the waterways themselves, but all of the activities that take place on the surrounding land.

The land area that surrounds and drains into a particular waterway is called a "watershed." As population increases, land uses in the watershed change. Trees and shrubs are cleared. Land is graded. Buildings, roadways, and parking lots are constructed. These changes affect the water that runs off of the land when it rains. This runoff empties into waterways, whether directly or through a series of ditches, pipes, and outfalls, and it carries a variety of pollutants from the land. These include sediment, bacteria, trash, toxic chemicals, and nutrients from farm fields and septic systems. Even air pollution can affect water quality. These pollutants, even in small amounts, can be extremely detrimental to the fragile environment of tidal waterways.

The landscape changes that affect water quality also affect the type, amount, and location of habitat, particularly waterfront, or riparian habitat, that is essential to the survival of many Maryland species. The permanent loss and fragmentation of forest, particularly when it is located adjacent to tidal waters, wetlands, and tributary streams, can be harmful to a variety of species.

The value of waterfront property is dependent on clean waterways with healthy and sustainable fish, wildlife, and plant populations. Clean water and vital habitat also promote a healthy economy by providing opportunities for fishing, crabbing, boating, and swimming. One of the best and simplest ways to reduce the effects of polluted runoff and create beneficial habitat is by establishing new vegetated buffers or enhancing existing ones. Vegetated buffers adjacent to waterways and wetlands perform vital habitat and water quality functions.

Forested buffers, even small ones, help to improve and protect Maryland's waterways and tidewater

ecosystems. Filtering runoff from the land before it reaches a stream, creek, or river can remove pollutants and sediment. The trees and shrubs in the Buffer take up nutrients and use them to grow. If the nutrients end up in the waterways, they can actually be harmful by causing an overgrowth of algae. Algae blooms block sunlight necessary for underwater grasses that provide important habitat for young fish and crabs. When the algae decompose, it removes oxygen from the water creating dead zones for aquatic life.

The habitat benefits of shoreline, wetland, and stream buffers are also important. Even a narrow buffer is better than no buffer at all. A narrow strip of trees and shrubs at the shoreline can create an important wildlife corridor that can provide food, water, and shelter for a variety of birds, amphibians, reptiles, and small mammals. These connecting corridors along waterways help wildlife travel safely to larger forested areas and help to maintain the overall health of species populations.

Maryland's Critical Area Program includes specific regulations for the "Critical Area Buffer" that address protection of existing Buffer vegetation, as well as requirements to plant additional Buffer vegetation when development activity takes place on a property that includes shoreline, wetland frontage, or a stream. This book was developed to help landowners gain a better understanding of the Buffer requirements and how to comply with the regulations. It includes some of the science and technical details about the many important functions of vegetated buffers, information about how to measure the Buffer on your property, and a description of the different types of Buffer Management Plans and when they are used. The second part of the book includes Garden Plans that you can use to design and plant in your Buffer. The plans are organized so that if you have a specific planting area requirement, you can easily select a plan that will provide the correct square footage credit. Buffer Management Plan Notes are included in the following chapter to make it easy to submit a complete Buffer Management Plan to the local planning office. There is also information about maintaining and enhancing an existing forested Buffer. Whether you are preparing to plant because you want to add a deck to your house or if you just want to shorten the time you spend mowing the lawn, the goals of this book are to provide you with knowledge, insight, and ideas.

Overview of Maryland's Critical Area Program

From the impressive expanse of the Chesapeake Bay at the Bay Bridge to the narrowest stream that eventually emerges as Marshyhope Creek, Maryland's tidal waterways are treasured resources. They are significant to all Maryland residents and visitors for the many benefits they provide.

The link between what happens on the land and the condition of our waters cannot be overlooked. We need to make every effort to make sure that pollutants and other harmful materials from the land do not end up in our waterways and that valuable habitats are conserved.

One of the most significant ways that these goals are met is through Maryland's Critical Area Program. The Critical Area Program is a land use and resource protection program that affects approximately 11 percent of the State, or 680,000 acres. Through the Critical Area law and regulations, the Program affects land use, development, and the use and protection of natural resources on all properties that are located within 1,000 feet of tidal waters and tidal wetlands. This strip of land is called the "Critical Area" because of the "critical" role it plays in protecting Maryland's water resources and tidewater-based ecosystems.

A Brief History

In the summer of 1982, a study by the Environmental Protection Agency (EPA) concluded that the water quality in the Chesapeake Bay was deteriorating and that the Bay's living resources were declining. EPA's work noted that population growth, related development, and landscape changes were the likely cause. The study concluded that this trend would probably continue and would potentially worsen unless comprehensive and long-term changes were made.

The link between what happens on the land and the condition of our waters cannot be overlooked.

In 1984, in response to this dire forecast, the General Assembly passed the Critical Area Law. Two years later, more specific and detailed regulations called the Critical Area Criteria were enacted. These regulations called for each county and town government with land in the Critical Area to develop and adopt its own local Critical Area program. Each local government was permitted to customize the program to meet its needs and to make it possible for the program to be implemented through existing planning and zoning processes. By 1990, all 64 affected jurisdictions were implementing local Critical Area programs.

General Requirements

Although each local Critical Area program is somewhat unique, all programs must address the following general goals:

- Minimize adverse impacts on water quality that result from runoff;
- Conserve fish, wildlife, and plant habitat;
- Establish land use policies that allow for growth but include measures to address the effects from the number, movement, and activities of people.

In order to accomplish these goals and comply with the regulations in the Critical Area, local governments developed maps of the Critical Area that classified the land into one of three categories. The category was based on the land use at the time the program was adopted. The three classifications are:

- Intensely Developed Area (IDA)
- Limited Development Area (LDA)
- Resource Conservation Area (RCA)

The regulations included specific permitted land uses and restricted some uses to certain areas. They also included standards for development in each classification directed toward conserving natural habitat and minimizing runoff. The land classification system allows jurisdictions to

use local zoning and existing plan review and permit processes to implement their Critical Area programs. The use of land classifications:

- Promotes new growth and development near or within existing developed areas;
- Provides for infill development of similar uses and intensity; and
- Protects areas for natural resource conservation and related resource use activities, such as agriculture, forestry, and aquaculture.

Intensely Developed Areas

Intensely Developed Areas (IDAs) are typically areas of mixed and relatively urbanized land use. They are areas of concentrated development where little natural habitat occurs. In IDAs, the Critical Area Program's main focus is improving water quality. New development and redevelopment must include measures to reduce pollutants from stormwater runoff. These techniques include site design, practices that promote runoff permeating naturally into the soil, and stormwater treatment measures such as sand filters and swales. Within

IDAs, projects that promote clustering, minimize forest clearing, and create new planting areas are encouraged.

Limited Development Areas

Limited Development Areas (LDAs) are areas of low or moderate intensity development that also contain forests, fields, wetlands, and woodlands. The predominant land use is typically residential, but other uses are permitted. Within LDAs, local zoning regulations specify what uses and residential densities are permitted. The Critical Area regulations require that development activities must maintain or improve water quality and conserve existing areas of natural habitat. These objectives are met through performance standards. These standards address lot coverage, forest and woodland protection and replacement, construction on steep slopes, and stormwater management. The Critical Area regulations require that all development projects include the replacement of cleared forest cover. In areas of new development or redevelopment, where no forest coverage existed prior to development, 15 percent of the area must be planted with trees.



Forests along the shoreline of Maryland's waterways are not only beautiful, but provide important water quality and habitat benefits.

Resource Conservation Areas

Resource Conservation Areas (RCAs) make up approximately 80 percent of the Critical Area. These areas include a combination of farms, forests, wetlands, and sparsely developed areas. RCAs make up most of the Critical Area and provide the best opportunity for meeting the goals of the Critical Area Program. Within RCAs, new development is limited to residential uses, with a density limit of one unit per 20 acres and activities related to resource oriented uses. These include agriculture, forestry, fisheries activities, and aquaculture. Standards for development are designed to conserve and protect RCA land and water resources. These performance standards are the same as those in LDAs and address lot coverage, forest and woodland protection, construction on steep slopes, and stormwater management. The Critical Area regulations require that all development projects include the replacement of cleared forest cover. In areas of new development or redevelopment, where no forest coverage existed prior to development, 15 percent of the area must be planted with trees.

Habitat Protection Areas

Habitat Protection Areas are designated areas that require special conservation measures within the Critical Area. This is because these areas provide habitat for fish, wildlife, and plant species that are significant to Maryland's Bays and related tidewater resources. In some cases, a species may be found in just a few locations State-wide. Other species may be more common but require certain landscape features, such as large areas of mature forest, in order to maintain healthy numbers. Habitat Protection Areas can be found in IDAs, LDAs, and RCAs and require special protection measures, in addition to the standard requirements for these areas. The Critical Area Criteria designate the following as Habitat Protection Areas:

- Critical Area Buffer
- Nontidal Wetlands
- Habitats of Threatened and Endangered Species
- Significant Plant and Wildlife Habitats
- Anadromous Fish Spawning Areas

The Critical Area Buffer is the largest and most common Habitat Protection Area. It is identified as the area immediately adjacent to all tidal waters, tidal wetlands, and tributary streams. The



Great blue herons are frequently seen in forested areas near tidal waterways and wetlands. Great blue herons nest in colonies, known as rookeries, which may include hundreds of nests.

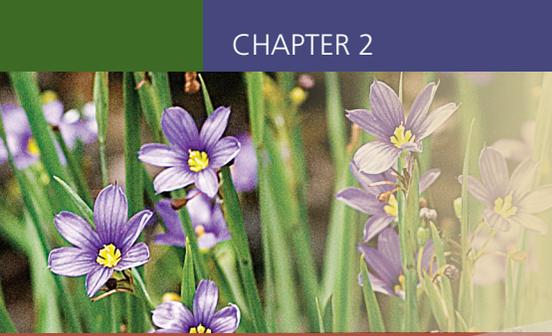
requirements for protecting, maintaining, planting, and enhancing the Buffer are the cornerstones of the Critical Area Program.

Other Regulations

The land classification system and Habitat Protection Area regulations are the primary elements of the Critical Area Program that affect homeowners. The regulations also cover shore erosion control measures such as marsh creation, and stone structures used to protect steep, eroding banks. This is because these facilities are constructed at the water's edge and often require alteration of the land adjacent to the shoreline.

There are also specific standards for water dependent facilities such as marinas and fisheries. Because these types of land uses are located at the shoreline and in the water itself, strict standards must be used to ensure that they do not create water quality problems. These standards include certain restrictions on the intensity of the use, as well as the types of uses that can be located within the Critical Area Buffer.

Although a significant portion of land in the Critical Area is developed with houses and commercial buildings, the Critical Area Program also includes regulations that affect agriculture, forestry, and surface mining. When these activities take place within the Critical Area, special requirements and sometimes site-specific management plans are necessary to ensure that water quality and habitat are protected. In addition to the local planning department, State and other local agencies are involved in overseeing and regulating these activities.



All About the Critical Area Buffer

There are a number of significant environmental benefits of maintaining a protected Buffer between developed land and adjacent waters and wetlands. These benefits include:

- Reducing the amount of sediment, excess nutrients, and potentially harmful substances in stormwater runoff
- Preventing or reducing erosion by stabilizing slopes and the shoreline
- Maintaining an area of habitat along shorelines and streams

These Buffer functions can be grouped into three general categories:

- Water quality management
- Habitat protection
- Management of human activities

Overview

A buffer is something that lessens or absorbs the shock of an impact. That is exactly what the Critical Area Buffer is intended to do, lessen the impact of people living and working within the Chesapeake Bay and Atlantic Coastal Bays watersheds. Development within the watershed has increased the number of roads and buildings, which in turn results in greater amounts of stormwater runoff. The runoff carries sediment and pollutants to tidal creeks, rivers, and the Bays. These pollutants have a negative effect on the water quality and habitat values of the Chesapeake and Coastal Bays.

The Critical Area Buffer is the area of at least one 100 feet located directly adjacent to the State's tidal waters, tidal wetlands, and tributary streams. Ideally, this Buffer is composed of trees, shrubs, and other plants that catch sediments and other pollutants coming from buildings, lawns, and paved areas.

Buffers protect the Bays' ecosystems from many of the negative impacts associated with development activities in the watershed. For this reason, a protected Buffer is considered an essential element of the Critical Area Program. State regulations and all local Critical Area ordinances require the establishment and maintenance of a minimum 100-foot Buffer adjacent to all tidal waters, tidal wetlands, and tributary streams. The Buffer is measured from mean high water, from the landward edge of tidal wetlands, and from the edge of streams located within the Critical Area. The Buffer is expanded beyond 100 feet in areas where there are adjacent sensitive resources such as steep slopes or soils with development constraints. Chapter 3 of this book describes how the Buffer is measured and expanded.

Protecting Water Quality

A considerable amount of sediment, excess nutrients, and toxins reach the tidal waters of the Chesapeake and Atlantic Coastal Bays through surface runoff from surrounding upland areas. The Buffer provides water quality protection against these major pollutants through natural physical, biological, and chemical processes. Vegetation within the Buffer traps and filters sediments, nutrients, and chemicals from surface runoff and shallow groundwater. The leaves and branches of mature trees within the Buffer slow the velocity of falling rain, so water reaches the ground with less energy and does not cause erosion. Leaf litter on the forest floor slows runoff velocity and captures sediment and the compounds (such as pesticides, oil, and other chemicals) attached to it. Roots keep the soil porous so water can be absorbed (infiltrated) instead of running off rapidly.

When runoff is infiltrated, excess nutrients or other potentially harmful substances found in stormwater can be bound to soils or biologically processed by plants and soil organisms. Roots can also hold soil

in place, preventing sediment and any pollutants attached to sediment particles from entering adjacent waterways. Sediment clouds the water and can bury aquatic life that forms the basis of the food chain. Murky water interferes with the growth of underwater grass or Submerged Aquatic Vegetation (SAV) beds, and these are critical nursery areas and food sources for many tidewater species. Cloudy water can also be caused by high levels of nutrients that run off the landscape and cause algae blooms. Algae blooms contribute to “dead zones” in Maryland’s waterways, which occur when dissolved oxygen in the water is used up by the decomposition of the algae. Dead zones can result in large fish kills. Trees and shrubs with deep root systems absorb nutrients into their branches and leaves for long-term storage. The tiny organisms living in the rich soils of the forest floor recycle nutrients from leaves and other debris, allowing for further uptake by living plants. The natural processes performed by vegetation within the Buffer, from the deepest roots to the tops of the tallest trees, significantly reduce the pollutants that enter the Chesapeake and Coastal Bays.



Forested buffers provide a wide variety of habitat types for many species. These box turtles rely on the unique physical characteristics of the forest floor for food, water, and protective cover. *Photo courtesy of The Chesapeake Bay Foundation*

Protecting Habitat

The Buffer borders wetlands, tidal waters, and streams and functions as an ecologically important transition zone that connects these aquatic environments to the adjacent land. The Buffer's physical features (often referred to as "riparian" or adjacent to water) create an environment for numerous plant, fish, and animal species. Riparian buffers are some of the most biologically diverse and ecologically important habitats within the Chesapeake and Atlantic Coastal Bays watersheds. The creation and maintenance of a naturally vegetated Buffer protects and enhances this habitat area and maintains the diverse fish, wildlife, and plant communities along the shoreline.

Aquatic species, including economically important fish and crabs, benefit from Buffers in numerous ways. In addition to the water quality benefits previously described, Buffers provide woody debris, leaves, and other vegetation that serve as food sources for the insects and microscopic creatures at the bottom of the aquatic food chain. Wooded Buffers also provide shade and moderate water temperatures for important fish nursery areas. The future of fish and crab populations depends upon healthy shallow water habitats. Naturally vegetated Buffers are essential to maintaining the functions of shallow water habitats.

Buffers are also especially important to a wide variety of bird species. These include raptors such as bald eagles and osprey. Colonial waterbirds such as great blue herons, which often establish groups of nests in mature trees, use the Buffer for food, cover, and nesting. Numerous species of migratory birds depend on coastal areas to rest and feed during their long flights from Central and South America. A range of mammal, amphibian, and reptile species also use these areas near shore. The number and variety of species are highly dependent on the amount and type of vegetation within the Buffer. The more natural the condition of the Buffer is, the greater the number of species that will use it. A fertilized and manicured lawn that leads to a bulkheaded shoreline provides none of the important habitat benefits found in a naturally vegetated Buffer.

"Riparian" means adjacent to water.



A chickadee perches on an early blooming branch of a native Eastern Redbud tree.

Managing Human Activities

When the Critical Area Law was passed, the General Assembly recognized that human activities within Maryland's tidewater areas were contributing to the decline of the natural resources found there. In implementing local Critical Area Programs, local government officials acknowledged that the need to manage these activities was urgent and necessary. They knew that development activities in shoreline areas can have a particularly adverse impact on water quality and natural habitats and that the collective impacts of many small development activities within the Buffer are contrary to the restoration of the Bays' resources. Working cooperatively, they developed regulations that strictly limit the types of activities allowed in the Buffer and require appropriate Buffer enhancements when development takes place in or near the Buffer.

When viewed from the land toward the water, the Buffer is the last 100 feet of the Critical Area and thus represents the last opportunity to minimize the adverse effects of human activities on the Chesapeake and Coastal Bays. The Buffer's physical barrier between development and the water or wetlands provides the last chance for infiltration of runoff or settling out of sediments. It also provides a physical separation between the built environment and the natural one. This physical buffering effect minimizes disruption to the habitat and behavior of many important species. The Buffer softens the impact of development within the watershed. The physical barrier alone, especially when forested, makes a notable difference in how many species inhabit an area. While human activities and associated development within the watersheds will continue, providing and maintaining a naturally vegetated Buffer is one of the simplest yet most significant ways to minimize their effects on the Chesapeake and Coastal Bays.

Regulations for the Critical Area Buffer

Protecting and enhancing the Critical Area Buffer is an important part of Maryland's Critical Area Program. The Code of Maryland Regulations (COMAR) includes specific and detailed regulations that local governments must use and apply when reviewing projects and permits in the Critical Area. The Buffer regulations in their entirety can be found online in COMAR 27.01.09.01-.01-5 at dsd.state.md.us/comar

Definitions and Buffer Delineation

In order to implement the Buffer regulations fairly and consistently, certain words used in the regulations need to be defined. The first part of the Buffer regulations, COMAR 27.01.09.01, includes the definitions that are used to implement the regulations. This section also includes the functions of the Buffer and the legal definition of the Buffer. The requirements for delineating the Buffer and expanding the Buffer, which are explained in Chapter 4 of *The Green Book for the Buffer*, are also found in this section.

Buffer Establishment

If you apply for a permit to build on your property, and your lot is waterfront or includes land within the Buffer, you may need to plant all or parts of the Buffer. The goal of this requirement is to enhance the functions of the Buffer in order to balance the effects of new buildings and development in the watershed. The area that is required to be planted is related to the date that the lot was created and the size of the construction project. The second section of the Buffer regulations, COMAR 27.01.09.01-1 "Buffer Establishment," includes the legal requirements related to planting in the Buffer for projects located outside the Buffer. If the existing Buffer is already fully forested, additional planting is not required.

Mitigation

The third section of the Buffer regulations, COMAR 27.01.09.01-2, applies when a development activity takes place inside the Buffer. These projects usually involve a variance. When a



A variety of canopy tree, understory tree, shrub, and herbaceous species enhance the important functions of the Buffer.

variance is approved, mitigation is required. The mitigation, in the form of planting trees, shrubs, and herbaceous plants, is necessary to replace the Buffer functions lost or reduced due to the project's location so close to tidal waters, wetlands, or tributary streams. The effects of the development activity are generally permanent, so the required planting cannot be removed or cut down without specific approval. The area of mitigation is determined based on the area that is disturbed in the Buffer. If trees must be cut to allow for the new construction, additional mitigation is required. Mitigation for a new deck is required at a three-to-one ratio. For example, a 200 square-foot deck would require a minimum of 600 square feet of planting. Additional planting at a one-to-one ratio would be required for temporary construction disturbance and any trees that would need to be removed.

The regulations specify that plantings for mitigation should be located in the Buffer. If there is insufficient area for planting in the Buffer, then plantings may be located somewhere else on the property. In those cases where there is no room for all or some of the required mitigation planting, a fee-in-lieu of \$1.50 per square foot can be collected by the local government. These funds will be used to plant Buffers elsewhere in the county's or town's Critical Area.

Planting Standards

The third section of the Buffer regulations, COMAR 27.01.09.01-2, also addresses the planting standards. These standards apply whenever planting is required in the Buffer, regardless of whether it is to meet an establishment or a mitigation requirement. When Buffer planting for mitigation is required, it is often at greater than a one-to-one ratio. The ratios are included in a table in the regulations. In some cases, a large area of the Buffer must be planted. In these instances, you may want to use smaller plants because they are cheaper and easier to plant. Tables in this section of the Buffer regulations specify what percentage of an area can be planted using different sizes of trees and shrubs. It also includes information regarding when an area of the Buffer can be allowed to grow into a forest naturally, a process called “natural regeneration.”

This section of the Buffer regulations includes a table that provides the square footage credit associated with different plant types and sizes. The table also specifies the maximum percentage of herbaceous plants, small shrubs, and large shrubs that can be used when planting the Buffer. These limits are needed to ensure that there is sufficient tree cover to provide true forest structure near shoreline areas. The garden plans in the second half of this book are based on the credit system used in this table and may be helpful if you wish to use different plants in your garden or would like to expand your garden to obtain additional Buffer credit.

Buffer Management Plans

When you obtain a building permit and are required to plant in the Buffer, the local planning office will advise you that you need to prepare and submit a Buffer Management Plan. There are three types of Buffer Management Plans: Simplified, Minor, and Major. The different types of plans and the requirements for each are addressed in the fourth section of the regulations, COMAR 27.01.09.01-3 and in Chapter 5 of this book. Chapter 5 describes each type of plan in detail and explains when each type of plan is used.

There are no specific rules about who can prepare Buffer Management Plans; however, Major Buffer Management Plans are usually put together by a landscape or design professional. Homeowners can often prepare and submit their own Simplified or Minor Buffer Management Plans. Chapter 6 of this book provides sample planting plans (Buffer Garden Plans) that you can use. These plans can be submitted to a local planning office with the notes and supplemental information in Chapter 7.

Natural Regeneration

Natural regeneration is when an area is not mowed, and the area is naturally seeded from surrounding forest and woodlands, allowing trees and shrubs to grow up on their own. Natural regeneration can be a good way to address large areas of the Buffer. It is often less expensive than planting. In many cases, trees that come up on their own survive better than those that are planted because they have adapted to the conditions on

Table 2: Planting Credits

Vegetation Type	Minimum Size Eligible for Credit	Credit Allowed (Square Feet)	Maximum Percent of Credit
Canopy tree	2-inch caliper	200	No maximum
Canopy tree	¾-inch caliper	100	No maximum
Understory tree	¾-inch caliper	75	No maximum
Large shrub	4 feet high	50	30%
Small shrub	18 inches high	25	20%
Herbaceous perennial	1-quart or based on the area covered by plugs or seed mix	2	10%
Planting cluster for Buffer establishment or mitigation planting less than ½ acre	1 canopy tree; and 3 large shrubs or 6 small shrubs	300	Not applicable
Planting cluster for Buffer establishment or mitigation planting less than ½ acre	2 understory trees; and 3 large shrubs or 6 small shrubs	350	Not applicable



Natural vegetation along Maryland's streams, creeks, rivers, and Bays filters runoff, stabilizes slopes, and takes up nutrients.

the site. Some site preparation, maintenance, and monitoring are usually part of sites where natural regeneration is used. COMAR 27.01.09.01-4 provides the specific details for including areas of natural regeneration in a Buffer Management Plan.

Fee in Lieu of Mitigation

In some cases when Buffer mitigation is required, you may not have sufficient space on the project site to fit all the required mitigation plantings. In this situation, the planning department can collect a fee in lieu of planting. Fee-in-lieu monies cannot be collected to satisfy a Buffer establishment requirement. In most counties and towns, the fee-in-lieu is \$1.50 per square foot of required planting. However, some counties charge a different rate in accordance with a local Buffer planting program that has been approved at the State level. The detailed regulations regarding the collection and use of fees in lieu of Buffer mitigation are found in COMAR 27.01.09.01-5.

Other Buffer Regulations

The State Buffer regulations include standards for agricultural activities and timber harvesting associated with forestry. COMAR 27.01.09.01-6 and COMAR 27.01.09.01-7 include limitations on certain activities that can take place in the Buffer. They also include performance standards for farming and forestry practices.

Modified Buffer Areas

These areas are places, communities, subdivisions, or neighborhoods within a town or county where the Buffer does not function properly. This is because the pattern of development involves roads, buildings, and utilities within the Buffer. Usually these areas include multiple lots and were developed and built out long before the Critical Area Law was adopted. In order to allow for reasonable development and redevelopment in these areas, COMAR 27.01.09.01-8 gives local governments the authority to designate them as Modified Buffer Areas. Modified Buffer Areas are clearly mapped, with all of the affected properties identified. Within these areas, property owners have some flexibility with regard to disturbance to the Buffer. Local programs vary, but generally the Buffer in these areas is regulated by local zoning laws. Development activities are permitted and mitigated as specified by the local zoning code as implemented by the planning department.

An area of the Buffer can be allowed to grow into a forest naturally, a process called "natural regeneration."

Measuring the Critical Area Buffer

The 100-foot Buffer is measured on the site when you apply for a permit to build, grade, or disturb the land on your lot. The Buffer must be measured on the site at the time you apply for a permit because the shoreline changes over time. It is very important that the Buffer be shown accurately on the plans that are submitted with your permit application. The location of the Buffer affects where you are allowed to build, so you want to be sure it is correct.

The Critical Area Buffer is measured landward from the mean high water line of open water areas, the edge of tidal wetlands, and each bank of tributary streams. If there are steep slopes, nontidal wetlands, or sensitive soils (hydric or highly erodible) adjacent to the Buffer, the Buffer must be expanded beyond 100 feet to ensure that development activity does not negatively affect water or wetland resources. This chapter provides information about how to measure the Buffer on your lot.

Measuring the Buffer Adjacent to Open Water

Measuring the Buffer adjacent to open water is done by locating the mean high water line. Often, mean high water is easy to determine because there is a bulkhead on the property or a vertical bank at the high tide line. If the property is bulkheaded, the Buffer begins at the bulkhead. In the case of a beach, the Buffer is measured landward from the estimated limit of mean high tide. The extent of mean high tide is usually identified using the rack line. A rack line is an area on a beach where uprooted bay grasses, sticks, shells, and other debris are deposited by the tide. This is a pretty good indicator of mean high tide. For shorelines that are protected with a rock revetment, water stains, algae, or barnacles on the rocks are usually good indicators of the location of mean high tide.

Measuring the Buffer Adjacent to Tidal Wetlands

Tidal wetlands are marshy wet areas that are affected on a regular basis by the rise and fall of the tide. The landward edge of a tidal marsh generally extends to the limit of flooding associated with the semi-regular high water of spring tides. Spring tides result when the sun and the moon are in line together, creating the highest water levels. Spring tides occur about every two weeks, roughly corresponding with the full and new moons.

The edge of tidal wetlands is identified in the field either by a change in elevation or by a change in vegetation. When an abrupt and obvious change in elevation is not present, vegetation can be used to determine when a system is not regularly influenced by the tide. Certain types of vegetation require regular inundation by salty or brackish water to grow. On a property with an adjacent tidal marsh, the 100-foot Buffer begins at the landward edge of the tidal extent of the marsh. Sometimes this limit can be easily identified as where the marsh grass ends and your lawn begins. On other sites, different types of grasses and shrubs are used to determine the extent of tidal wetlands. If you are unsure of the limit of the tidal marsh, staff from your local planning office can often assist you in determining where it is or deciding if you need to hire a consultant to do it for you.

Measuring the Buffer Adjacent to Tributary Streams

Tributary streams are smaller watercourses that have a certain amount of consistent water flow throughout all, or a substantial portion of the year. Perennial streams are those that under normal circumstances flow year round. Intermittent streams are those that have a water source other than simply runoff from surrounding lands, but may be dry at certain times of the year. Both perennial streams and intermittent streams normally appear on the U.S. Geological Survey 7½ minute quadrangle maps (scale = 1:24,000) or on more detailed maps or studies. Local

governments have the discretion to use a variety of sources, including an actual site visit, to determine if a watercourse is a tributary stream requiring a 100-foot Buffer.

Characteristics of tributary streams are the presence of a defined stream channel, staining or other indicators of a high water mark, hydric soil characteristics in the stream bed, and evidence of use by aquatic organisms such as insects, bivalves, crustaceans, etc. If physical indicators are not present, there are a variety of scientific studies that can confirm the presence of a tributary stream. The Buffer is delineated 100 feet landward from the edge of each bank of the stream channel.

It is possible that on a particular parcel, the Buffer will be measured from more than one direction or feature. For example, a Buffer may extend from the edge of a tidal wetland on one side and from open water on another side. Buffers must be delineated based on the physical features present on the site and in certain instances can overlap, resulting in a Buffer that includes your entire property.

Expansion of the Buffer

The Critical Area regulations require expansion of the Buffer in situations where 100 feet may not be adequate to protect the waterway. The Buffer must be expanded beyond 100 feet to include adjacent sensitive areas, such as steep slopes, hydric soils, or highly erodible soils. If the Buffer needs to be expanded on your property, the staff at the planning department can assist you in determining how much expansion is required.

Expanding the Buffer for Steep Slopes

On sites with steep slopes of 15 percent or greater, the Buffer must be expanded four feet for every one percent of slope, or to the top of the slope, whichever is greater. This means that if the slope were 20 percent, the Buffer would be expanded by 80 feet or to the top of the slope if that were greater. This would equate to a minimum Buffer in this situation of 180 feet ($20 \times 4 = 80 + 100 = 180$).

Expanding the Buffer for Highly Erodible Soils

Highly erodible soils are those that are unstable and tend to wash away easily because of their composition and location in the landscape. These soils are defined as soils with a slope greater than 15 percent or having a K value greater than 0.35 on a slope greater than five percent. The K value

refers to the erodibility factor and is an indicator of the susceptibility of a soil to erosion by runoff during storms. The K value is reported as a number between 0 and 1.0. The higher the K value, the more susceptible the soil is to erosion. The K value for a specific soil can be found in the Soil Survey for each county or from the Natural Resources Conservation Service. The Buffer is expanded for highly erodible soils on slopes of less than 15 percent shall be to the limit of the erodible soil or 300 feet, whichever is less. For erodible soils on slopes that are 15 percent or greater, the expansion method for steep slopes as specified above should be used.

Expanding the Buffer for Hydric Soils

Hydric soils are those soils that tend to be under water, wet, or saturated for significant portions of the year. From a scientific perspective, the moisture content in these soils produces anaerobic conditions that influence the kind of plants that grow in these soils and the way that they grow. Some areas of hydric soils have other related characteristics and will be designated as nontidal wetlands under the State's Nontidal Wetlands Program. Expansion of the Buffer when it is adjacent to, or crosses, a nontidal wetland is to the limit of the nontidal wetland. Not all areas of hydric soils are nontidal wetlands. For areas of hydric soils that are not nontidal wetlands, the Buffer is expanded to the limit of the hydric soil or 300 feet, whichever is less.

Determining the Location of the Buffer on Your Property

In order to determine the location of the Buffer on your property, you will need a plan of your lot drawn to scale. You should first verify that the plan is current and accurately reflects the location of the physical features from which the Buffer is determined. The shoreline, edge of tidal wetlands, and tributary streams should be shown. You can then measure 100 feet from the waterway, the edge of wetlands, or the bank of the stream to determine the location of the Buffer. If you think that your Buffer is near or includes sensitive areas of steep slopes, hydric soils, or highly erodible soils, you should discuss this with the planning department staff. They may be able to verify if these areas are present and if Buffer expansion is required. If they cannot make a determination, they can advise you regarding the need to obtain the services of a professional.

Buffer Management Plans

If you are applying for a permit to build, grade, or disturb the land on your lot, and it is next to tidal waters, tidal wetlands, or a tributary stream, you must comply with the regulations for the Buffer. Typically, as a condition of your permit, you will need to do some planting in the Buffer on your property. The local planning department will require that you submit a Buffer Management Plan to satisfy this condition. The purpose of a Buffer Management Plan is to show what type of work will take place and to specify what, where, when, and how the required planting in the Buffer will be accomplished.

A Buffer Management Plan is generally not required to maintain an existing grass lawn, to plant trees and shrubs, or to garden in the Buffer. However, a plan is required if these activities involve

grading, heavy equipment, or the construction of structures. Brick or block garden walls or wood or masonry planting beds are considered structures. If you are unsure whether a Buffer Management Plan is required, ask the local planning staff before starting the work. Not knowing the regulations and not obtaining the appropriate authorization can result in a violation. Serious violations in the Critical Area can involve a citation and fines of up to \$10,000.

There are three different types of Buffer Management Plans. The type of plan that you will need is based on the type of activity and the area of Buffer establishment or mitigation required. The plan is submitted with your permit application and is reviewed by the planning department. In general, the plan must be approved before you can receive your permit.



A Buffer Management Plan is used by local governments to ensure that existing forest is maintained and additional trees and shrubs are added if required by the proposed project application.

SIMPLIFIED BUFFER MANAGEMENT PLAN

Complete all sections below.

NOTE: PROPERTY OWNER MUST SIGN IN SECTION 8 OR THE PLAN WILL BE RETURNED WITHOUT APPROVAL

1. Applicant Information

Name: <u>Martha Washington</u>	
Address: <u>123 Creekside La.</u>	
City: <u>Rivertowne</u>	State: <u>MD</u> Zip: <u>45678</u>
Telephone: <u>(410) 555-7890</u>	E-mail address: <u>mwash@fmail.com</u>

2. Property address if different than above

Address: <u>Same as above</u>		
City:	State:	Zip:
Tax Map: <u>12</u>	Parcel: <u>23</u>	Lot: <u>34</u>

3. Proposed activity must be one of the following: (check all that apply)

Access to pier or shoreline <input type="checkbox"/>	Removing invasive vegetation* <input type="checkbox"/>	Filling to maintain existing lawn <input type="checkbox"/>	Removal of tree in danger of falling <input checked="" type="checkbox"/>
--	--	--	--

4. Describe proposed work within the Buffer:

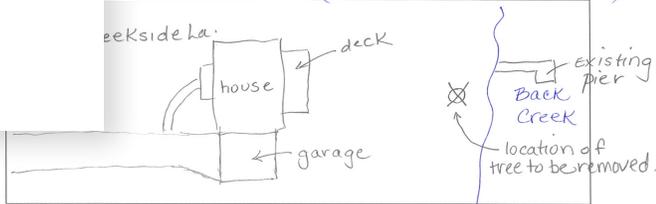
I would like to cut down one (1) existing tree within Buffer. It is a locust which was damaged during winter ice storm and is now leaning towards pier & water. I will have stump ground in place and would like to make a planting bed in that location.
(Please see photos attached.)

PLEASE COMPLETE REVERSE SIDE

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size review time, attach photos or provide sketch of property, area of work: (Photos also attached.)*



6. Site restoration or replanting (must include mulch or ground cover for any areas disturbed; new lawn areas prohibited):
Area around existing tree will be covered in mulch and planted as flower bed. Replacement tree - a 1 1/2" caliper willow oak - will be planted in bed as well.

*Note: For invasive vegetation removal, natural regeneration may be utilized. Area must be stabilized. If regeneration of native species does not occur within 2 years of invasive removal, the area should be replanted.

7. Estimated dates for proposed work and mitigation:

Work will be completed by: May 1, 2011
 Restoration will be completed by: Nov. 1, 2011 (Flower bed established immediately, tree planted in fall)

8. Certification:

I certify that the information on this form is true and accurate to the best of my knowledge and belief. I understand that County personnel may contact me and arrange to inspect the work. I will abide by this plan if approved and will not conduct any work beyond the limits of this plan.

**PROPERTY OWNER SIGNATURE: Martha Washington
 DATE: April 1, 2011

NOTE:
****PLAN IS CONSIDERED INVALID WITHOUT A PROPERTY OWNER SIGNATURE**

Page 2 of 2

Simplified Buffer Management Plan

A Simplified Buffer Management Plan is a basic two-page plan that addresses Buffer planting associated with the following specific activities:

- Providing an access path up to three feet wide leading to a private pier or the shoreline
- Manually removing invasive or noxious vegetation
- Filling to maintain an existing lawn
- Managing storm damage, including the removal of fallen trees
- Repairing or replacing a septic system in an existing grass lawn
- Cutting a tree that may fall and cause damage or may cause or increase shore erosion

Most counties and towns use a form that you can complete and attach to photos and a sketch. A copy of a sample form is included in this chapter. You will need to provide a brief description of the work, the method to be used to do the work, and the start date. The form includes a place to describe the replacement planting and when it will be installed. You will need to make sure that you or the person that is responsible for the planting signs the form. For an emergency situation, such as when a tree appears likely to fall on a structure after a storm event, the Plan may be filed after the tree has been cut.

The Green Book for the Buffer is designed as a resource to help you prepare and submit a Minor Buffer Management Plan. Once you have determined the square footage of your Buffer planting requirement, you can select one of the Buffer Garden Plans with its Landscape Schedule in Chapter 6. You can combine, edit, or adjust the plans to meet the area requirements, landscaping goals, and the conditions on your site. The Buffer Garden Plans and Landscape Schedules can be modified to adjust the square footage credit, and include helpful tips about species, spacing, and planting that are provided in the Notes section of

Minor Buffer Management Plan

A Minor Buffer Management Plan is required when the area of Buffer establishment or the area of Buffer mitigation required is less than 5,000 square feet. Most projects that involve the construction of decks, additions, sheds, and garages will require submission of a Minor Buffer Management Plan. A Minor Buffer Management Plan must include:

- A site plan (drawing of the property) showing the area to be disturbed and the location of the proposed construction
- The existing tree canopy and total number, size, and location of trees to be removed
- Calculations as necessary to determine the required area of Buffer mitigation or Buffer establishment
- A planting plan that shows the location of the proposed plantings
- A landscape schedule or table that includes the species, quantity, and size of all plantings
- The anticipated planting date
- A maintenance plan with provisions for two years of monitoring and replacement planting
- An inspection agreement that allows a local government access to your property to inspect the plantings
- Your signature or that of the person responsible for the development activity and the survival of the planting



Planting trees and shrubs at the shoreline to expand existing naturally vegetated areas increases the water quality benefits and enhances the wildlife habitat values of the Buffer.

each Landscape Schedule. Once you have selected (and edited if necessary) your Buffer Garden Plan and Landscape Schedule, you can submit them along with the Buffer Management Plan Notes in Chapter 8. Some of the notes require that you fill in the blanks regarding specific information about your project.

In general, the area requirements of each garden are roughly equal to the square footage credit. Buffer Garden Plans 1 through 18 are drawn at a scale of 1/8 inch equals one foot (1/8" = 1'- 0") or one inch equals eight feet. Buffer Garden Plans 19 through 24 are drawn at a scale of 1/16 inch equals one foot (1/16" = 1'- 0") or one inch equals 16 feet. You will see that some of the plantings overlap in the Buffer Garden Plans. This will facilitate the creation of the structural diversity that ensures the presence of a canopy layer, understory layer, shrub layer, and herbaceous layer as the plantings mature. Structural diversity will maximize the desired water quality and habitat benefits of your garden. The spacing of the canopy trees and

understory trees is very important to make certain that you have the necessary area to accommodate the anticipated size of the plants at maturity. The spacing of the shrub species is somewhat more flexible. The drawings show the recommended spacing and arrangement of the plantings. Chapter 6 provides additional details about plant spacing.

Major Buffer Management Plan

A Major Buffer Management Plan is required when the area of Buffer establishment or the area of Buffer mitigation required is 5,000 square feet or greater. The requirements for a Major Buffer Management Plan are the same as those for a Minor Buffer Management Plan with one exception. A Major Buffer Management Plan requires that the landowner provide information about long-term protection and maintenance of the Buffer and provide financial assurance that covers the planting and required survival. The financial assurance, which is usually a bond or letter of credit, is necessary for Major Buffer

Management Plans because these Plans often involve large planting areas associated with more complex projects that may be constructed in phases over many years. The financial assurance provides a mechanism for the local government to make sure that the Buffer gets planted. The bond provides the funds to plant the Buffer if the original owner does not comply with the requirement.

Although there is no requirement to have a Major Buffer Management Plan prepared by a landscape design professional or site design consultant, it is recommended. Planting areas of 5,000 square feet or more often require careful evaluation of site conditions, a more complex species mix, and more involved site preparation than Minor Buffer Management Plans. The knowledge and experience of professionals who are familiar with the soil types, drainage conditions, and tree and shrub species in your area can often make the design, implementation, and maintenance of a large Buffer planting area easier and more successful.

Although not specifically designed to address Major Buffer Management Plans, the garden designs in *The Green Book for the Buffer* can be modified, reconfigured, and combined to address larger planting requirements. If you like a particular garden design and are working with a landscape design professional, the professional can work with you to modify the design to meet the conditions on your site and the planting area required by your project.

Buffer Management Plan Approval

As part of the permit review process, the local government will need to approve your Buffer Management Plan. In general, the Buffer Garden Plans in *The Green Book for the Buffer* have been designed specifically to meet the requirements for planting in the Buffer in the Critical Area. Using one of these plans will make the review process go more smoothly. It is important to remember that you must obtain approval of your Buffer Management Plan before starting any work.

It is important to remember that you must obtain approval of your Buffer Management Plan before starting any work.

A Major Buffer Management Plan must include:

- A site plan showing the area to be disturbed and the location of the proposed construction
- The existing tree canopy and total number, size, and location of trees to be removed
- Calculations as necessary to determine the required area of Buffer mitigation or Buffer establishment
- A planting plan that shows the location of the proposed plantings
- A landscape schedule or table that includes the species, quantity, and size of all plantings
- The anticipated planting date (for a subdivision project, planting may be required prior to the sale of any individual lots)
- A maintenance plan with provisions for two years of monitoring and replacement planting
- An inspection agreement that allows a local government access to your property to inspect the plantings
- Your signature or that of the person responsible for the development activity and the survival of the planting
- A long-term protection plan that includes financial assurance, such as a bond or letter of credit that covers the planting and the required survival term





The Many Functions of a Forested Buffer

Nutrients like phosphorus and nitrogen are taken up by trees and shrubs in the Buffer. They are stored in leaves, limbs, and roots instead of reaching the water. The amounts of these nutrients that are taken up and used by forest vegetation far exceed what is used by a grass lawn.

Forests have deep and complex root systems that allow water to percolate more rapidly and efficiently into the soil. Infiltration of runoff and water storage in a forested Buffer can be 10 to 15 times higher than in a grass lawn.

Leaves, limbs, logs, and woody debris that fall into waterways adjacent to shoreline forests provide food and habitat for insects, amphibians, crustaceans, and small fish. These species are essential to the aquatic food chain.

A forested Buffer can provide an important connection for wildlife, providing protective cover for a variety of species and allowing them to move safely from one larger forested tract to another.

Canopy trees at the shoreline reduce soil erosion by slowing and capture rainfall, improve air quality by filtering dust and other pollutants, and moderate temperatures by providing shade and through the effects of evapotranspiration.

Buffer Garden Plans

Overview of the Buffer Garden Plans

This chapter contains 24 Buffer Garden Plans that have been designed to satisfy the requirements for planting in the Buffer. The Buffer Garden Plans can be copied and can be submitted with the accompanying Landscape Schedule and Buffer Management Plan Notes to your local government as part of your permit application. At the top of each Buffer Garden Plan, there is an approximate square footage credit that can be used to select a Plan to meet the requirements associated with your project. The Plans have been created to provide the percentages of trees, shrubs, and herbaceous plants that are specified in the Buffer regulations. (In some cases, the “Actual Total Credit” shown at the bottom of the Landscape Schedule is slightly higher where quantities have been adjusted for aesthetic purposes.) If you want to select different species to address specific conditions in your yard, just make

sure that you replace the plants with the same plant type and use plant species that are native to Maryland’s Coastal Plain. For example, a canopy tree should be replaced with another canopy tree in order to ensure that the integrity of the Plan is maintained.

If you want more information about specific plant species or want to explore some alternative species, all of the plants used were selected from the U.S. Fish and Wildlife Service publication *Native Plants for Wildlife Habitat and Conservation Landscaping Chesapeake Bay Watershed*. This publication describes in detail over 400 different species of trees, shrubs, herbaceous plants, grasses, vines, and ferns. This guide is a wealth of information about growing conditions, mature size, and wildlife value. It is available online at nps.gov/plants/pubs/chesapeake. When selecting alternatives, make sure to look for species that are native to the Coastal Plain.



A garden area of native shrubs, grasses, and wildflowers planted near young saplings can provide a transition between existing lawn and maturing forest.

Landscape Schedules

Each Buffer Garden Plan is accompanied by a Landscape Schedule that includes the following information:

Symbol:	Identifies the type of plant on the Buffer Garden Plan
Common Name:	Refers to the generally used name of the plant
Scientific Name:	Provides the detailed Latin name of the plant that specifically identifies its genus and species
Size:	Indicates the size of the plant to be planted in order to obtain the credit
Plant Type:	Specifies the position of the plant in the forest structure and generally indicates overall mature height
Total Number:	Indicates the quantity of plants of each species that are included in the Buffer Garden Plan
Credit:	Provides the square footage credit associated with the total number of each species
Actual Total Credit:	Provides the actual total square footage credit. In some cases this may exceed the square footage in the title because the garden exceeds the minimum requirements for aesthetic purposes
Notes:	Provides additional information about species selection, alternatives to increase the total credit, and modifications to improve water quality and habitat benefits

Plant Spacing

The Buffer Garden Plans numbered 1 through 18 in this chapter have been drawn at a scale of $\frac{1}{8}$ inch equals one foot ($\frac{1}{8}'' = 1' - 0''$) or 1 inch equals eight feet. Buffer Garden Plans 19 through 24 have been drawn at a scale of $\frac{1}{16}$ inch equals one foot ($\frac{1}{16}'' = 1'' - 0''$) or one inch equals 16 feet. You can use a regular ruler to measure the spacing of the plants. There is some flexibility with the spacing, but do consider that many canopy trees grow to 50 feet tall or more, and the canopy may cover as much 1,000 square feet. It is fine to adjust plants to work around existing vegetation or to accommodate structures or utilities in your yard. The garden plans show how trees, shrubs, and herbaceous plants can be located and arranged so they can grow to maturity and provide optimum water quality and habitat benefits. If your site requires modification of a garden plan, the following standards should be used:

- Canopy trees (using the trunk as the planting location) should be planted 14 to 20 feet apart.
- Understory trees can be planted under canopy trees, but should be spaced at least eight to ten feet away from the trunk of a canopy tree or another understory tree.
- Large shrubs can be planted under canopy trees and understory trees, but should be planted at least five to seven feet away from trees or other large shrubs.
- Small shrubs can be planted under canopy trees and understory trees, but should be planted at least three to five feet away from trees, large shrubs, or other small shrubs.
- Herbaceous plants can be planted under and around trees and shrubs. It is important to consider how much sun the plants need. Herbaceous plants may be easier to maintain when they are planted in groups, with individual plants spaced at least one to two feet apart.

Planting Your Buffer Garden

You will notice in some of the Buffer Garden Plans that the trees and shrubs may overlap slightly. This is to show that as the trees and shrubs grow and mature, the leaves and branches of some of the canopy trees will touch and grow over the understory trees and shrubs. Planting in this way will ensure that your garden develops into one with a natural forest structure. In a natural woodland setting, the vegetation is randomly scattered with the canopies of larger trees overlapping each other. Understory trees, large shrubs, and small shrubs grow beneath the canopy. Herbaceous plants may be present and quite dense in some areas and sparser in other areas. Some canopy tree species can actually function as understory species when the available sunlight, water, and nutrients are restricted by taller and faster growing canopy tree species. This is not problematic but is an adaptive characteristic of a natural forest.

In general, large and small shrubs can be planted either underneath the tree canopy or outside of the canopy. Many shrub species tend to adapt their growing habits and size depending on the sunlight, space, water, and nutrients available. Shrubs with ample growing area and optimum sunlight will get fuller and larger than those that may be closer to other plantings. The Buffer Garden Plans show herbaceous plants spaced two feet apart. Depending on the size of the plant at maturity, herbaceous plants can be planted more densely. They are generally more tolerant of crowded growing conditions than shrubs and trees and can be easily transplanted or separated as they mature. Allowing adequate area for the plantings in your Buffer Garden ensures the long-term survival, good health, and optimum water quality and habitat benefits of your Buffer.

Planting more densely minimizes weeding and can improve soil porosity, composition, and texture.

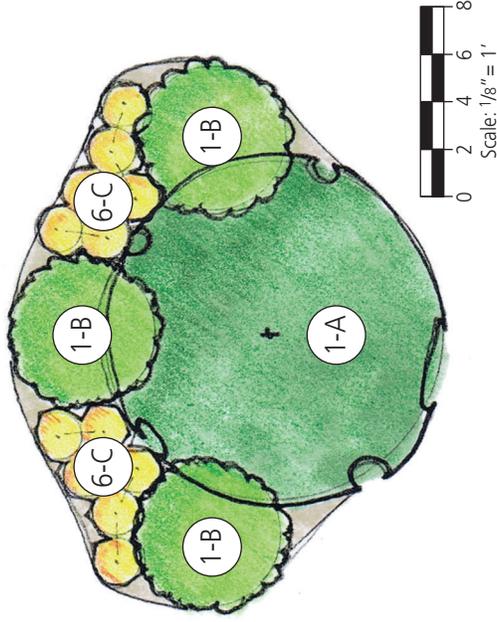
These Buffer Garden Plans have been drawn to show the general areal coverage and size of the trees and shrubs as they begin to mature. Depending on the size and age of the plants that you purchase for your garden, you may find that certain areas of the garden seem somewhat bare when the plants are first put in place. This ensures that the larger canopy and understory trees won't be overcrowded as they grow. All of the herbaceous plants, grasses, vines, and ferns listed in the Landscape Schedules are perennial plants, meaning that they come back year after year. Many of these species spread and reproduce easily, so it is likely that they will fill in the bare spots relatively quickly in the first few years. However, if you want a fuller, denser appearance when your garden is first installed, you may want to add additional small shrubs and herbaceous plants to fill in any gaps. Planting more densely minimizes weeding and can improve soil porosity, composition, and texture. Herbaceous plants can be moved to other locations or thinned as they mature.



Herbaceous plants, like wildflowers, and grasses, add color and attract birds, butterflies, and other pollinators.

**Plan 1: 300 SF (Sun)
Fall Glory Cluster Garden**

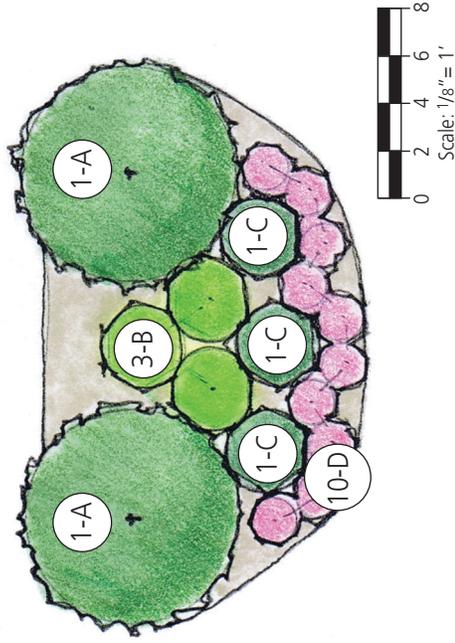
This small cluster garden has excellent value for wildlife and beautiful fall color.



Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Red Maple	<i>Acer rubrum</i>	¾-inch caliper	Canopy tree	1	N/A
B	Virginia Sweetspire	<i>Itea virginica</i>	3 feet	Large shrub	3	N/A
C	Butterfly Flower	<i>Asclepias tuberosa</i>	1 quart	Herbaceous plant	12	N/A
Actual Total Credit: 300 SF						
Notes: Cluster plantings are designed to be grouped together so credit is given for the cluster as a whole. Butterfly Flower has brilliant orange blooms and grows well in sun or partial shade.						

**Plan 2: 350 SF (Shade)
Spring Beauty Cluster Garden**

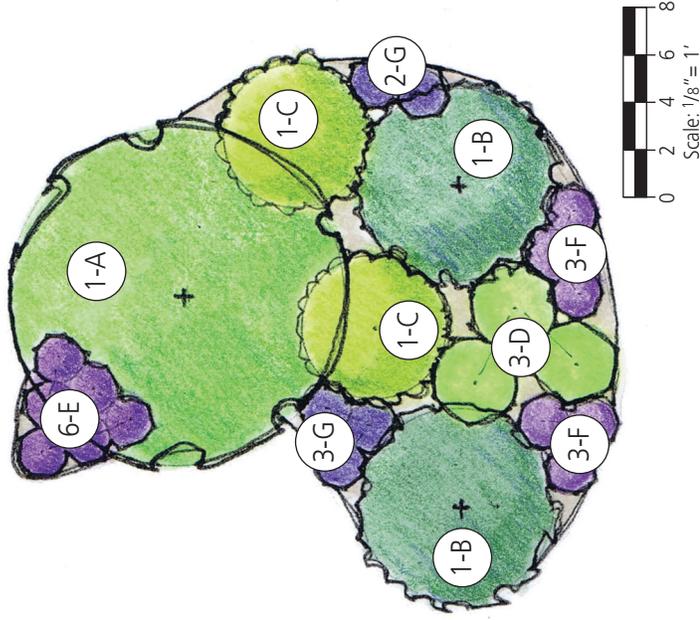
This small cluster garden has beautiful pinkish purple color in the spring, and the American Beautyberry shrubs have royal purple berries in early fall.



Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Eastern Redbud	<i>Cercis canadensis</i>	3/4-inch caliper	Understory tree	2	N/A
B	American Beautyberry	<i>Callicarpa americana</i>	18 inches	Small shrub	3	N/A
C	Pink Azalea	<i>Rhododendron periclymenoides</i>	18 inches	Small shrub	3	N/A
D	Wild Geranium	<i>Geranium maculatum</i>	1 quart	Herbaceous plant	10	N/A
Actual Total Credit: 350 SF						
Notes: Cluster plantings are designed to be grouped together so credit is given for the cluster as a whole. Native azaleas are required in order to receive credit for Buffer planting. If native azalea species are not readily available, they can be replaced with Steeplebush (<i>Spiraea tomentosa</i>).						

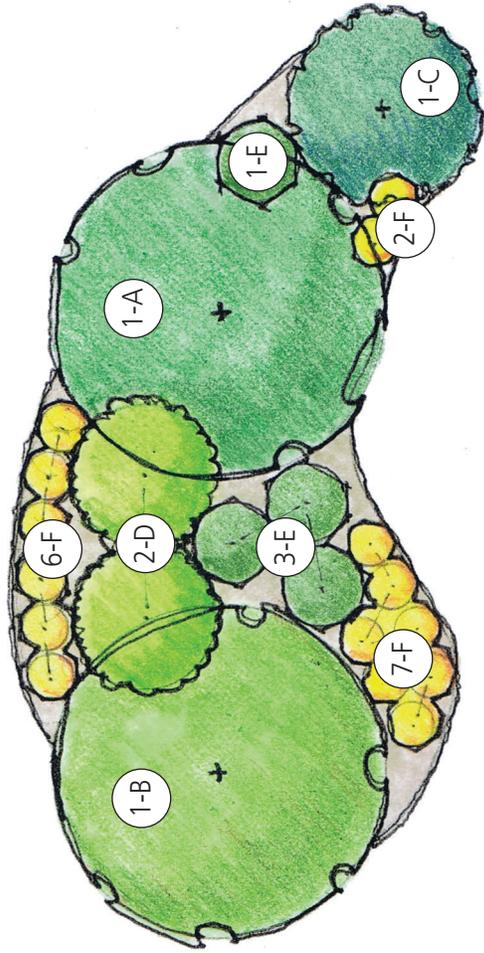
Plan 3: 450 SF (Low-lying) Violet Mist Garden

This small garden works well in low-lying or wet areas and can be planted near a drainage swale or low spot. The plants in this garden thrive in moist soils, and the pink and purple flowers of the herbaceous plants make a beautiful contrast to the dark foliage of the trees and shrubs.



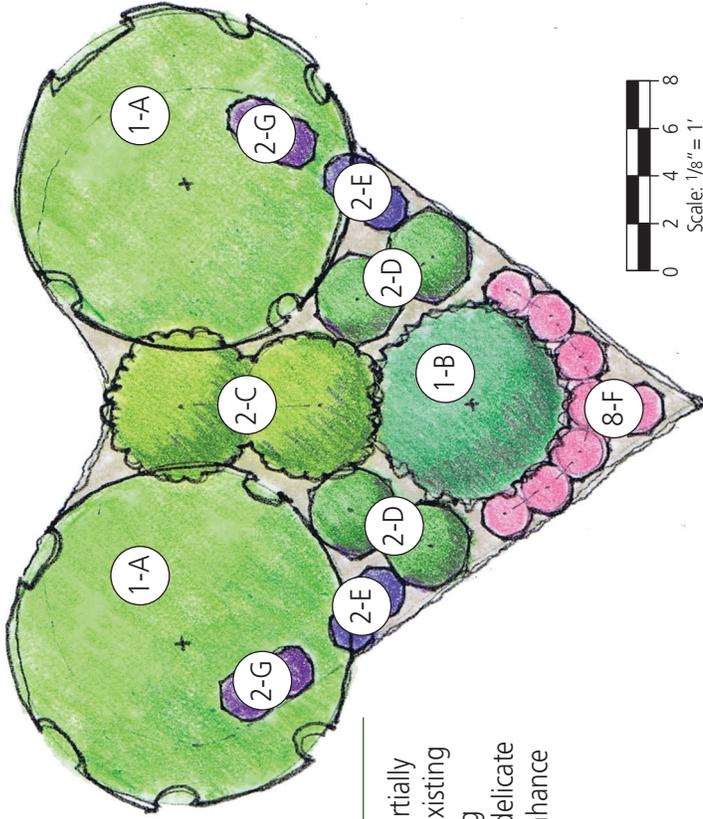
Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	River Birch	<i>Betula nigra</i>	¾-inch caliper	Canopy tree	1	100
B	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	2	150
C	Red Chokeberry	<i>Photinia pyrifolia</i>	3 feet	Large shrub	2	100
D	Sheep Laurel	<i>Kalmia angustifolia</i>	18 inches	Small shrub	3	75
E	Virginia Spiderwort	<i>Tradescantia virginiana</i>	1 quart	Herbaceous plant	6	12
F	New England Aster	<i>Symphotrichum novae-angliae</i>	1 quart	Herbaceous plant	6	12
G	Helmet Flower	<i>Scutellaria integrifolia</i>	1 quart	Herbaceous plant	5	10
Actual Total Credit: 459 SF						

Notes: Passionflower (*Passiflora incarnata*) is a vine with lovely and unusual purple flowers that can be used as a spreading plant in place of some of the herbaceous plants. Blue-eyed grass (*Sisyrinchium angustifolium*) is another blue flowering alternative to the herbaceous plants.



**Plan 4: 500 SF (Sun)
Golden Sunshine Garden**
This small garden has a variety of species with a focus on gold and yellow colors and a variety of leaf sizes, shapes, and textures.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Southern Red Oak	<i>Quercus falcata</i>	¾-inch caliper	Canopy tree	1	100
B	American Beech	<i>Fagus grandifolia</i>	¾-inch caliper	Canopy tree	1	100
C	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	1	75
D	Red Chokeberry	<i>Photinia pyrifolia</i>	3 feet	Large shrub	2	100
E	Maple-leaved Arrowwood	<i>Viburnum acerifolium</i>	18 inches	Small shrub	4	100
F	Black-eyed Susan	<i>Rudbeckia hirta</i>	1 quart	Herbaceous plant	15	30
Actual Total Credit: 505 SF						
Notes: Replace some of the Black-eyed Susans with Beebalm (<i>Monarda didyma</i>), Wood Lily (<i>Lilium philadelphicum</i>), or Butterfly Flower (<i>Asclepias tuberosa</i>) for some bright red and orange color.						



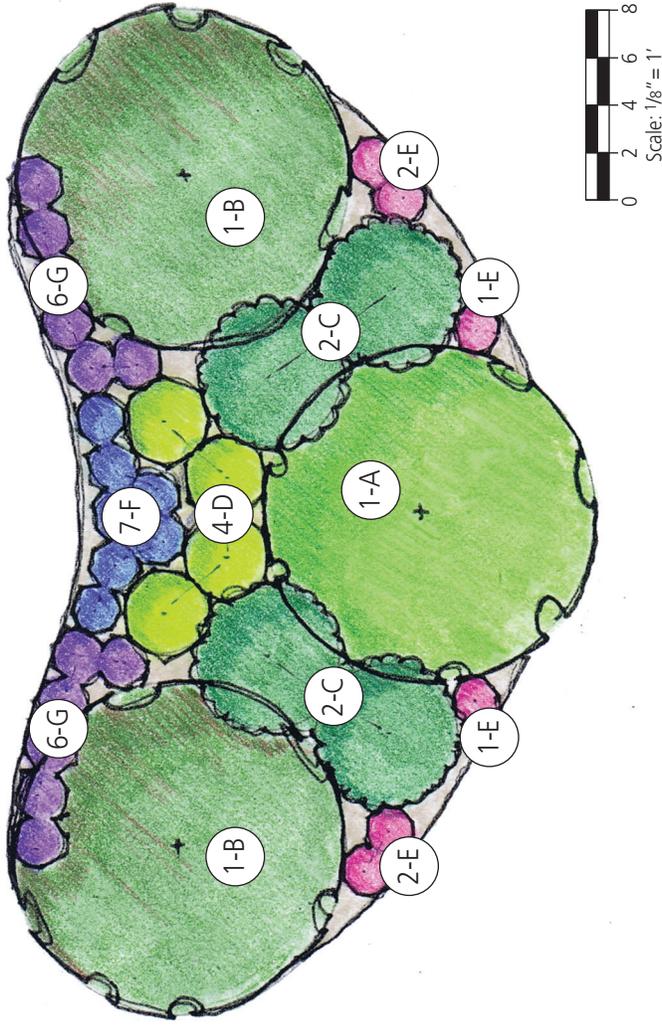
**Plan 5: 500 SF (Shade)
Hearts and Flowers Garden**

This garden works well in areas that are partially shaded and can be easily integrated with existing large canopy trees. The beautiful branching structure, lovely heart-shaped leaves, and delicate pinkish to purple blooms of the Redbud enhance the beauty of existing wooded areas.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Flowering Dogwood	<i>Cornus florida</i>	¾-inch caliper	Canopy tree	2	200
B	Eastern Redbud	<i>Cercis canadensis</i>	¾-inch caliper	Understory tree	1	75
C	Silky Dogwood	<i>Cornus amomum</i>	3 feet	Large shrub	2	100
D	Black Huckleberry	<i>Gaylussacia baccata</i>	18 inches	Small shrub	4	100
E	Meadow Phlox	<i>Phlox maculata</i>	1 quart	Herbaceous plant	4	8
F	Sundial Lupine	<i>Lupinus perennis</i>	1 quart	Herbaceous plant	8	16
G	Gayfeather	<i>Liatris spicata</i>	1 quart	Herbaceous plant	4	8
Actual Total Credit: 507 SF						
Notes: This garden works best in areas that are not exposed to extreme sun or wind and where there are already some existing canopy species.						

Plan 6: 650 SF (Wet) Turtles Repose Garden

The plants in this garden grow well in moist areas. Turtles are attracted to moist shady areas because these environments help them to regulate their body temperature. Turtles benefit from natural leaf mulch, so leaving this garden "natural" in the fall will provide the best turtle habitat in the spring and summer.

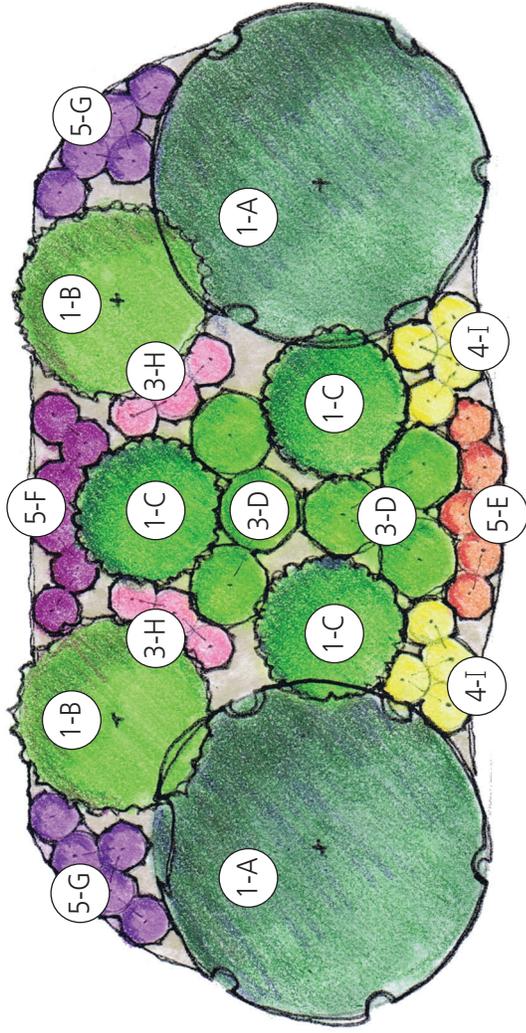


Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	American Sycamore	<i>Platanus occidentalis</i>	¾-inch caliper	Canopy tree	1	100
B	Red Maple	<i>Acer rubrum</i>	¾-inch caliper	Canopy tree	2	200
C	Winterberry	<i>Ilex verticillata</i>	3 feet	Large shrub	4	200
D	Lowbush Blueberry	<i>Vaccinium angustifolium</i>	18 inches	Small shrub	4	100
E	Wild Geranium	<i>Geranium maculatum</i>	1 quart	Herbaceous plant	6	12
F	False Blue Indigo	<i>Baptisia australis</i>	1 quart	Herbaceous plant	7	14
G	Virginia Spiderwort	<i>Tradescantia virginiana</i>	1 quart	Herbaceous plant	12	24
Actual Total Credit: 650 SF						

Notes: Add one Red Maple to increase the credit of this garden to 750 square feet or add two to increase it to 850 square feet. An alternative to False Blue Indigo is Virginia Bluebells (*Mertensia virginica*), which may bloom more in shady conditions.

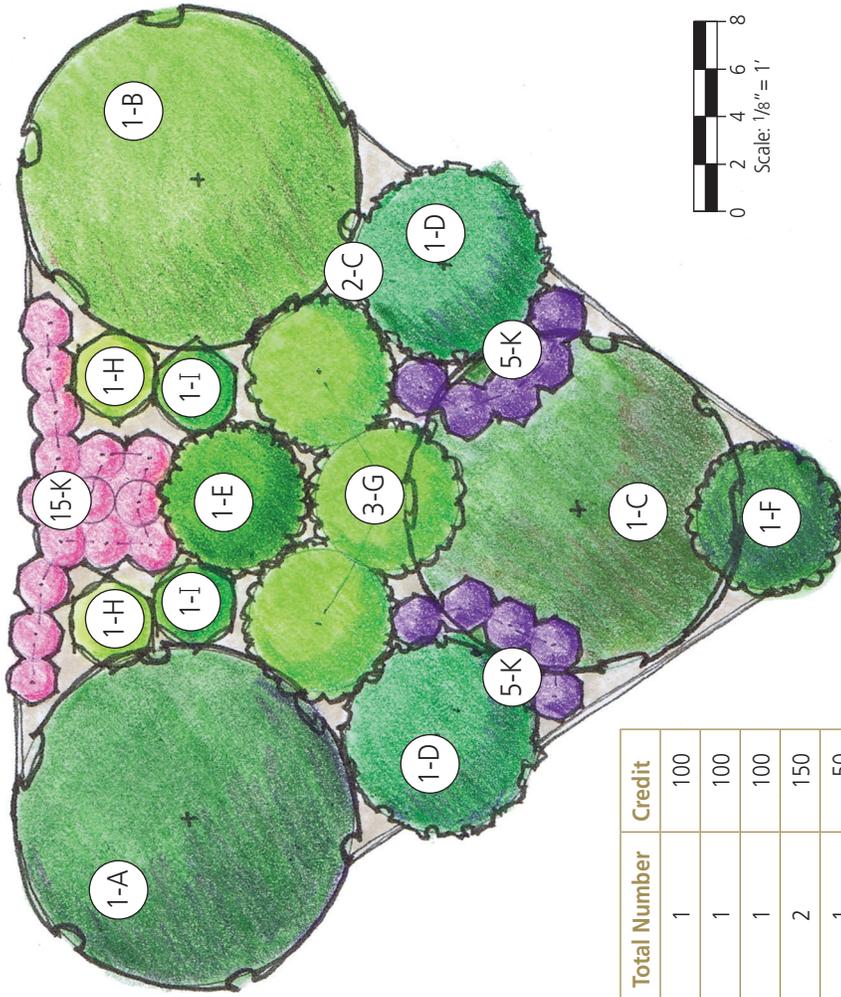
Plan 7: 700 SF (Partial to Full Sun) Sweet Sensations Butterfly Garden

This garden will bring a variety of butterflies to your yard, as well as provide beautiful flowers throughout the spring and summer. The mix of colors, shapes, and sizes of the flowers, and the long blooming time of these hardy perennials, will enhance any Buffer area.



Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Chestnut Oak	<i>Quercus prinus</i>	¾-inch caliper	Canopy tree	2	200
B	Eastern Redbud	<i>Cercis canadensis</i>	¾-inch caliper	Understory tree	2	150
C	Sweet Pepperbush	<i>Clethra alnifolia</i>	3 feet	Large shrub	3	150
D	Dense St. John's Wort	<i>Hypericum densifolium</i>	18 inches	Small shrub	6	150
E	Butterfly Flower	<i>Asclepias tuberosa</i>	1 quart	Herbaceous plant	5	10
F	Summer Phlox	<i>Phlox paniculata</i>	1 quart	Herbaceous plant	5	10
G	Stiff-leaf Aster	<i>Ionactis linariifolius</i>	1 quart	Herbaceous plant	10	20
H	Joe-Pye Weed	<i>Eupatorium dubium</i>	1 quart	Herbaceous plant	6	12
I	Tall Coreopsis	<i>Coreopsis tripteris</i>	1 quart	Herbaceous plant	8	16
Actual Total Credit: 718 SF						

Notes: Add one Flowering Dogwood (*Cornus florida*) to increase the credit of this garden to 800 square feet. Eastern Redbuds and Flowering Dogwoods bloom in mid- to late spring.



**Plan 8: 850 SF (Sun)
Rabbit's Fancy Garden**

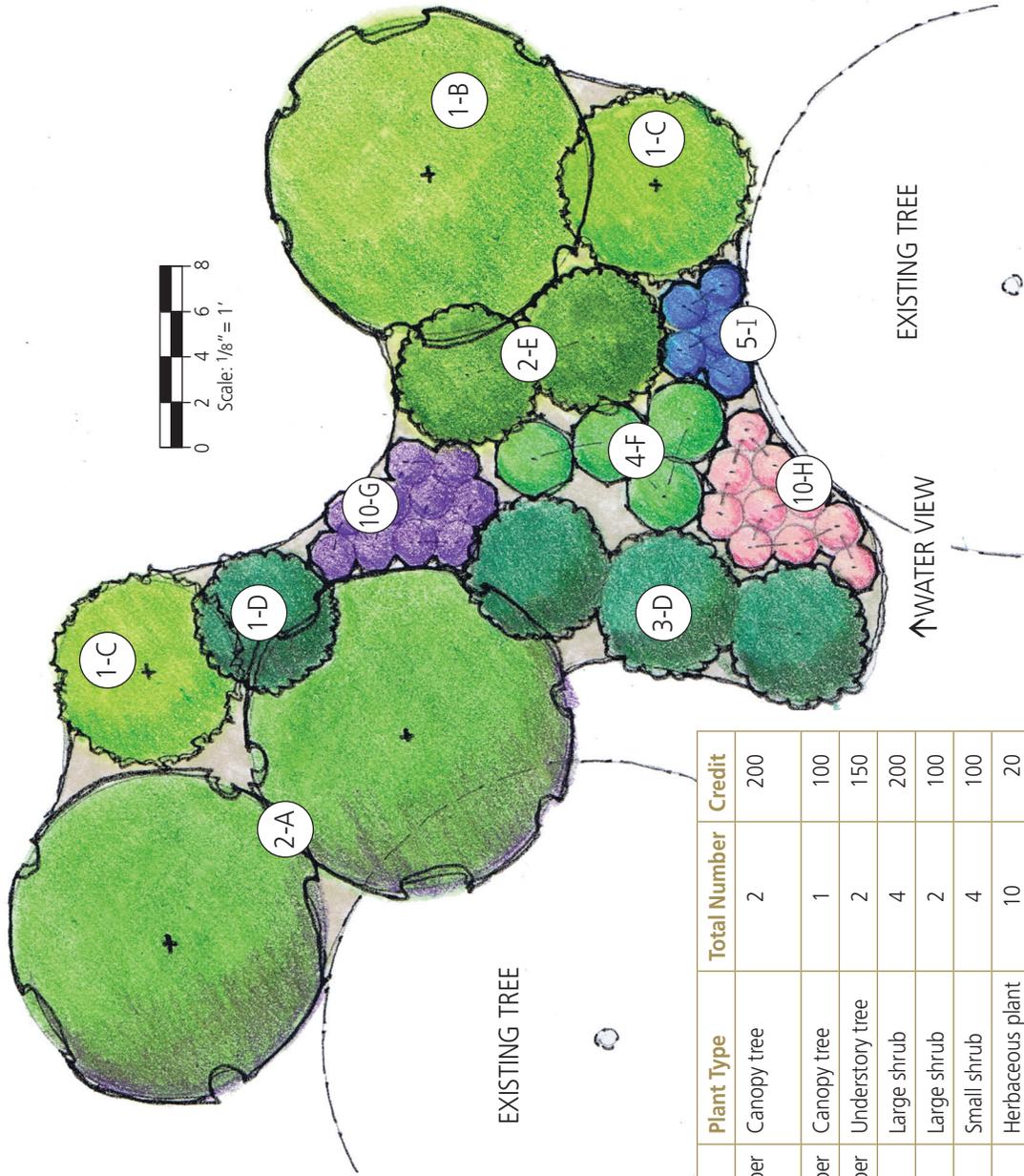
This compact garden includes a variety of plants with unique bark textures and branching patterns. The mix of canopy and understory trees combined with the large and small shrubs provide good and varied structure, which attracts birds and wildlife. The mix of colors and shapes add visual interest and work well in an existing lawn area or adjacent to existing woodlands.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Southern Red Oak	<i>Quercus falcata</i>	¾-inch caliper	Canopy tree	1	100
B	Willow Oak	<i>Quercus phellos</i>	¾-inch caliper	Canopy tree	1	100
C	Shagbark Hickory	<i>Carya ovata</i>	¾-inch caliper	Canopy tree	1	100
D	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	2	150
E	Southern Arrowwood	<i>Viburnum dentatum</i>	3 feet	Large shrub	1	50
F	Silky Dogwood	<i>Cornus amomum</i>	3 feet	Large shrub	1	50
G	Inkberry	<i>Ilex glabra</i>	3 feet	Large shrub	3	150
H	Maple-leaved Arrowwood	<i>Viburnum acerifolium</i>	18 inches	Small shrub	2	50
I	Lowbush Blueberry	<i>Vaccinium angustifolium</i>	18 inches	Small shrub	2	50
J	Plains Blazing Star	<i>Liatris squarrosa</i>	1 quart	Herbaceous plant	10	20
K	Summer Phlox	<i>Phlox paniculata</i>	1 quart	Herbaceous plant	15	30
Actual Total Credit: 850 SF						

Notes: Add another Southern Red Oak to increase credit to 950 square feet. Add the Oak and a second Willow Oak for 1,050 square feet. Dense St. John's Wort (*Hypericum densiflorum*) is a small shrub that can work well as a groundcover. It spreads easily and has bright yellow flowers.

Plan 9: 900 SF (Shade) Twilight Retreat Garden

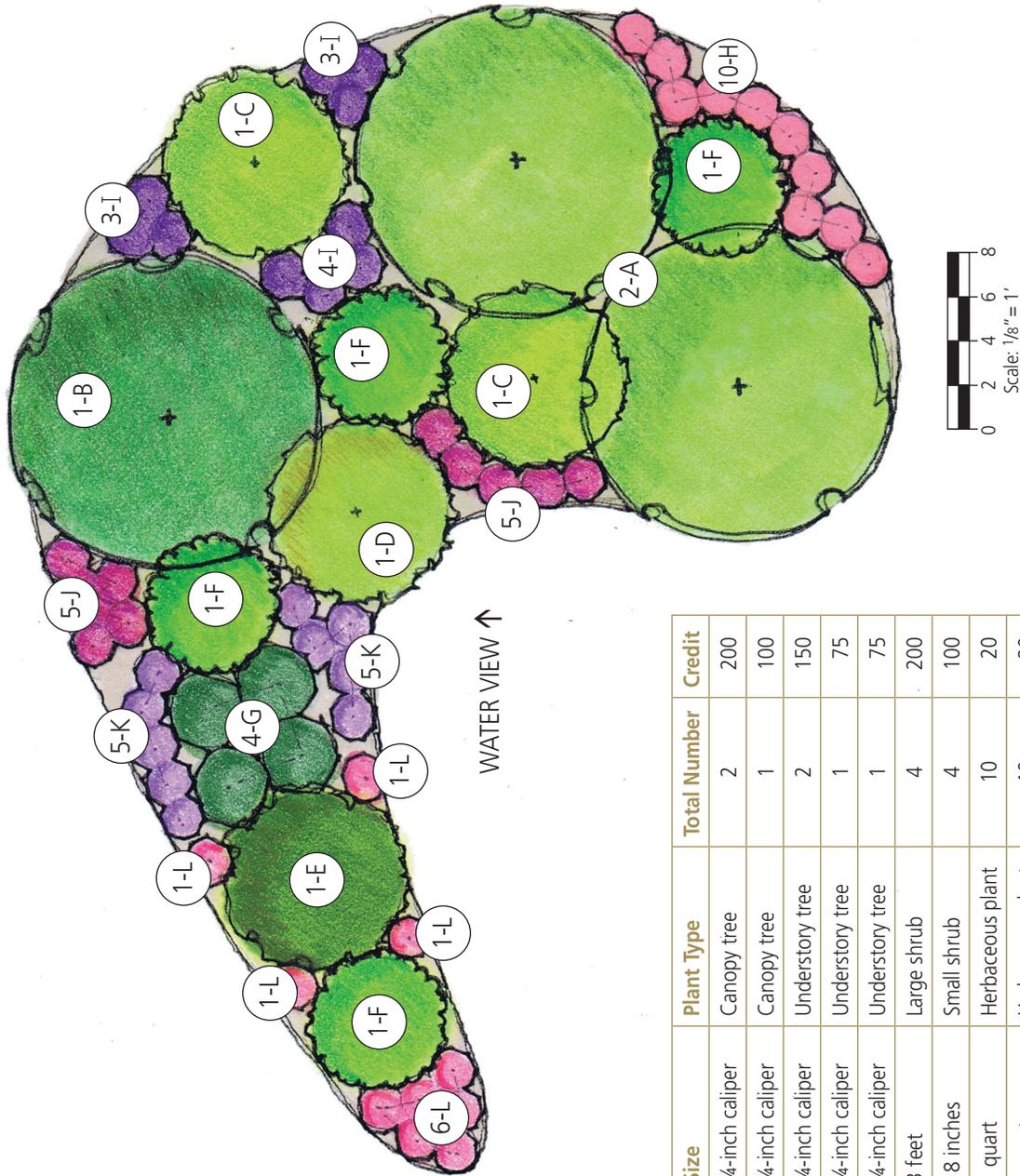
This small garden is designed for shady places, and it can be planted in areas where there may be existing large trees. The trees and shrubs in this garden work well together and provide a mix of blue and purple color. The berries on the shrubs attract birds and wildlife. The hardy shrubs can be pruned to maintain their size and shape. This garden works well in areas where you may want to maintain a view of the water.



Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Shadbush	<i>Amelanchier canadensis</i>	¾-inch caliper	Canopy tree	2	200
B	Common Hackberry	<i>Celtis occidentalis</i>	¾-inch caliper	Canopy tree	1	100
C	Eastern Redbud	<i>Cercis canadensis</i>	¾-inch caliper	Understory tree	2	150
D	Southern Bayberry	<i>Morella pensylvanica</i>	3 feet	Large shrub	4	200
E	Beach Plum	<i>Prunus maritima</i>	3 feet	Large shrub	2	100
F	American Beautyberry	<i>Callicarpa americana</i>	18 inches	Small shrub	4	100
G	Virginia Spiderwort	<i>Tradescantia virginiana</i>	1 quart	Herbaceous plant	10	20
H	Virginia Waterleaf	<i>Hydrophyllum virginianum</i>	1 quart	Herbaceous plant	10	20
I	Sundial Lupine	<i>Lupinus perennis</i>	1 quart	Herbaceous plant	5	10

Actual Total Credit: 900 SF

Notes: Add another Shadbush to increase credit to 1000 square feet or add two Eastern Redbud for 1050 square feet. All of the shrub species can be pruned. Pruning should not exceed 25% of the overall shrub size.



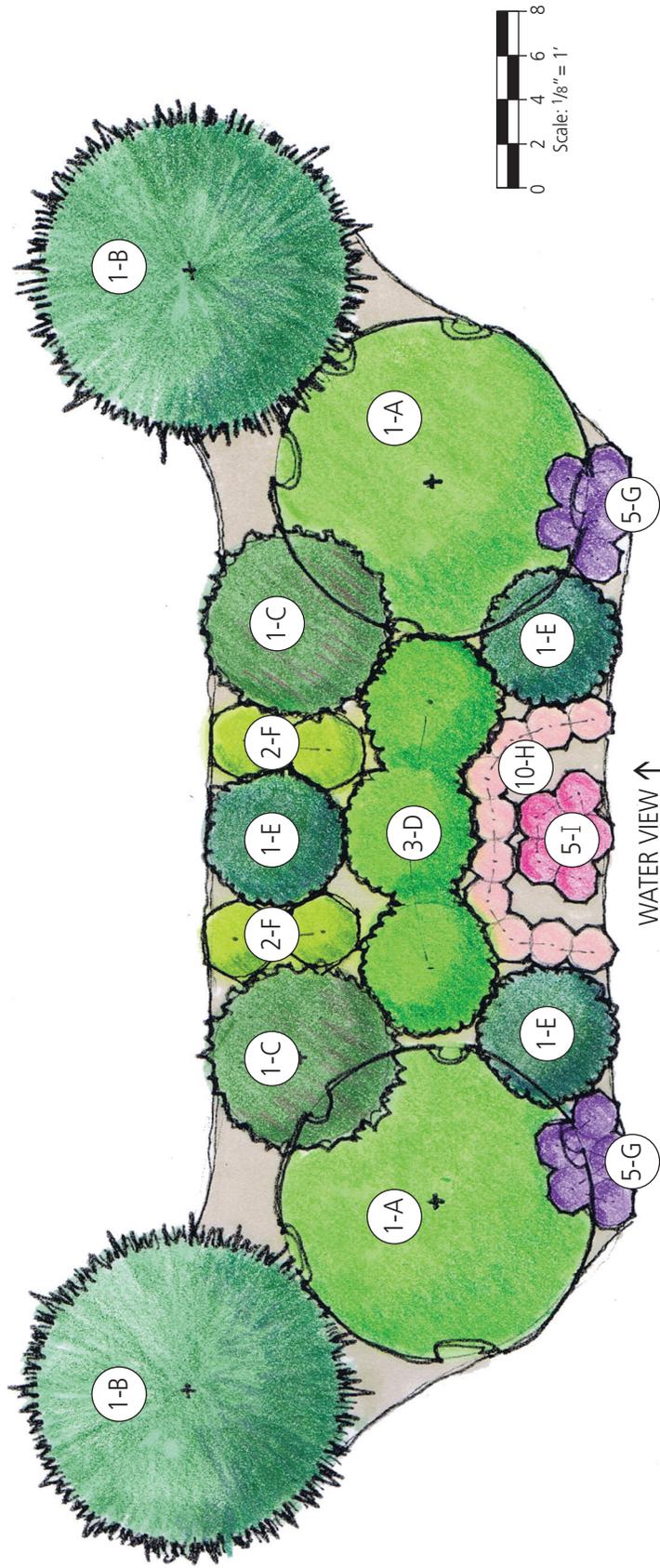
**Plan 10: 1000 SF (Dry)
Burst of Color Garden**

This garden uses a varied mix of plant species to add texture and color. The use of evergreen and deciduous shrubs provides important cover throughout the year, and the berries add color and interest. The herbaceous plants provide a dramatic burst of color with various species blooming throughout the spring and summer months.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Red Maple	<i>Acer rubrum</i>	3/4-inch caliper	Canopy tree	2	200
B	Common Hackberry	<i>Celtis occidentalis</i>	3/4-inch caliper	Canopy tree	1	100
C	Sweetbay Magnolia	<i>Magnolia virginiana</i>	3/4-inch caliper	Understory tree	2	150
D	Eastern Redbud	<i>Cercis canadensis</i>	3/4-inch caliper	Understory tree	1	75
E	American Crabapple	<i>Malus coronaria</i>	3/4-inch caliper	Understory tree	1	75
F	Inkberry	<i>Ilex glabra</i>	3 feet	Large shrub	4	200
G	Black Chokeberry	<i>Photinia melanocarpa</i>	18 inches	Small shrub	4	100
H	Meadow Phlox	<i>Phlox maculata</i>	1 quart	Herbaceous plant	10	20
I	Smooth Blue Aster	<i>Aster laevis</i>	1 quart	Herbaceous plant	10	20
J	New York Ironweed	<i>Vernonia noveboracensis</i>	1 quart	Herbaceous plant	10	20
K	Gayfeather	<i>Liatris spicata</i>	1 quart	Herbaceous plant	10	20
L	Wild Bergamot	<i>Monarda bradburiana</i>	1 quart	Herbaceous plant	10	20

Actual Total Credit: 1000 SF

Notes: Herbaceous plants can be grouped together to provide dramatic bursts of color or spread out to provide better ground coverage. Most native herbaceous plants spread and multiply easily and can be divided and used in other areas or to fill in barer spots.



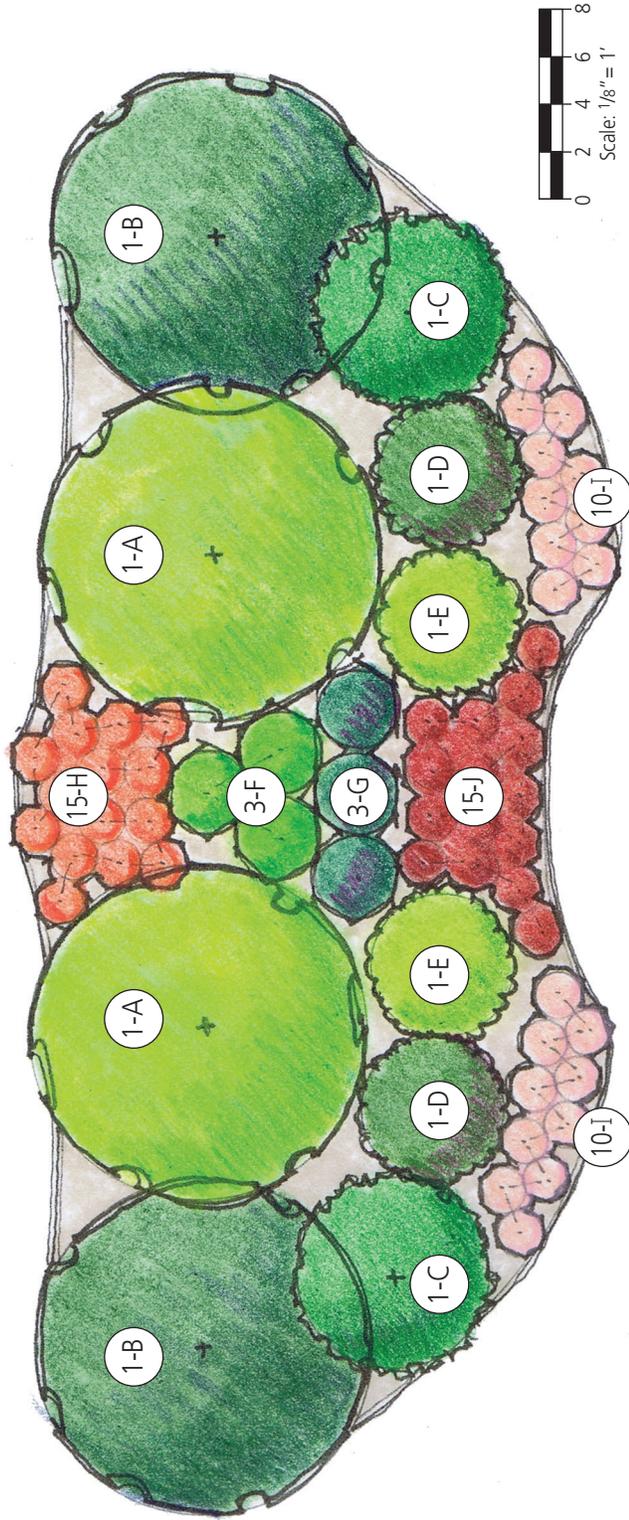
Plan 11: 1000 SF (Shade) Riverside Refuge Garden

This garden includes an interesting mix of colors and textures, and the selected species do well in moist and shady conditions. Atlantic White Cedar is an evergreen tree with somewhat feathery blue-green foliage that provides a nice backdrop for the delicate white flowers of the Gray Dogwood and Sweet Pepperbush.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Water Oak	<i>Quercus nigra</i>	¾-inch caliper	Canopy tree	2	200
B	Atlantic White Cedar	<i>Chamaecyparis thyoides</i>	¾-inch caliper	Canopy tree	2	200
C	Eastern Redbud	<i>Cercis canadensis</i>	¾-inch caliper	Understory tree	2	150
D	Gray Dogwood	<i>Cornus racemosa</i>	3 feet	Large shrub	3	150
E	Sweet Pepperbush	<i>Clethra alnifolia</i>	3 feet	Large shrub	3	150
F	Black Huckleberry	<i>Gaylussacia baccata</i>	18 inches	Small shrub	4	100
G	Virginia Spiderwort	<i>Tradescantia virginiana</i>	1 quart	Herbaceous plant	10	20
H	Foamflower	<i>Tiarella cordifolia</i>	1 quart	Herbaceous plant	10	20
I	Common Marsh-pink	<i>Sabatia angularis</i>	1 quart	Herbaceous plant	5	10

Actual Total Credit: 1000 SF

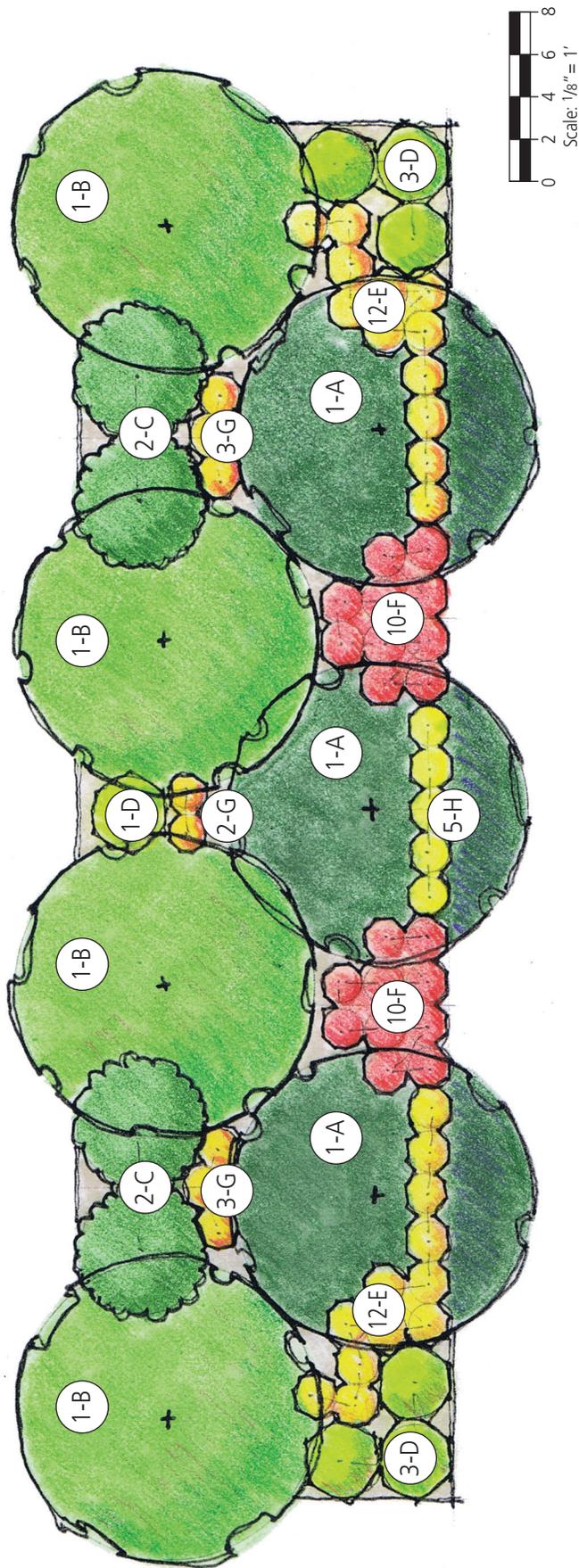
Notes: The Atlantic White Cedars can be replaced with Eastern Red Cedars (*Juniperus virginiana*) or Virginia Pines (*Pinus virginiana*). Evergreen species are important for wildlife as they provide cover and protection during the winter months.



**Plan 12: 1000 SF (Partial to Full Sun)
Hummingbirds' Delight Garden**

This garden is designed for sunny or partially sunny areas and includes species that are known to attract a variety of birds and butterflies. This garden can play an important role in preserving native plants by attracting pollinators. Pollinators are species that fertilize plants while moving from flower to flower in search of nectar, pollen, or materials to build a nest. Bees, moths, butterflies, and hummingbirds are common pollinators that you may see when you plant this garden.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Red Maple	<i>Acer rubrum</i>	¾-inch caliper	Canopy tree	2	200
B	Black Gum	<i>Nyssa sylvatica</i>	¾-inch caliper	Canopy tree	2	200
C	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	2	150
D	Silky Dogwood	<i>Cornus amomum</i>	3 feet	Large shrub	2	100
E	Smooth Winterberry	<i>Ilex laevigata</i>	3 feet	Large shrub	2	100
F	Black Chokeberry	<i>Photinia melanocarpa</i>	18 inches	Small shrub	3	75
G	Steeplebush	<i>Spiraea tomentosa</i>	18 inches	Small shrub	3	75
H	Butterfly Flower	<i>Asclepia tuberosa</i>	1 quart	Herbaceous plant	15	30
I	Wild Bergamot	<i>Monarda bradburiana</i>	1 quart	Herbaceous plant	20	40
J	Beebalm	<i>Monarda didyma</i>	1 quart	Herbaceous plant	15	30
Actual Total Credit: 1000 SF						
Notes: Wood Lily (<i>Lilium philadelphicum</i>) is another herbaceous plant that attracts pollinators.						



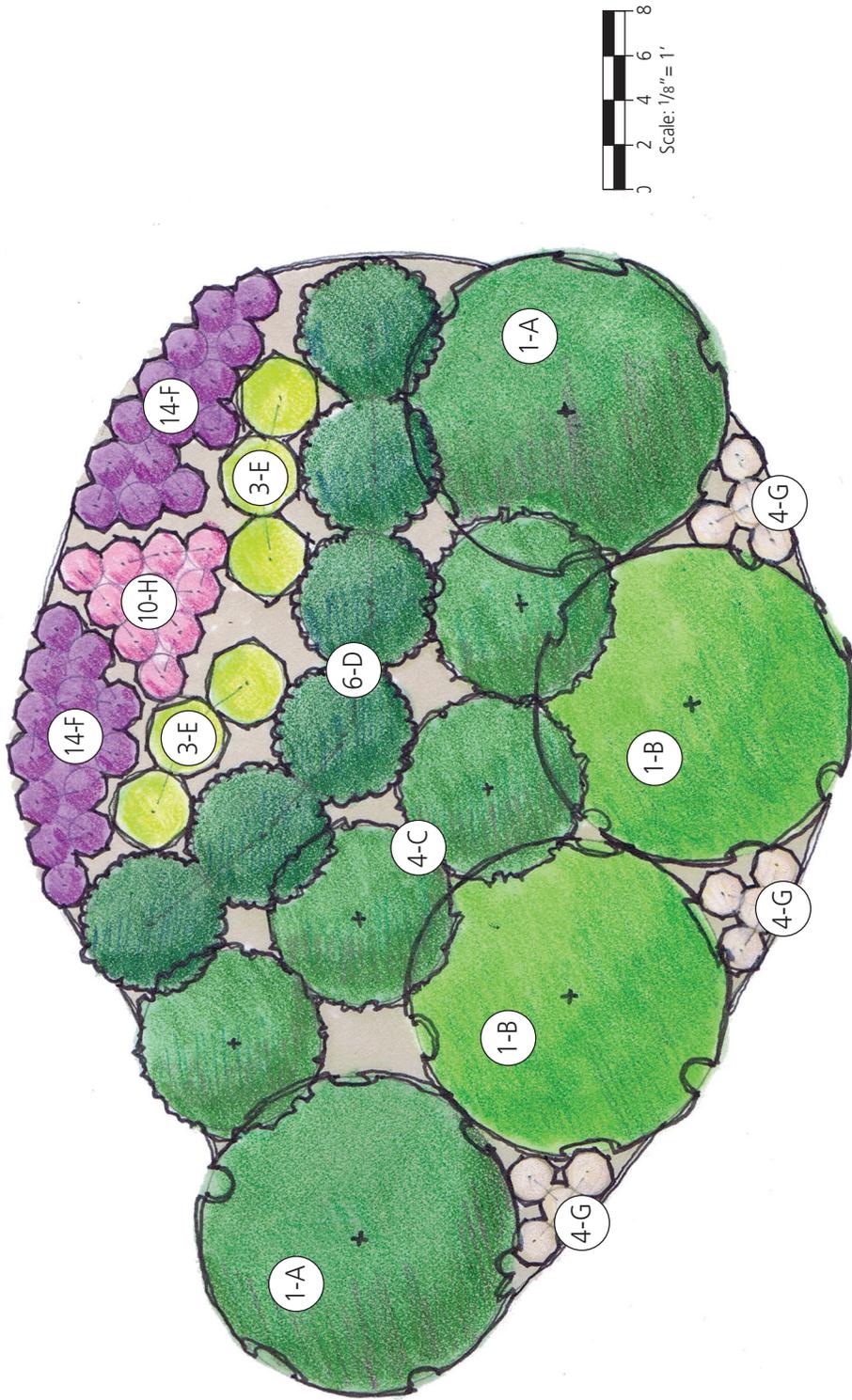
Plan 13: 1150 SF (Sun)

Quail's Content Hedgerow Garden

This linear garden is perfect for planting along property lines, lawn edges, fences, or areas adjacent to swales, ditches, or streams. The mix of species provides different levels of vegetation that are desirable to a variety of bird species. The yellow flowers of the Maryland Wild Senna and the orange flowers of the Butterfly Flower are showy and bright and can provide color from May through August.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Willow Oak	<i>Quercus phellos</i>	¾" caliper	Canopy tree	3	300
B	Green Hawthorn	<i>Crataegus viridis</i>	¾" caliper	Canopy tree	4	400
C	Winterberry	<i>Ilex verticillata</i>	3 feet	Large shrub	4	200
D	Dense St. John's Wort	<i>Hypericum densiflorum</i>	18 inches	Small shrub	7	175
E	Maryland Wild Senna	<i>Senna marilandica</i>	1 quart	Herbaceous plant	24	48
F	Butterfly Flower	<i>Asclepias tuberosa</i>	1 quart	Herbaceous plant	20	40
G	Old-Field Goldenrod	<i>Solidago nemoralis</i>	1 quart	Herbaceous plant	8	16
H	Common Sneezeweed	<i>Helenium autumnale</i>	1 quart	Herbaceous plant	5	10
Actual Total Credit: 1189 SF						

Notes: Add four Dangleberry (*Gaylussacia frondosa*) to increase the square footage credit to approximately 1250 square feet and greatly enhance the wildlife value of this garden.



**Plan 14: 1250 SF (Wet or Low Areas)
Frog's Leap Garden**

This garden is perfect for low-lying or wet areas. The plants prefer moist conditions and can tolerate saturated soils. If you have a low area in your yard or have an area that collects rooftop or driveway runoff, this garden may be perfect for that location. The species and conditions in this garden provide excellent habitat for amphibians, like frogs and salamanders.

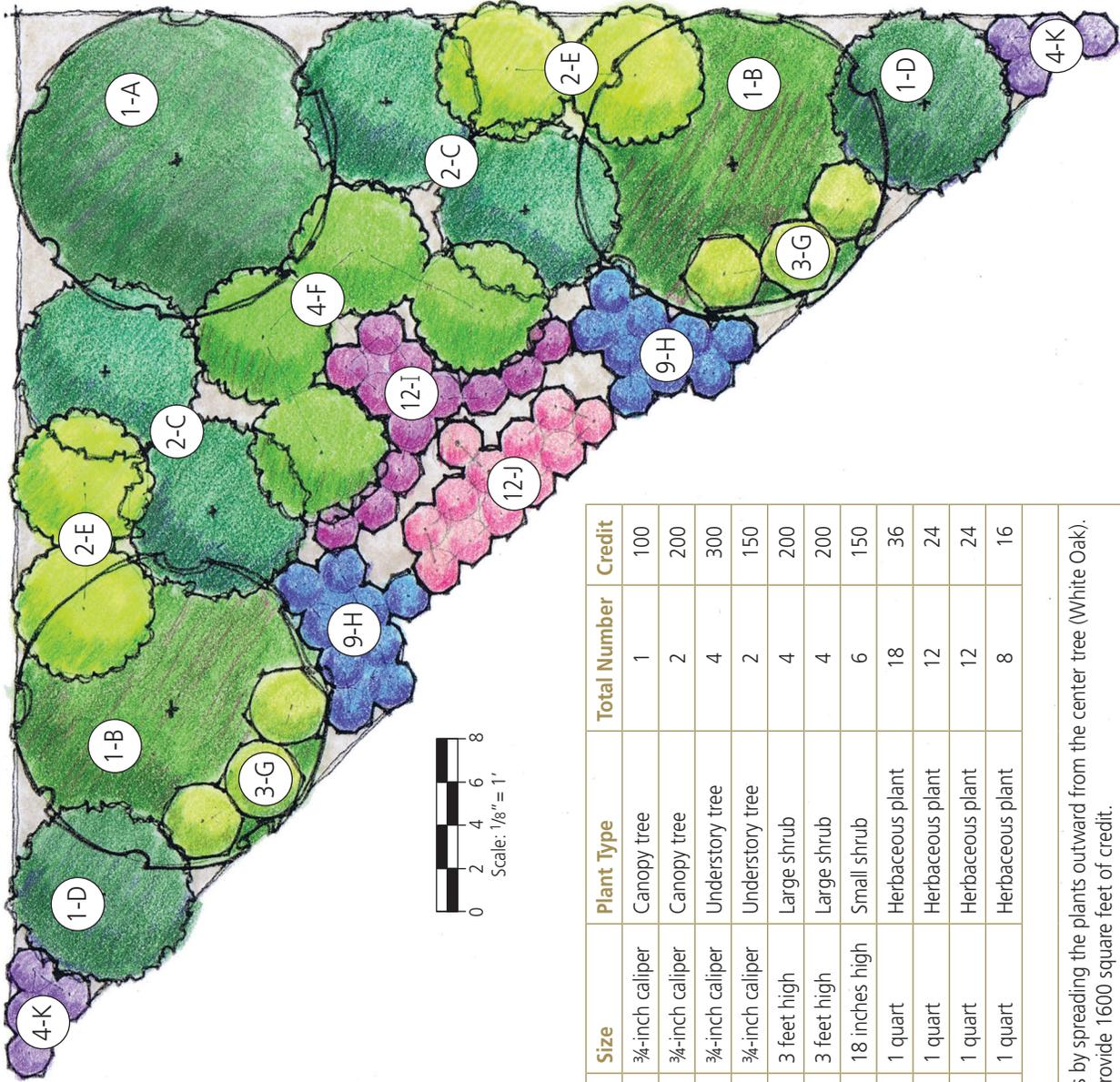
Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	River Birch	<i>Betula nigra</i>	¾-inch caliper	Canopy tree	2	200
B	American Hornbeam	<i>Carpus caroliniana</i>	¾-inch caliper	Canopy tree	2	200
C	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	4	300
D	Sweet Pepperbush	<i>Clethra alnifolia</i>	3 feet	Large shrub	6	300
E	Dangleberry	<i>Gaylussacia frondosa</i>	18 inches	Small shrub	6	150
F	Carolina Wild Petunia	<i>Ruellia caroliniensis</i>	1 quart	Herbaceous plant	28	56
G	Joe-Pye Weed	<i>Eupatorium dubium</i>	1 quart	Herbaceous plant	12	24
H	White Turtlehead	<i>Chelone glabra</i>	1 quart	Herbaceous plant	10	20

Actual Total Credit: 1250 SF

Notes: This garden can easily be modified to function as a rain garden by creating a 6- inch to 8- inch depression where the herbaceous plants are located and incorporating herbaceous emergent species (wetland type plants) such as Virginia Blue Flag (*Iris virginica*) and Pickerelweed (*Pontederia cordata*) in the areas where water ponds.

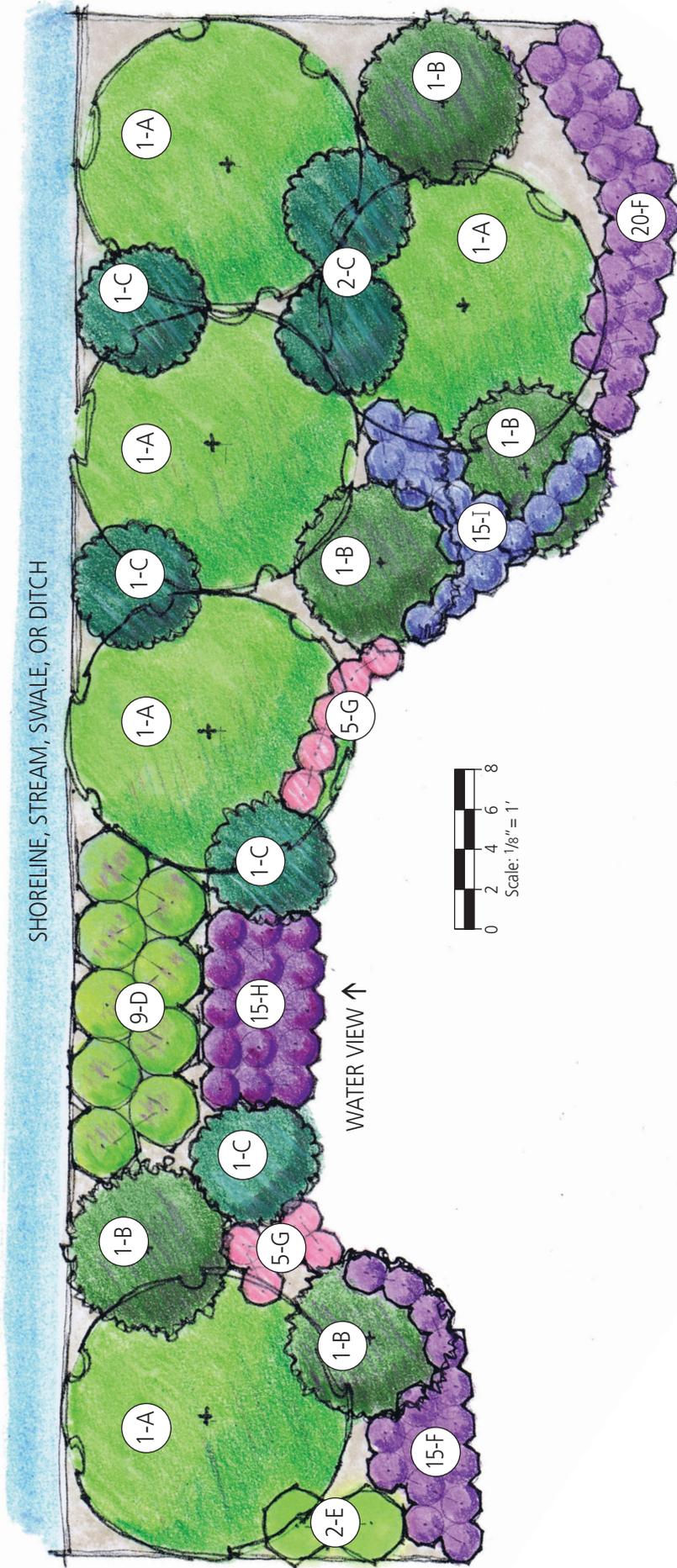
Plan 15: 1400 SF (Shade) Corner Cottage Garden

This compact corner garden works well in a corner of your property or at the water's edge, and it can also be used to create defined outdoor "spaces" for different activities. The mix of large canopy trees and understory trees can create a shady area for relaxing and eating outdoors. The variety of leaf and branch colors, shapes, and textures will enhance any backyard.



Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	White Oak	<i>Quercus alba</i>	¾-inch caliper	Canopy tree	1	100
B	Serviceberry	<i>Amelanchier canadensis</i>	¾-inch caliper	Canopy tree	2	200
C	Eastern Redbud	<i>Cercis canadensis</i>	¾-inch caliper	Understory tree	4	300
D	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	2	150
E	Smooth Winterberry	<i>Ilex laevigata</i>	3 feet high	Large shrub	4	200
F	Silky Dogwood	<i>Cornus amomum</i>	3 feet high	Large shrub	4	200
G	Maple-leaved Arrowwood	<i>Viburnum acerifolium</i>	18 inches high	Small shrub	6	150
H	Heart-leaved Aster	<i>Symphotrichum cordifolium</i>	1 quart	Herbaceous plant	18	36
I	Carolina Wild Petunia	<i>Ruellia caroliniensis</i>	1 quart	Herbaceous plant	12	24
J	Summer Phlox	<i>Phlox paniculata</i>	1 quart	Herbaceous plant	12	24
K	Hedge Nettle	<i>Stachys tenuifolia</i>	1 quart	Herbaceous plant	8	16
Actual Total Credit: 1400 SF						

Notes: This garden can be adjusted to fit a variety of corner locations by spreading the plants outward from the center tree (White Oak). Adding two more White Oaks on either side of the center tree will provide 1600 square feet of credit.



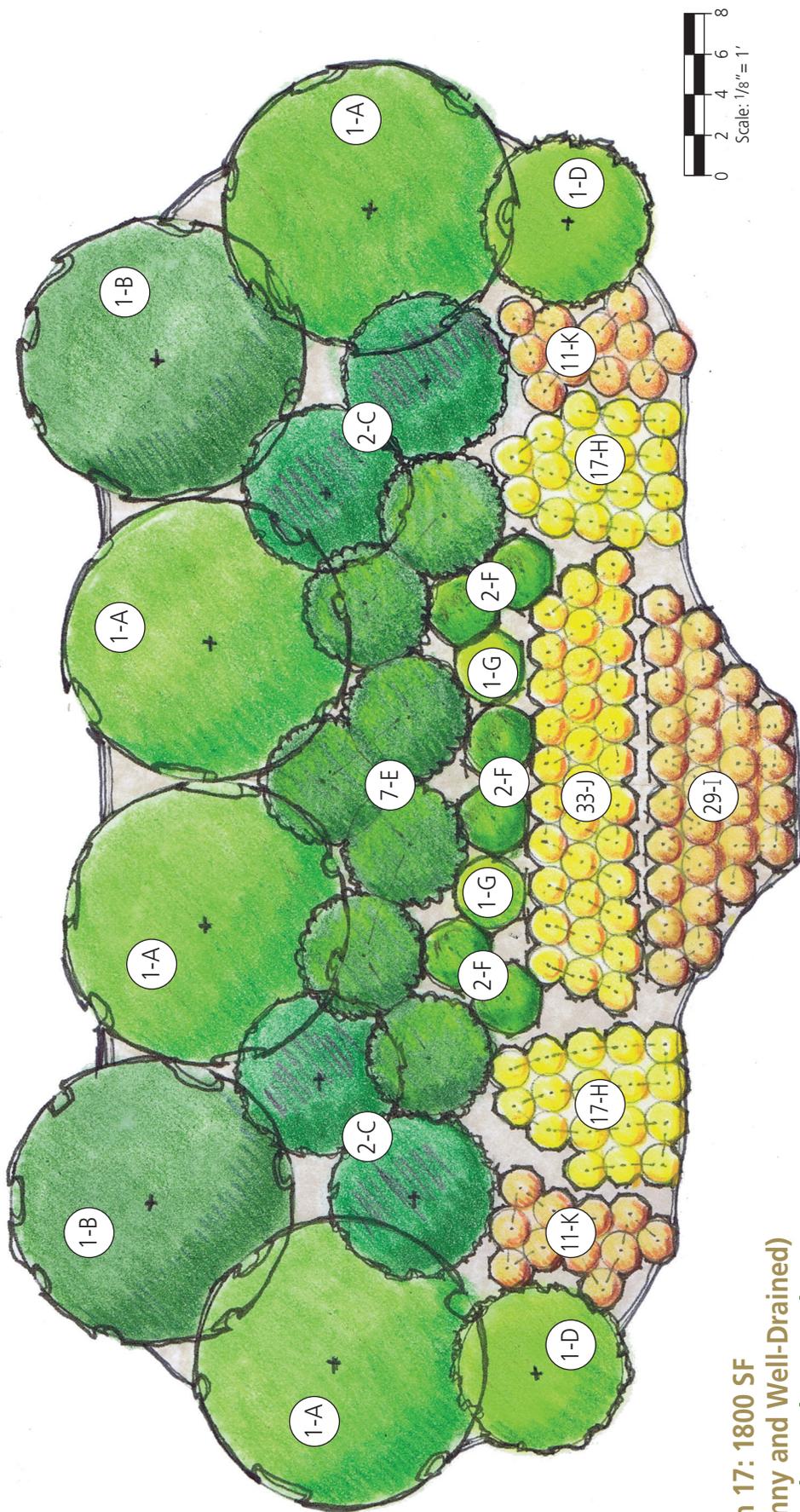
**Plan 16: 1600 SF (Sun)
Bountiful Border Garden**

This linear garden makes a wonderful border when planted along a shoreline, wetland edge, or stream bank. The varied structure of the species and the use of semi-evergreen and deciduous species provide a variety of benefits including nutrient uptake, soil stabilization, and enhanced infiltration of stormwater. This border garden can also be planted adjacent to a swale or ditch, which can help to stabilize the drainageway, reduce flooding, and filter sediment and debris.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	American Beech	<i>Fagus grandifolia</i>	¾-inch caliper	Canopy tree	5	500
B	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	5	375
C	Inkberry	<i>Ilex glabra</i>	3 feet	Large shrub	6	300
D	Sheep Laurel	<i>Kalmus angustifolia</i>	18 inches	Small shrub	9	225
E	Lowbush Blueberry	<i>Vaccinium angustifolium</i>	18 inches	Small shrub	2	50
F	New England Aster	<i>Symphotrichum novae-angliae</i>	1 quart	Herbaceous plant	35	70
G	Narrow-leaved Mountain Mint	<i>Pycnanthemum tenuifolium</i>	1 quart	Herbaceous plant	10	20
H	Gayfeather	<i>Liatris spicata</i>	1 quart	Herbaceous plant	15	30
I	False Blue Indigo	<i>Baptisia australis</i>	1 quart	Herbaceous plant	15	30

Actual Total Credit: 1600 SF

Notes: If the area to be planted stays moist or wet or can be watered easily, native iris species including Blue Flag Iris (*Iris versicolor*), Slender Blue Flag (*Iris prismatica*), and Virginia Blue Flag (*Iris virginica*) can survive in fresh to moderately brackish areas. If the area to be planted is along a shoreline and is regularly exposed to salt water, replace the American Beech with Red Maple (*Acer rubrum*) and five of the Sheep Laurel (at the shoreline) with Southern Bayberry. This will increase the credit to 1725 square feet.

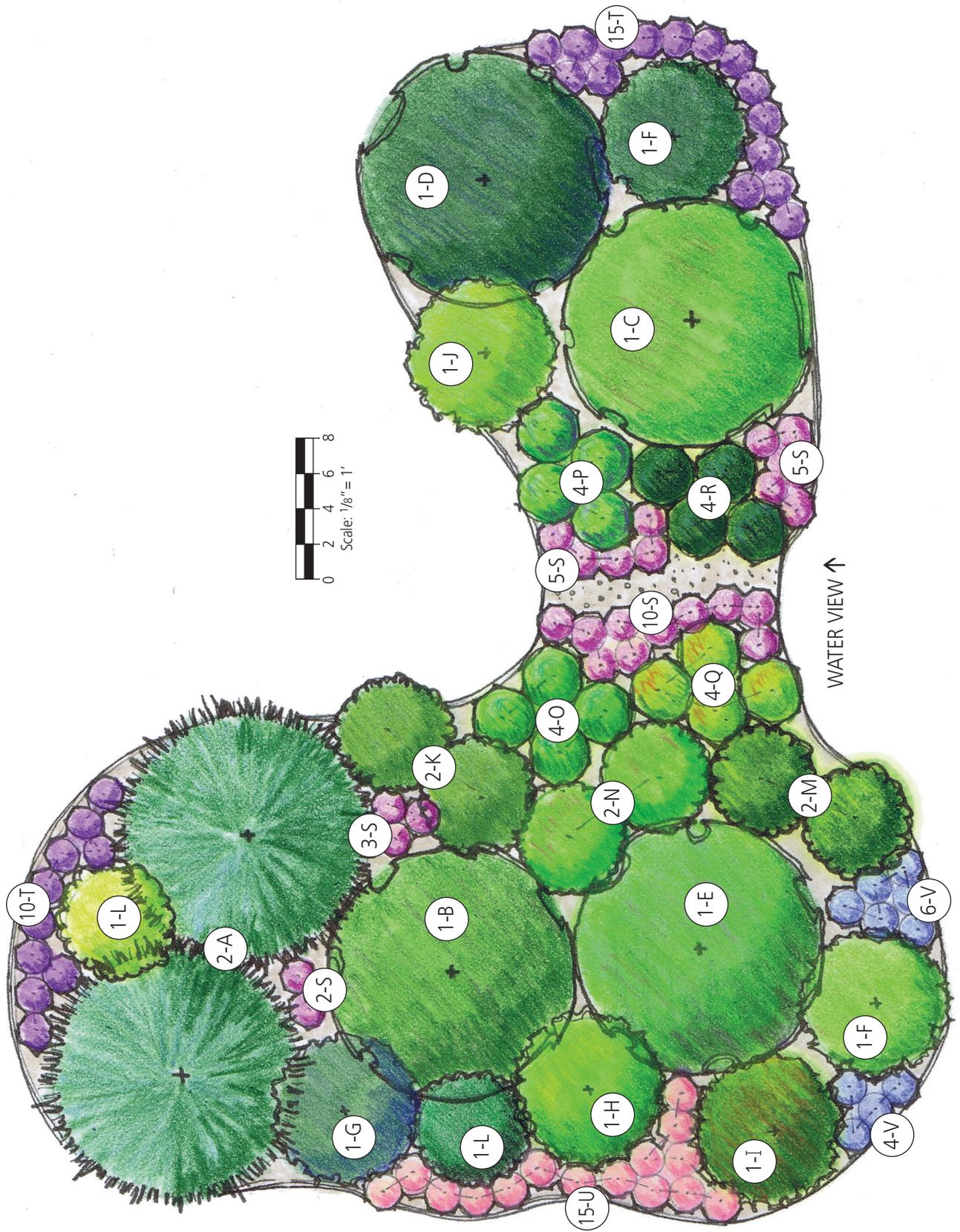


Plan 17: 1800 SF (Sunny and Well-Drained) Mixed Meadow Garden

Planting a Buffer garden in drier, sunny areas that have well-drained soils provides opportunities to use a variety of grasses that are attractive because of the unique and varied texture and their different appearance in the fall and winter. Because many grasses grow in clumps, this garden also creates habitat for species that tend to prefer dense meadow cover. Native grasses provide significant water quality benefits because of their deep and fibrous root systems that take up nutrients and stabilize soil. Turf grass does not provide these benefits because of its small, fine stems and shallow root system.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Southern Red Oak	<i>Quercus falcata</i>	¾-inch caliper	Canopy tree	4	400
B	Common Persimmon	<i>Diospyros virginiana</i>	¾-inch caliper	Canopy tree	2	200
C	Eastern Redbud	<i>Cercis canadensis</i>	¾-inch caliper	Understory tree	4	300
D	White Fringetree	<i>Chionanthus virginicus</i>	¾-inch caliper	Understory tree	2	150
E	Southern Bayberry	<i>Morella cerifera</i>	3 feet	Large shrub	7	350
F	Deerberry	<i>Vaccinium stamineum</i>	3 feet	Small shrub	6	150
G	Steeplebush	<i>Spiraea tomentosa</i>	18 inches	Small shrub	2	50
H	Big Bluestem	<i>Andropogon gerardii</i>	1 quart	Grass	34	68
I	Broomsedge	<i>Andropogon virginicus</i>	1 quart	Grass	29	58
J	Redtop	<i>Tridens flavus</i>	1 quart	Grass	33	66
K	Little Bluestem	<i>Andropogon scoparius</i>	1 quart	Grass	22	44
Actual Total Credit: 1836 SF						

Notes: If you want a mix of flowers and grasses, replace some of the grasses with sun-loving herbaceous plants that do well in field environments, such as Black-eyed Susans (*Rudbeckia hirta*), Wild Bergamot (*Monarda bradburiana*), or Plains Blazing Star (*Liatris squarrosa*).



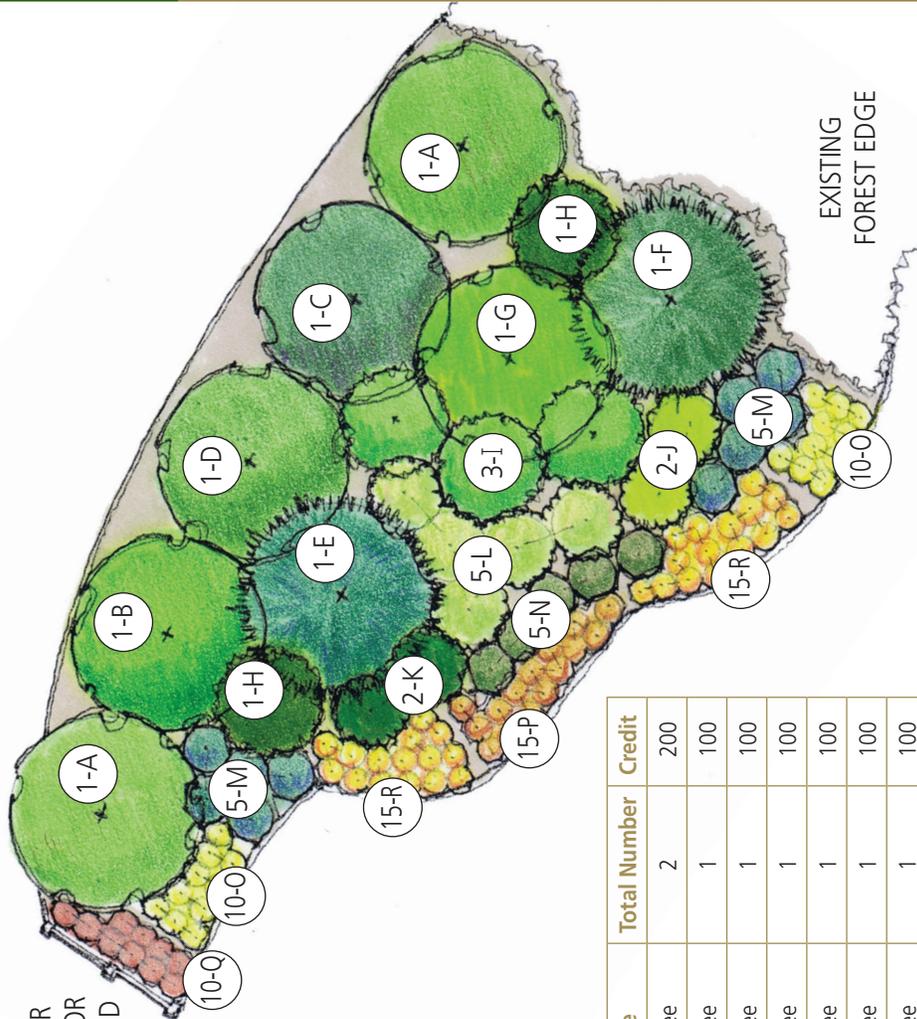
Plan 18: 2000 SF (Shoreline Sun) Four Seasons Garden

This garden is designed to have blooms and berries along with varied leaf colors and textures throughout the year. A wide variety of species and plant types were selected so that each season presents different focal points. Several of the tree species have interesting bark colors and textures, and the Eastern Red Cedars are evergreen with dark needles. Eastern Red Cedars also produce pale green to dark blue berries and adapt well to a variety of growing conditions. Many of the species bloom in the spring, and others produce berries in late summer and fall.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Eastern Red Cedar	<i>Juniperus virginiana</i>	¾-inch caliper	Canopy tree	2	200
B	American Sycamore	<i>Platanus occidentalis</i>	¾-inch caliper	Canopy tree	1	100
C	Flowering Dogwood	<i>Cornus florida</i>	¾-inch caliper	Canopy tree	1	100
D	River Birch	<i>Betula nigra</i>	¾-inch caliper	Canopy tree	1	100
E	Red Maple	<i>Acer rubrum</i>	¾-inch caliper	Canopy tree	1	100
F	Eastern Redbud	<i>Cercis canadensis</i>	¾-inch caliper	Understory tree	2	150
G	Paw-paw	<i>Asimina triloba</i>	¾-inch caliper	Understory tree	1	75
H	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	1	75
I	White Fringetree	<i>Chionanthus virginicus</i>	¾-inch caliper	Understory tree	1	75
J	American Crabapple	<i>Malus coronaria</i>	¾-inch caliper	Understory tree	1	75
K	Naked Witherod	<i>Viburnum nudum</i>	3 feet	Large shrub	2	100
L	Southern Bayberry	<i>Morella carolinensis</i>	3 feet	Large shrub	2	100
M	Smooth Sumac	<i>Rhus glabra</i>	3 feet	Large shrub	2	100
N	Deerberry	<i>Vaccinium stamineum</i>	3 feet	Large shrub	2	100
O	American Beautyberry	<i>Callicarpa americana</i>	18 inches	Small shrub	4	100
P	Black Chokeberry	<i>Photinia melanocarpa</i>	18 inches	Small shrub	4	100
Q	Maple-leaved Arrowwood	<i>Viburnum acerifolium</i>	18 inches	Small shrub	4	100
R	New Jersey Tea	<i>Ceanothus americanus</i>	18 inches	Small shrub	4	100
S	New England Aster	<i>Symphotrichum novae-angliae</i>	1 quart	Herbaceous plant	25	50
T	Helmet Flower	<i>Scutellaria integrifolia</i>	1 quart	Herbaceous plant	25	50
U	Narrow-leaved Mountain Mint	<i>Pycnanthemum tenuifolium</i>	1 quart	Herbaceous plant	15	30
V	Beardtongue	<i>Penstemon digitalis</i>	1 quart	Herbaceous plant	10	20
Actual Total Credit: 2000 SF						

Notes: If you want a mix of flowers and grasses, replace some of the flowers with shade tolerant grasses such as Virginia Wild Rye (*Elymus virginicus*) or River Oats (*Chasmanthium latifolium*).

FENCE OR
ARBOR FOR
VINES AND
PERCH



Plan 19: 2150 SF (Mixed Sun and Shade) Songbird Garden

Maryland has a wide variety of native songbirds that rely on forests in the Critical Area. In this garden, the trees are planted next to existing forest to expand the canopy cover. Many songbird species require large expanses of continuous forest to nest and breed. The shrubs, vines, flowers, and grasses provide nesting locations, food, and protection from predators. Different bird species require different types of food at different times, so using a variety of species is important. Fruit and seed bearing trees, shrubs, and herbaceous plants, as well as species that provide winter cover, ensure that this garden provides essential habitat elements all year round.

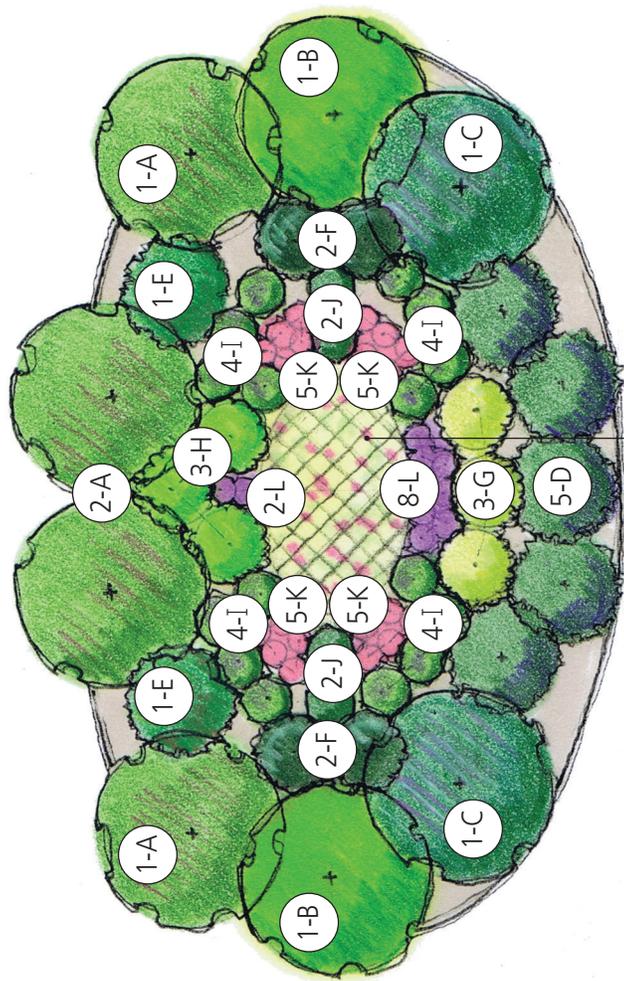
Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Pin Oak	<i>Quercus palustris</i>	¾-inch caliper	Canopy tree	2	200
B	Red Maple	<i>Acer rubrum</i>	¾-inch caliper	Canopy tree	1	100
C	Flowering Dogwood	<i>Cornus florida</i>	¾-inch caliper	Canopy tree	1	100
D	River Birch	<i>Betula nigra</i>	¾-inch caliper	Canopy tree	1	100
E	American Holly	<i>Ilex opaca</i>	¾-inch caliper	Canopy tree	1	100
F	Eastern Red Cedar	<i>Juniperus virginiana</i>	¾-inch caliper	Canopy tree	1	100
G	Shadbush	<i>Amelanchier canadensis</i>	¾-inch caliper	Canopy tree	1	100
H	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	2	150
I	American Crabapple	<i>Malus coronaria</i>	¾-inch caliper	Understory tree	3	225
J	Silky Dogwood	<i>Cornus amomum</i>	3 feet	Large shrub	2	100
K	Highbush Blueberry	<i>Vaccinium corymbosum</i>	3 feet	Large shrub	2	100
L	Black Chokeberry	<i>Aronia melanocarpa</i>	3 feet	Large shrub	5	250
M	Dense St. John's Wort	<i>Hypericum densifolium</i>	18 inches	Small shrub	10	250
N	Dangleberry	<i>Gaylussacia frondosa</i>	18 inches	Small shrub	5	125
O	Black-eyed Susan	<i>Rudbeckia herta</i>	1 quart	Herbaceous plant	20	40
P	Maryland Wild Senna	<i>Senna marilandica</i>	1 quart	Herbaceous plant	15	30
Q	Trumpet Honeysuckle	<i>Lonicera sempervirens</i>	1 quart	Vine	10	20
R	Switch Grass	<i>Panicum virgatum</i>	1 quart	Grass	30	60

Actual Total Credit: 2150 SF

Notes: This garden can work especially well when planted near a fence. The fence provides support for the Trumpet Honeysuckle, which flowers with red to coral and yellow blooms from April through October. The fence also provides a perch for songbirds.

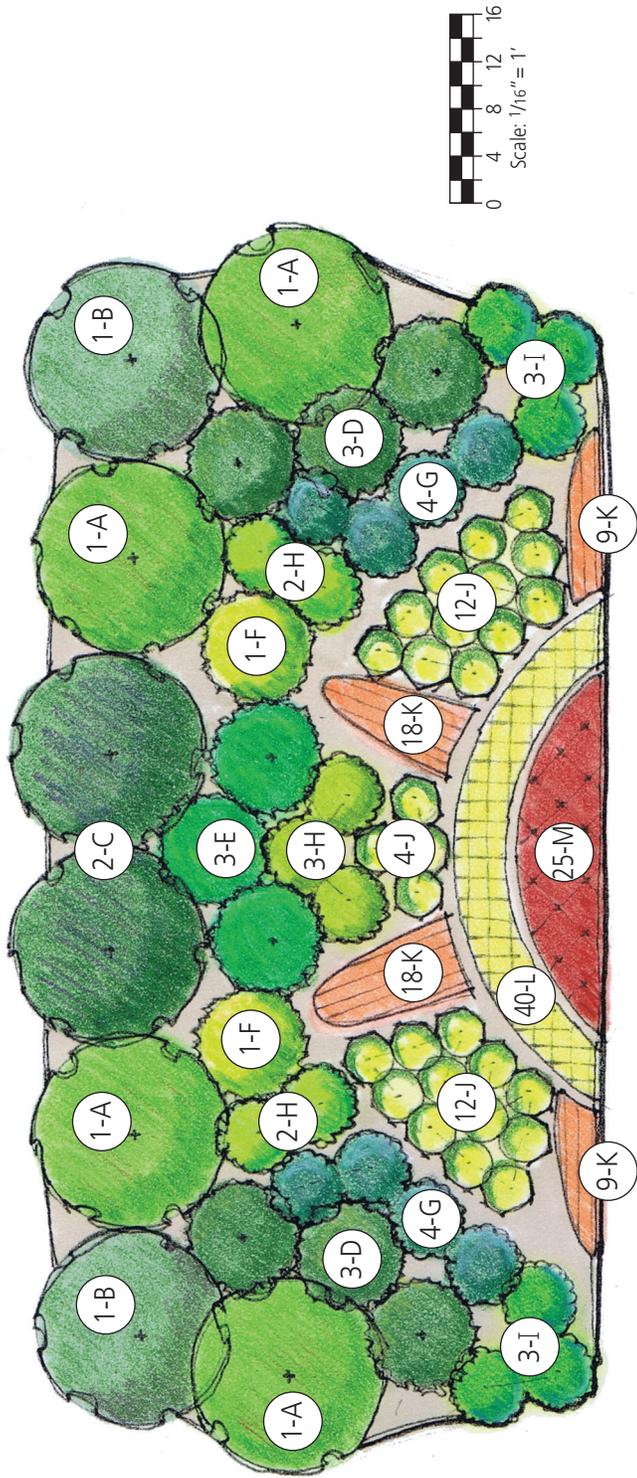
Plan 20: 2500 SF (Shade and Sun) Secret Grove Garden

This garden is designed to create a small glade of grasses and wildflowers surrounded by deciduous trees and shrubs. This garden includes a variety of tree, shrub, and herbaceous species that attract wildlife. The protected cover around the edges makes the center grassy area ideal for a variety of wildlife species. It is also a lovely area to place a bench to enjoy the tranquil surroundings. You may end up having some visitors.



Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Northern Red Oak	<i>Quercus rubra</i>	3/4-inch caliper	Canopy tree	4	400
B	Tulip Poplar	<i>Liriodendron tulipifera</i>	3/4-inch caliper	Canopy tree	2	200
C	American Holly	<i>Ilex opaca</i>	3/4-inch caliper	Canopy tree	2	200
D	Paw-paw	<i>Asimina triloba</i>	3/4-inch caliper	Understory tree	5	375
E	Eastern Redbud	<i>Cercis canadensis</i>	3/4-inch caliper	Understory tree	2	150
F	Inkberry	<i>Ilex glabra</i>	3 feet	Large shrub	4	200
G	Virginia Sweetspire	<i>Itea virginica</i>	3 feet	Large shrub	3	150
H	Witch Hazel	<i>Hamamelis virginiana</i>	3 feet	Large shrub	3	150
I	Sheep Laurel	<i>Kalmia angustifolia</i>	18 inches	Small shrub	16	400
J	Dangleberry	<i>Gaylussacia frondosa</i>	18 inches	Small shrub	4	100
K	Rose Pink	<i>Sabatia angularis</i>	1 quart	Herbaceous plant	20	40
L	Wild Geranium	<i>Geranium maculatum</i>	1 quart	Herbaceous plant	10	20
M	Smooth Blue Aster	<i>Aster laevis</i>	1 quart	Herbaceous plant	10	20
N	Autumn Bentgrass	<i>Agrostis perennans</i>	1 quart	Grass	25	50
O	Blue-eyed Grass	<i>Sisyrinchium angustifolium</i>	1 quart	Grass	25	50
Actual Total Credit: 2505 SF						

Notes: Replace the American Holly with Eastern Red Cedar to provide more cover. Replace the Paw-paw with Sweetbay Magnolia for denser cover and white flowers in the early summer. For the center meadow area, the ten asters and 50 grasses can be replaced with a grass and wildflower seed mix.



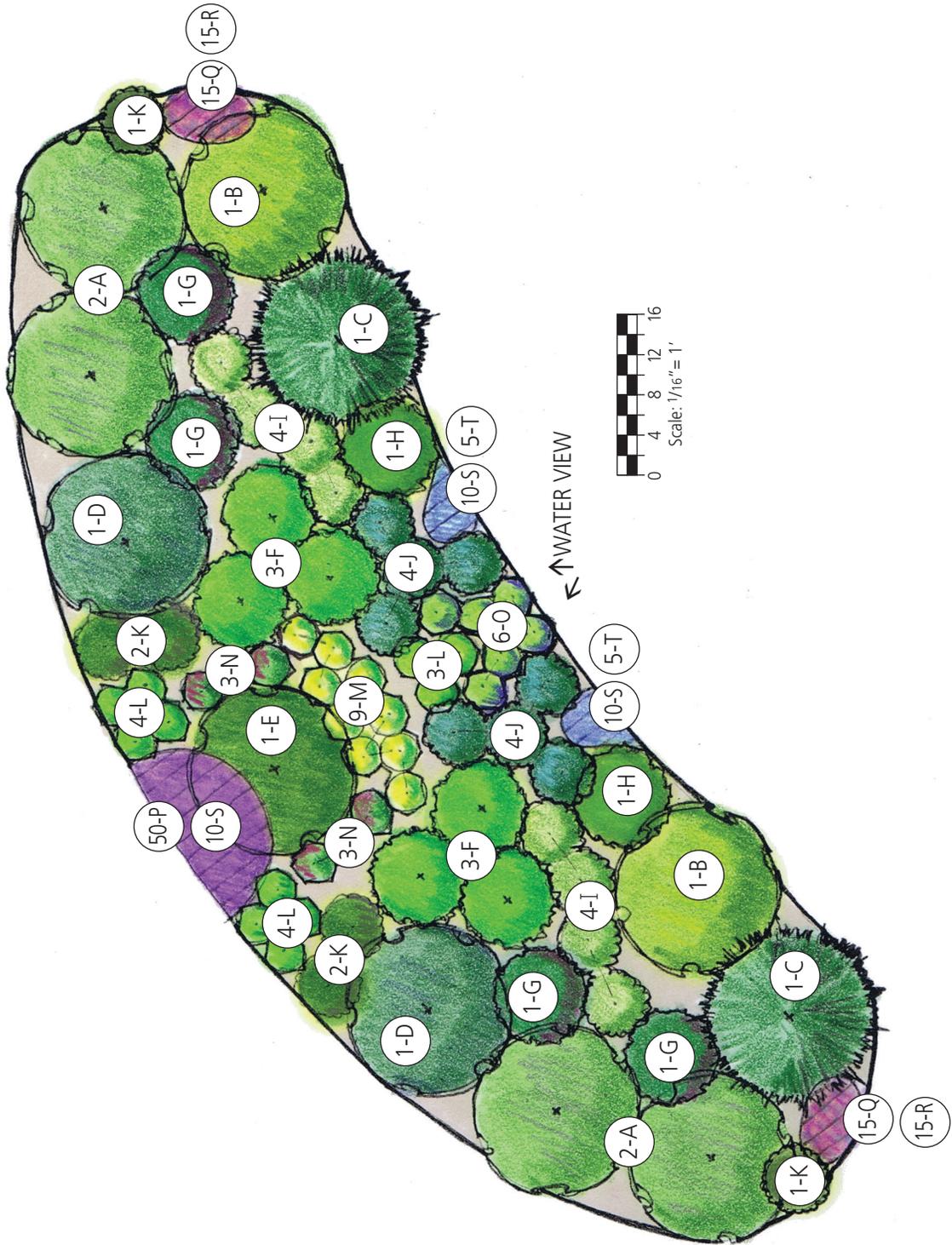
Plan 22: 3600 SF (Sun) Sunset Garden

This garden is a hardy mix of native trees, shrubs, and long flowering perennials that provide red, orange, gold, and yellow color throughout the year. The trees have wonderful fall color, and the Red Maple has red blooms in the spring as well. The large shrubs all have beautiful fall color. The Dense St. John's Wort is a small shrub that blooms with golden yellow blossoms from July through September. It spreads easily and is a beautiful complement to the red Beebalm, orange Butterfly Flower, and gold Black-eyed Susans.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Red Maple	<i>Acer rubrum</i>	¾-inch caliper	Canopy tree	4	400
B	White Ash	<i>Fraxinus americana</i>	¾-inch caliper	Canopy tree	2	200
C	Black Gum	<i>Nyssa sylvatica</i>	¾-inch caliper	Canopy tree	2	200
D	White Fringetree	<i>Chionanthus virginicus</i>	¾-inch caliper	Understory tree	6	450
E	Green Hawthorn	<i>Crataegus viridis</i>	¾-inch caliper	Understory tree	3	225
F	Eastern Redbud	<i>Cercis canadensis</i>	¾-inch caliper	Understory tree	2	150
G	Spicebush	<i>Lindera benzoin</i>	3 feet	Large shrub	8	400
H	Southern Arrowwood	<i>Viburnum dentatum</i>	3 feet	Large shrub	7	350
I	Virginia Sweetspire	<i>Itea virginica</i>	3 feet	Large shrub	6	300
J	Dense St. John's Wort	<i>Hypericum densiflorum</i>	18 inches	Small shrub	28	700
K	Butterfly Flower	<i>Asclepias tuberosa</i>	1 quart	Herbaceous plant	54	108
L	Black-eyed Susan	<i>Rudbeckia hirta</i>	1 quart	Herbaceous plant	40	80
M	Bee Balm	<i>Monarda didyma</i>	1 quart	Herbaceous plant	25	50

Actual Total Credit: 3613 SF

Notes: To create the curved beds for the herbaceous plants, tie a string to a stake and drive the stake in the ground in the middle of and approximately eight feet from the southern edge of the garden. Use lime to mark the "lines." Remember, a perfect circle is not necessary as your usual view of this garden will be at eye level.

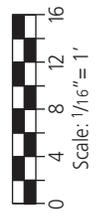
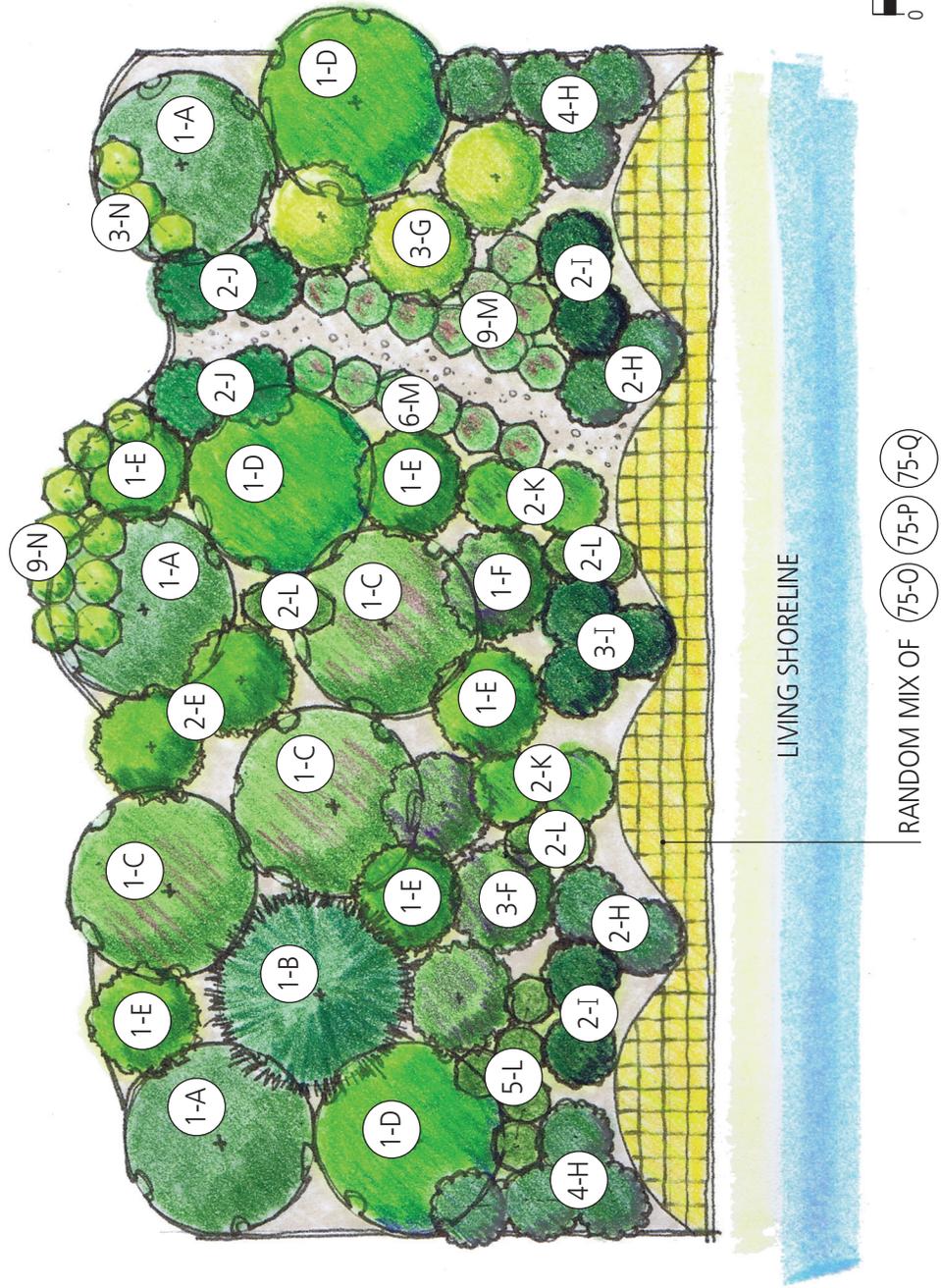


Plan 23: 4200 SF (Sun) Wild and Wonderful Garden

This planting is designed to use a variety of evergreen and deciduous species with varied size and structure, while maintaining views through the center. The American Sycamore in the middle of the garden is a lovely focal point. American Sycamores have an interesting branching pattern and can be limbed up to allow for views. This tree species has mottled bark that peels away to reveal a white trunk and limbs that are quite dramatic against the sky, water, or a mixed evergreen forest. This garden includes a wide variety of large and small shrubs with interesting forms and structures. Most of the shrubs can be pruned or left "wild." This garden has several pockets of mixed native flowering perennials that provide spring and summer color.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Shagbark Hickory	<i>Carya ovata</i>	¾-inch caliper	Canopy tree	4	400
B	American Beech	<i>Fraxinus americana</i>	¾-inch caliper	Canopy tree	2	200
C	Eastern Red Cedar	<i>Juniperus virginiana</i>	¾-inch caliper	Canopy tree	2	200
D	White Oak	<i>Quercus alba</i>	¾-inch caliper	Canopy tree	2	200
E	American Sycamore	<i>Platanus occidentalis</i>	¾-inch caliper	Canopy tree	1	100
F	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾-inch caliper	Understory tree	6	450
G	Cockspur Hawthorn	<i>Crataegus crus-galli</i>	¾-inch caliper	Understory tree	4	300
H	American Crabapple	<i>Malus coronaria</i>	¾-inch caliper	Understory tree	2	150
I	Inkberry	<i>Ilex glabra</i>	3 feet	Large shrub	8	400
J	Common Elderberry	<i>Sambucus nigra</i>	3 feet	Large shrub	8	400
K	Male-Berry	<i>Lyonia ligustrina</i>	3 feet	Large shrub	6	300
L	Dangleberry	<i>Gaylussacia frondosa</i>	18 inches	Small shrub	11	275
M	Stagger-bush	<i>Lyonia mariana</i>	18 inches	Small shrub	9	225
N	Early Lowbush Blueberry	<i>Vaccinium pallidum</i>	18 inches	Small shrub	6	150
O	Sheep Laurel	<i>Kalmia angustifolium</i>	18 inches	Small shrub	6	150
P	Summer Phlox	<i>Phlox paniculata</i>	1 quart	Herbaceous plant	50	100
Q	Gayfeather	<i>Liatris spicata</i>	1 quart	Herbaceous plant	30	60
R	Stiff Leaf Aster	<i>Ionactis linariifolius</i>	1 quart	Herbaceous plant	30	60
S	Wild Blue Indigo	<i>Baptisia australis</i>	1 quart	Herbaceous plant	30	60
T	Passionflower	<i>Passiflora incarnata</i>	1 quart	Vine	10	20
Actual Total Credit: 4200 SF						

Notes: This garden uses species that do well in sun or shade. If the area beneath the canopy trees seems too bare, most fern species do very well in shady forested conditions. Add some Christmas Fern (*Polystichum acrostichoides*) or Sensitive Fern (*Onoclea sensibilis*) to fill in. Many native fern species spread easily. Add two American Holly (*Ilex opaca*) to enhance winter structure and cover and increase the credit to 4400 square feet.



LIVING SHORELINE

RANDOM MIX OF 75-O 75-P 75-Q 75-R 75-S

Plan 24: 4800 SF (Mixed Sun and Shade) Living Shoreline Garden

This planting is perfect for shoreline areas where a “living shoreline” has been (or will be) implemented to control shoreline erosion. The garden is designed to provide ample sunlight near the shoreline so that the native grasses that are part of the shoreline erosion control practice will grow and spread. The area next to the shoreline is a mix of grasses and salt tolerant shrubs that will work well with the plantings that are part of the living shoreline. Adjacent to this area, there is a mix of shrubs and smaller trees. Larger canopy trees and shade tolerant shrubs are planted farthest from the shoreline so as not to interfere with the sunlight needed for the living shoreline or affect the structural integrity of the bank. A three-foot-wide mulched path lined with shrubs provides access and a view through the garden.

Symbol	Common Name	Scientific Name	Size	Plant Type	Total Number	Credit
A	Green Ash	<i>Fraxinus pennsylvanica</i>	¾-inch caliper	Canopy tree	3	300
B	Eastern Red Cedar	<i>Juniperus virginiana</i>	¾ – inch caliper	Canopy tree	1	100
C	Black Gum	<i>Nyssa sylvatica</i>	¾ – inch caliper	Canopy tree	3	300
D	Swamp White Oak	<i>Quercus bicolor</i>	¾ – inch caliper	Canopy tree	3	300
E	Sweetbay Magnolia	<i>Magnolia virginiana</i>	¾ – inch caliper	Understory tree	7	525
F	Eastern Redbud	<i>Cercis canadensis</i>	¾ – inch caliper	Understory tree	4	300
G	Chinquapin	<i>Castanea pumila</i>	¾ – inch caliper	Understory tree	3	225
H	High-Tide Bush	<i>Baccharis halimifolia</i>	3 feet	Large shrub	12	600
I	Southern Bayberry	<i>Morella cerifera</i>	3 feet	Large shrub	7	350
J	Smooth Winterberry	<i>Ilex laevigata</i>	3 feet	Large shrub	4	200
K	Inkberry	<i>Ilex glabra</i>	3 feet	Large shrub	4	200
L	Black Chokeberry	<i>Photinia melanocarpa</i>	18 inches	Small shrub	11	275
M	Steeplebush	<i>Spiraea tomentosa</i>	18 inches	Small shrub	15	375
N	Maple-leaved Arrowwood	<i>Viburnum acerifolium</i>	18 inches	Small shrub	12	300
O	Little Bluestem	<i>Schizachyrium scoparium</i>	1 quart	Grass	75	150
P	Switchgrass	<i>Panicum virgatum</i>	1 quart	Grass	75	150
Q	Broomsedge	<i>Andropogon virginicus</i>	1 quart	Grass	75	150
Actual Total Credit: 4800 SF						

Notes: Rose Mallow (*Hibiscus moscheutos*) is a beautiful flowering herbaceous plant that can be used in place of some of the grasses as it tolerates brackish areas. Add two additional Eastern Red Cedars to reduce the quantity of grasses (by 100 plants) or to increase the credit to 5000 square feet. The grasses can be replaced with a native seed mix that includes salt tolerant species.

Preparing the Location for Your Buffer Garden

Converting a portion of a lawn into your Buffer garden starts with eliminating the turf grass. An easy non-chemical method is to use newspaper and mulch. Cut grass as short as possible, spread several overlapping layers of newspaper over the entire area, wet thoroughly, and cover it with compost and mulch. Keep the area moist and after six to eight weeks, the area will be free of grass and ready for planting. This can work any time of the year.

Another option is digging up the turf grass. Removing the sod is labor intensive but may be your best option if you are in prime planting time (early spring and fall). Depending upon the size of the area involved, a rototiller and rake, or for smaller areas, a shovel and rake are the best tools to have at hand. Regardless of whether you use a rototiller or do it by hand, thoroughly turn over the soil and rake away the grass. The area should be planted with your trees, shrubs, and perennials and then covered in mulch to reduce the amount of grass returning.

Improving the Soil of Your Buffer Garden

The surest way to improve plant growth is the regular incorporation of organic matter such as composted yard waste. Organic matter improves soil structure, slowly releases nutrients, and increases beneficial microbial activity. The best time to provide wholesale soil improvement is prior to planting your Buffer garden, but even after the garden is planted, regular soil improvements can greatly enhance the long-term appearance and survival of your Buffer garden.

Start with a soil test. The University of Maryland Extension, Home and Garden Information Center at **800-342-2507** or hgic.umd.edu can provide all the information you may need about doing a soil test and how to address any problems such a test may find.

How to Plant a Tree

1. Dig a shallow, broad planting hole. Make the hole wide and shaped like a saucer, at least three to five times the diameter of the container or root ball but only as deep as the root ball.
2. Remove the tree from the container or remove all rope, wire, and burlap from the sides of the root ball. Cut or remove any circling roots.
3. Place the tree in the planting hole with the top of the root ball level with or slightly above the existing soil line (to allow for some settling). Backfill with the loosened soil. Gently pack the soil around the base of the root ball.
4. Fill the remainder of the hole, taking care to firmly pack soil to eliminate air pockets that may cause roots to dry out. Add soil a few inches at a time and settle with water. Keep backfilling until the soil is just below the root collar. Do not fertilize a newly planted tree.
5. Create a slight water-holding basin around the base of the tree and give the tree a good watering. Once the water has soaked in, spread approximately two to four inches of mulch around the base of the tree. Leave a mulch-free area of about two inches around the trunk to avoid decay.
6. Keep the soil moist but not soaked by watering at least once a week (if it does not rain) and more frequently during hot weather. When the soil is dry below the surface of the mulch, it is time to water.



Buffer Management Plan Notes

The notes in this chapter are required to be submitted with your Buffer Garden Plan and Landscape Schedule in order to complete your Buffer Management Plan. You will need to fill in the blanks to provide specific information about your property. The notes provide additional details about the plan and the installation of the plants, and are necessary to ensure that the plants are the right size, are properly installed, and are properly maintained. The notes also include the plan approval information date and the provisions for follow-up inspections.

GENERAL NOTES

1. The purpose of this Buffer Management Plan is to comply with the Buffer mitigation and establishment requirements for the following project:

2. The street address of the property is:

3. The property is identified as: Tax Map _____ Parcel _____ Block/Section _____ Lot _____

4. The Critical Area designation is (select designation): RCA LDA IDA

PLANTING DATE AND SEQUENCE OF IMPLEMENTATION

1. Planting will begin on or about _____

2. Remove turf grass, weeds, and debris. Prepare site for planting by tilling, digging, and incorporating topsoil or other soil conditioners.

3. Prior to planting, protect plants from adverse weather conditions after delivery until they are planted. Plants should be planted within 72 hours of delivery.

4. Install plants in accordance with nursery specifications in the locations shown on the plan. Plant the largest stock first.

5. Prune only dead or broken branches on new stock prior to installation.

6. Stake trees only if necessary due to site conditions or stock size.

7. Water plants thoroughly.

8. Mulch around new plants to maintain moisture levels and reduce competition from weeds and invasive species.

SPECIFICATIONS

1. All plantings should be native to the Coastal Plain based on the U.S. Fish and Wildlife Service publication titled *Native Plants for Wildlife Habitat and Conservation Landscaping, Chesapeake Bay Watershed*.
2. Canopy trees are those that reach a height of at least 35 feet at maturity. Canopy trees will be balled and burlapped or container stock. Stock that is 2-inch caliper is credited at 200 square feet. Stock that is $\frac{3}{4}$ -inch caliper is credited at 100 square feet. Heights may vary.
3. Understory trees are those that reach a height of 12 to 35 feet at maturity. Understory trees will be balled and burlapped or container stock. Stock that is $\frac{3}{4}$ -inch caliper is credited at 75 square feet. Heights may vary.
4. Large shrubs are those that reach a height of at least six feet at maturity. Large shrubs will be balled and burlapped or container stock and will be at least three feet high.
5. Small shrubs are those that reach a height of up to six feet at maturity. Small shrubs will be balled and burlapped or container stock and will be at least 18 inches high.
6. Herbaceous plants and grasses are nonwoody vegetation that is often dormant during the winter. Herbaceous plants and grasses will be container stock. Sizes and heights may vary. A seed mix may be used for larger areas of herbaceous plants and grasses at the discretion of the local government.

MAINTENANCE PLAN

1. Monitor the plantings twice weekly to reduce transplant stress from water deficiency, nutrient deficiency, invasive species competition, pest damage, and disease.
2. Water as necessary but at least once every ten days without rainfall from May through September, depending on soil moisture levels. Monitor to ensure that overwatering does not occur.
3. If needed, use a low nitrogen, slow release fertilizer in late fall or early spring.
4. Two years from the planting date, the plantings shall be inspected and assessed to determine the need for replacement plantings.

MONITORING AND REQUIRED SURVIVAL

1. The planting area will be monitored for two years from the planting date. Survival of all plants is required. Any plants that do not survive must be replaced.
2. If the local government determines that the survival is not adequate, the monitoring period may be extended, and additional inspections required at the local government's discretion.

BUFFER MANAGEMENT AND PROTECTION STANDARDS

- 1. Removal of natural vegetation within the Buffer and expanded Buffer is prohibited. Cutting, clearing, pruning, and removal of invasive or noxious vegetation are permitted only in accordance with and as shown on this Buffer Management Plan.
- 2. The Buffer and expanded Buffer on this property shall be planted in accordance with this Buffer Management Plan. All existing and planted vegetation within the Buffer shall be permanently maintained and may not be cut, cleared, or removed. Survival of the new plantings shall be as described in the monitoring and required survival notes.
- 3. New lawn areas shall not be created within the Buffer and expanded Buffer unless special circumstances exist, and they are specifically addressed in this Buffer Management Plan.
- 4. This Buffer Management Plan may be amended or modified, subject to approval by the local government. Additional information can be obtained from the planning and zoning office at

Phone _____

E-mail _____

CERTIFICATION

I certify that the information submitted on this plan and form is true and accurate to the best of my knowledge and belief. I understand that local government personnel will contact me and arrange to inspect the work. I will abide by this plan as submitted and approved and will not conduct any work beyond the limits of this plan.

Owner Signature

Date

INSPECTION AGREEMENT

I, _____ (Print Name), the owner of the subject property addressed herein, do hereby grant permission to the approving authority to access my property for the purpose of inspecting the plantings at the appropriate times.

Owner Signature

Date

BUFFER MANAGEMENT PLAN APPROVAL

This Buffer Management Plan has been reviewed and approved for consistency with the local Critical Area Program and the provisions of COMAR 27.01.09.01-1-8.

Staff Name

Title

Date

Maintaining Your Buffer

Buffers that are carefully designed and planted with native species do not require extensive care and attention, but some maintenance is necessary.

Maintaining an existing forested Buffer or a newly planted Buffer will keep it beautiful, healthy, and functioning. Three primary activities are useful for maintaining the appearance and resource benefits of the Buffer:

- Pruning
- Invasive (and Noxious) Species Control
- Mulching and/or Ground Cover Establishment

In order to make sure that these activities will enhance the Buffer and not harm existing forest vegetation, a Buffer Management Plan may be required depending on the scope of the work to be performed. In general, if live branches or invasive species are to be pruned or removed, and three or more trees will be affected, a Buffer Management Plan should be filed with the local government. In some cases, a Simplified Buffer Management Plan (see Chapter 5) may be sufficient. The local planning office can provide more specific information regarding your project.

Pruning

The pruning of trees and shrubs in the Critical Area Buffer is permitted for safety, health, and aesthetic purposes. Pruning can remove branches that could fall and cause injury or property damage, that obstruct lines of sight on roads, or that interfere with utility lines. In some instances, pruning is necessary to maintain the health of trees and promote the development of a strong structure. Pruning for aesthetics related to maintaining or creating a view of the water is permitted, but

The pruning of trees and shrubs in the Critical Area Buffer is permitted for safety, health, and aesthetic purposes.

it must be done carefully. Precise and judicious pruning will ensure that the health of the tree is not adversely affected and that the water quality and habitat benefits of the riparian Buffer are not impaired in any way.

In Maryland, all tree pruning, by a person other than the owner of the property, must be performed by a Maryland licensed tree expert. Licensed tree experts have the training, skill, and insurance coverage necessary to perform the work properly, legally, and safely. Before starting any work, the property owner or the tree expert should contact the local planning office to determine what permits or approvals are required. This varies depending on the size and scope of the pruning project. In general, a Buffer Management Plan is required to cut, trim, remove, clear, or disturb any natural vegetation within the Buffer in the Critical Area.

Canopy “cleaning” is the removal of dead, dying, diseased, or broken branches from a tree. Removing these branches can reduce the likelihood of further decay, damage, or pest infestation of living portions of the tree. Often canopy cleaning will yield the desired results, and further pruning will not be necessary.

Crown raising or “limbing up” involves selectively removing branches between the ground and the bottom of the tree crown. This is often done to provide access around the tree, provide a view, and improve the form and appearance of the tree. In general, no more than the lowest one-third of the tree should be pruned, leaving a ratio of live crown to total tree height of at least two-thirds. The removal of too many lower branches can lead to trunk defects and decay. Trees that are improperly pruned above the lower third can become unstable during storm events. The risk of the tree becoming uprooted is intensified when the tree is tall with a relatively slender trunk, the canopy is wet and heavy, and the ground is saturated.

Crown thinning can be employed to improve the health of a tree or trees by increasing light and air in the tree canopy. Crown thinning can also be used to open up a view. Selective removal of



Limbing up, crown thinning, and pruning of trees can be permitted in the Buffer, as long as the water quality and habitat benefits are not adversely affected.

live branches is allowed; however, it is important that pruning not impair the tree's natural structure and form. Generally, no more than one-quarter of the living crown should be removed at any one time. Branches that rub or cross each other or that compete with the central trunk leader should be removed first. If possible, the branches removed should be evenly distributed through the canopy to maintain a stable structure. This is especially important for open-grown or isolated trees. These trees often have a very large canopy, are exposed to high winds during storm events, and are located in soils along the shoreline that can become unstable when saturated.

Pruning cuts should be made so that only branch tissue is removed. Every effort should be made to ensure that trunk tissue is not damaged. This will ensure that the trunk tissue will not become decayed and the cut area will seal more effectively.

Shrubs should be pruned similarly to trees. Using a motorized "hedge trimmer" is not recommended for pruning shrubs because there is a tendency to prune too much. This type of pruning can result in irregular cuts and damage to trunk tissue and bark. The resulting "crew cut" appearance looks unnatural and can lead to dense sprouting of weak new growth near the cuts, altering the natural form of the shrub.

Vine, Invasive, and Noxious Species Control

On some sites, certain vine, invasive, and noxious plant species can significantly impair the appearance of the Buffer, views of the water, and access to the shoreline. Invasive species are those species that have been introduced to the region from other areas and may cause economic or environmental damage. In some cases, the species can be harmful to human health. In the Buffer, both native and invasive vine species can grow quite densely and climb up trees and shrubs. They can threaten the health and survival of the trees and shrubs and may crowd out or overwhelm native plants. Some invasive vine species that you may see along the shoreline include English Ivy, Kudzu, Japanese Honeysuckle, and Wisteria.

Not all invasive species are vines. A variety of trees, shrubs, and herbaceous plants are also considered invasive species. Often these species thrive in disturbed areas and places where soil types and moisture levels can create difficult growing conditions. Certain species grow quickly and spread rapidly and easily. They can quickly out-compete other trees and shrubs, dominating an area with a single species. The removal of large areas of invasive species is often difficult, time-consuming, and expensive.

Typically, herbicide spraying and manual removal using hand tools are the best ways to eliminate and control invasive species in the Buffer. Some species may require maintenance for two or more years. It is important to understand the growth and reproduction habits of the species that you are trying to eliminate. Some species may be successfully removed by pulling up the plants and their roots, whereas others may spread when the soil is disturbed. When using herbicides in the Buffer, be sure that the product you are using is designed for residential use near waterways. Make sure that you read and follow the label and application directions. On sites where the area of invasive species to be removed exceeds 1,000 square feet, you may want to obtain the services of a qualified professional. Certain types of herbicides can only be applied by licensed applicators.

Mulching and Groundcover Establishment

In natural forests and wooded areas, leaves, twigs, acorns, and other organic material fall to the ground and build up over time. This “duff layer” provides important benefits. It acts as a “natural fertilizer,” providing nutrients to growing trees and shrubs, helping to retain moisture, increasing the ground’s capacity to hold water, inhibiting the growth of weeds, and stabilizing and protecting bare soil from eroding during heavy downpours.

In newly planted areas, where such a layer does not yet exist, it is beneficial to mulch the area to begin establishing the duff layer. Wood fiber mulch, such as shredded hardwood or pine bark, is readily available and reasonably priced. Generally, three to four inches of mulch spread over the entire planting area works best. Mulching planting beds thoroughly will minimize the time spent weeding as the new plants get established. Mulch should not be mounded up around the trunks of trees or woody shrubs, as this limits air circulation and can lead to disease and decay. When mulch is spread properly, it will decompose over time, and leaves and twigs from the new plantings will accumulate into a healthy and functional duff layer. Depending on the size of your new plantings and their rate of growth, you may need to mulch your new planting area in the spring for several years.

In order to optimize the different water quality and habitat benefits in the Buffer, you may want to mulch certain areas and establish groundcover in other areas. Although existing areas of turf grass in the Buffer can be maintained, new areas

of turf grass cannot be created in the Buffer. Turf should not be cultivated in areas designated for Buffer mitigation or Buffer establishment. Mulch or groundcover species should be used. Turf grass is not considered an appropriate groundcover plant for the Buffer. Most turf grass varieties sold in Maryland are not native species. Their shallow root systems and fine texture do not provide significant water quality or habitat benefits when compared to other native grass and groundcover species.

A wide variety of native grass species grow well in Maryland. When using native grasses as a groundcover or as part of a “natural meadow” planting, it is important to note that the natural mature height of these grasses is often one to three feet. Native grasses cannot be maintained by weekly mowing like turf grass. Generally, native grasses should not be mowed more than twice per year.

If you wish to maintain a more “manicured” appearance with your groundcover, you may want to consider a dense planting of low-growing herbaceous plants such as violets, Blue-eyed Grass, Robin’s Plantain, or Partridgeberry. Ferns can also be used as a groundcover, and most ferns grow the best in full or partial shade. They are ideal groundcover plants for the Buffer because they thrive in full or partial shade, and grow well in moist forested settings. Many fern species transplant well and spread easily. Regardless of the type of groundcover you choose, you will find that these plantings significantly enhance the beauty and habitat value of your Buffer to small wildlife species such as chipmunks, voles, salamanders, and turtles.

Long-Term Management

Depending on the condition of your Buffer and the species that are present or planted there, the Buffer on your property may require ongoing maintenance. Most local governments will allow a property owner to obtain approval of a Buffer Management Plan for ongoing maintenance activities. Typically, this Plan can be valid for up to five years; however, the approval must specify the duration of the implementation period. This type of Plan is flexible and allows certain ongoing maintenance activities that are necessary to ensure the long term health and functions of the Buffer. If you are interested in this type of long-term plan approval, you will need to coordinate with the local planning office to make sure the proposed activities are permitted and necessary inspections are performed. Photos and a more detailed description of the maintenance activities may be required.

Enhancing Your Buffer

Whether you live on a river, have a stream on your property, or just like to sail, everyone wants to enjoy clean and healthy waterways. Planting in the Buffer benefits everyone by improving shoreline conditions.

Even if you already have trees in your Buffer, planting native shrubs and herbaceous plants enhances the capacity of your Buffer to provide water quality benefits to adjacent streams, creeks, and rivers. Increasing the number and variety of plants in your Buffer also benefits wildlife species by increasing food, cover, and nesting areas.

Native Plants Improve the Buffer

Native plants are those plants that grow naturally in a specific region or geographic area. In Maryland, hundreds of native tree, shrub, grass, vine, and herbaceous plant species are considered native to the “Coastal Plain.” Many of these native plants have beautiful flowers, berries, seed pods,

or cones. These plants will enhance any garden, whether the design is formal or natural. If there are already trees in your Buffer, you can plant shrubs, herbaceous plants, and groundcovers between them. This will improve the water quality and habitat benefits of your Buffer by providing different layers and forms of plants.

Removing an area of lawn and planting native plants in its place provides multiple benefits at the shoreline. It promotes infiltration, increases habitat, eliminates the need for fertilizers and pesticides, and reduces the time you spend mowing. It also helps your yard to function more like a natural forest. Encouraging your neighbors to enhance the shoreline habitat on their properties can help to build protective vegetated corridors that are essential to maintaining healthy wildlife populations. Every square foot of Buffer planted increases the benefits to Maryland’s waters and wetlands.



Using a variety of plant types in the Buffer improves structural diversity, which is an important characteristic of healthy forests.



Many native herbaceous plants are quite hardy and spread naturally, blanketing areas with beautiful flowers.
Photo by Ann Rohlfing

Native plants are ideal for planting in the Buffer because they have adapted to the soil, water, and climate conditions in the Chesapeake and Atlantic Coastal Bays' watersheds. These species are easier to grow and, once established, generally require less maintenance than non-native plants. This can be very important during drought conditions, particularly if your planting area is large, and water is not readily available. Some native plants, particularly grasses and herbaceous species, will go dormant during severe conditions and appear to be dead. However, the roots of the plants will stay alive, and the plant will begin to grow again when

conditions change. Many herbaceous plants, vines, and ferns will disappear completely during the winter months but will emerge in the spring.

Buffers Provide Quality of Life Benefits

In addition to the natural resource benefits that Buffers provide, they can also enhance your enjoyment of your property. Densely planted trees and shrubs absorb sound and reduce noise levels from nearby roads and surrounding development. Trees and shrubs can also be strategically placed to provide privacy and screening, creating a "garden sanctuary" near the water. Many waterfront communities are densely developed, so planting areas of lawn with trees and shrubs provides separation and can enhance outdoor living space.

Planting can also provide "microclimate" benefits. Trees provide cooling shade in the summer and can block cold, gusty winds in the winter. The "evapotranspiration" process of trees and shrubs, whereby water moves through plants and is evaporated into the air, actually can make the air temperature feel several degrees cooler. This is why you feel more comfortable on a hot August day when you are standing in a forest as opposed to being near a busy street. Plantings also moderate heat absorption and glare reflection associated with smooth surfaces like rooftops and pavement.

Trees and Shrubs Can Frame Views

Beautiful views of the shoreline, a beach, or a tidal marsh are one of the many benefits of living on the water. Although it may seem that planting in the Buffer could block water views, this does not have to be the case. The arching branches of mature trees and interwoven forms of large and small shrubs can frame a view and provide a unique vista. The leaves of different species of trees and shrubs can create a beautiful mix of colors, patterns, and textures. They can surround and direct a view through the Buffer. The varying tree and shrub forms provide a much more interesting (and ever changing) perspective than the somewhat austere and monotonous appearance of an area of turf grass that ends abruptly at the shoreline.

When planting in your Buffer, it is important to consider the mature height, structure, and form of the trees and shrubs that you are planting. You can use taller trees to frame a view, particularly if their branching structure is relatively open. Species like oaks are ideal for surrounding views and can be pruned, if needed, to create larger openings.

Lower-growing shrub species can be planted between taller trees in order to direct a view to a focal point or to the water. Smaller shrubs can be used to maintain an opening for a view, while still establishing riparian forest cover. Many native shrub species are quite hardy and can be pruned regularly. Low-growing ferns, vines, and flowering perennials can also be used to establish and build a functioning forest Buffer, thus helping to stabilize the shoreline, promote infiltration, and improve soil health.

Different Plant Types Improve Structural Diversity

Many waterfront lots do not have a naturally forested Buffer. In some instances, there may be isolated trees and shrubs growing in turf grass in the Buffer, but the presence of a community of plants of varying heights, sizes, shapes, and forms is lacking. Structural diversity is the term used to describe this combination of different types of plants growing together at various heights in a forest setting. Ideally, a riparian forest has a canopy layer, an understory layer, a shrub layer, and an herbaceous layer with natural duff covering the ground. The mixture of species will vary depending on site conditions. Often areas with a mature canopy will have a sparser herbaceous layer than areas with younger trees because the dense canopy shades out other species. Some areas may develop a dense shrub layer because the soil type or moisture conditions are not as conducive to deeper rooted species.

There is no single exact combination of plant types that will work perfectly on a specific site. Usually, many planting options will work on any site. When deciding what to plant in an unvegetated Buffer, the following general design standards will work on most sites: 1) approximately half of the area to be planted should be canopy and understory trees; 2) about 40 percent of the area can be large and small shrubs; and 3) the remaining ten percent can be groundcovers, vines or herbaceous plants. If your Buffer has some existing vegetation, additional plants can be added to improve its natural resource value. Adding a row of native shrubs along the edge of your lawn can provide an attractive transition to a more natural forest. Planting a four-foot to six-foot wide strip with small shrubs and herbaceous plants can create an attractive border to an area that you decide to stop mowing and allow to naturally regenerate. It is important to remember that many herbaceous

plant species are dormant from November to March so the benefits that they provide during the winter are limited.

Species Variety Improves Resilience

Selecting a variety of plant species not only promotes structural diversity in the Buffer, but also ensures the long-term health and vitality of your planting area. In natural systems, resilience is the ability to recover rapidly from adverse conditions. Planting several different tree and shrub species improves resilience. This helps to decrease the likelihood that a disease, such as Dutch elm disease, or a pest that targets certain species, such as the Emerald Ash Borer, will destroy your Buffer.

Using a variety of species also mimics the way natural forests grow and mature. A walk in a mature forest (one that has been growing 30 years or longer) is an easy way to observe the variety of species that occur naturally. You may notice that there are several different canopy tree species, understory tree species, and large and small shrub species. The species present will vary depending on the seed sources, moisture levels, soil types, sunlight, and exposure.

Planting both deciduous and evergreen species provides different types of food and forms of cover for wildlife. Evergreen species also enhance the water quality function of a riparian Buffer because the needles or leaves are present during the winter months when deciduous trees and shrubs are bare.

Attracting Wildlife

One of the objectives in planting, enhancing, and protecting forested Buffers adjacent to waterways is to enhance habitat. Planting in the Buffer or allowing this strip of land to naturalize can allow it to function as a wildlife corridor. Even in a developed community, a forested Buffer can provide a way for wildlife to move from one forested tract to another. Strips of forest provide protection from both the weather and predators. In general, a wider area of forest provides more benefits to a larger number of species.

Buffers planted with native trees, shrubs, and herbaceous plants can provide the food, water, cover, and nesting areas that wildlife need. Different wildlife species have different food and habitat requirements, so a variety of plant species will attract a variety of wildlife species. Wildlife

species may eat the twigs, leaves, or stems of plants, as well as any berries, nuts, or seeds that they produce.

Making the Buffer as natural as possible is essential to attracting wildlife. Many wildlife species use dead trees or brush piles in the forest. If possible, dead trees should be left standing so that they can be used by wildlife species, such as bluebirds, that nest in cavities. Dead trees are also an important source of food for many woodpeckers. A brush pile can be hidden behind shrubs and provides a way for limbs and branches to decompose naturally rather than being added to a landfill.

The Creative Touch

The many habitat and water quality benefits of Buffer Gardens are emphasized throughout this book; however, Buffer Gardens also offer aesthetic benefits and opportunities for creative expression. The trees and shrubs that provide the structural framework of the planting area form the foundation of the Buffer Gardens in this book. These are the permanent features of the garden, although they will change with the seasons and over time as the plants mature. Many flowering trees and shrubs boast beautiful berries during the winter months, providing striking color on bare branches when viewed against a backdrop of dark green evergreens.

You can highlight, enhance, supplement, and personalize your Buffer Garden in a variety of ways. Seasonal touches can be added by using colorful annuals that complement the landscape and enable the gardener to change the “look and feel” of the garden. (Herbaceous perennial plants can also be used, just make sure that they are native species or, at the very least, are not invasive.) Depending on the wildlife in your neighborhood, you can choose natural ornaments (pumpkins, gourds, driftwood, or an interesting stone) to provide a focal point or add interest. Garden ornaments and small sculptural elements can also be placed in your Buffer Garden. Select those that are sturdy, stable, and weatherproof as the shoreline location may expose them to salt spray, wind, and harsh sunlight. Make sure that they are small enough (no more than two square feet) that they do not require any type of footing or foundation and that they do not interfere with plant growth or natural infiltration.

A Buffer Garden provides many opportunities for self-expression, both in the selection of the basic plan itself and in the choices of plants within it. Don't be afraid to try different plant species, or to add or move plants to suit your needs and your site. Remember, your Buffer Garden will grow and change over time, providing endless opportunities to make adjustments and create a new look.



Even a small Buffer garden can provide habitat for wildlife that surprise, amaze, and delight us.

Frequently Asked Questions

When is a Buffer Management Plan required?

Any development activity (human action that results in disturbance to land, natural vegetation, or a structure) on land that has frontage on a tidal waterway, a tidal wetland, or a stream, or any disturbance to the Buffer or expanded Buffer will require a Buffer Management Plan. The Buffer Management Plan must be submitted to and approved by the local government, usually the planning office.

Can I prepare my own Buffer Management Plan?

Yes. A property owner can prepare a Buffer Management Plan for removal of individual trees, riparian access paths to the water, pruning, and most small construction projects. The Buffer Garden Plans in Chapter 6 of this book can be submitted for projects that require submission of a Minor Buffer Management Plan. If your required Buffer planting is 5,000 square feet or greater, you may want to hire a professional to assist in developing a plan that addresses conditions on your site and meets your specific needs.

Will my Buffer Management Plan require that I replant areas where I remove vegetation?

Yes. When vegetation, including invasive species, is removed in the Buffer, it must be replaced. The only exception is when a dead tree is removed. In that case, the area of the stump must be stabilized with native groundcover or other native vegetation as may be necessary.

Do I need a Buffer Management Plan to plant trees, shrubs, or a garden in the Buffer?

In general, a Buffer Management Plan is not required to plant voluntarily in the Buffer. A garden may be planted in the Buffer: however, it should not involve the removal of existing trees and shrubs or grading. Check with your local planning office before starting work.

If I am building a house or an addition outside the Buffer, is Buffer planting still required?

Generally yes. In many situations, planting is required unless the Buffer is already fully forested. The area of planting required depends on the type of project proposed, when the lot was recorded, and the area of existing forest in the Buffer.

What is the difference between “Buffer establishment” and “Buffer mitigation”?

“Buffer establishment” is required on certain properties when construction or development takes place outside the Buffer. “Buffer mitigation” is required when construction or development takes place in the Buffer.

I have a lot of poison ivy, vines, and brush in my Buffer. Can I “bush hog” it?

No. Bush hogging is not permitted in the Buffer because it is potentially damaging to this sensitive area. Poison ivy can be sprayed with an herbicide and removed by hand (gloves are strongly recommended). Vines and brush can be cut or grubbed by hand. Some brush species may actually be native shrubs. Manual removal will ensure that desirable native species can be maintained. Mulching or planting with native groundcover species is strongly recommended to stabilize that area after removing noxious or invasive species.

What size plants do I need to satisfy a Buffer planting requirement?

The minimum size for a canopy tree is ¾-inch caliper (trunk diameter measured six inches from the ground) in order to receive 100 square feet of credit. A ¾-inch understory tree is worth 75 square feet of credit. Large shrub species should be at least three feet high for 50 square feet of credit and small shrubs at least 18 inches high for 25 square feet of credit. Smaller planting materials or natural regeneration may be acceptable for large planting requirements. Check with your local planning office for detailed requirements.



New York Ironweed

How do I arrange the plants in my garden to make sure they have enough room to grow?

The Buffer Garden Plans in Chapter 6 show how trees, shrubs and herbaceous plants can be arranged so that they can grow to maturity and provide optimum water quality and habitat benefits. If your site requires modification of a garden plan so that it will work, the following standards should be used:

- Canopy trees (using the trunk as the planting location) should be planted 14 to 20 feet apart.
- Understory trees can be planted under canopy trees, but should be spaced at least eight to ten feet away from the trunk of a canopy tree or another understory tree.
- Large shrubs can be planted under canopy trees and understory trees, but should be planted at least five to seven feet away from trees or other large shrubs.
- Small shrubs can be planted under canopy trees and understory trees, but should be planted at least three to five feet away from trees, large shrubs, or other small shrubs.
- Herbaceous plants can be planted under and around trees and shrubs. It is important to consider how much sun the plants need. Herbaceous plants may be easier to maintain when they are planted in groups, with individual plants spaced at least 1½ to 2 feet apart.

Can I cut trees in the Buffer that are less than four inches in diameter without a Buffer Management Plan approved by the County or Town?

No. The cutting and removal of any trees, shrubs, and natural vegetation in the Buffer require the homeowner to file a Buffer Management Plan.

Can I remove a tree or natural vegetation that blocks my view?

Removal of healthy trees and natural vegetation in the Buffer is not permitted solely for the purpose of creating a view. However, trees and shrubs can be pruned and limbed up to create openings that provide a view. The removal of invasive species and vines is permitted and can also improve a view.

What can I do about trees that are damaged by storms?

If a tree is diseased, dying, invasive, or considered a hazardous tree (likely to fall and cause damage or injury), a property owner can remove the tree by obtaining approval of a Simplified Buffer Management Plan. Each tree removed must be replaced with a ¾-inch caliper nursery stock tree. If the tree removal involves more than five trees, a local government may require a site visit, additional documentation, or a Minor Buffer Management Plan at its discretion. The removal of dead trees does not require replacement, but the area should be stabilized with native vegetation.

Can I preserve my view of the water?

Yes. The Critical Area regulations for the Buffer do not include standards for creating or maintaining a view of the water; however, a Buffer Management Plan can be used for this purpose. A view can be addressed through thoughtful design in selecting the type and location of plants in the Buffer, careful pruning of existing trees and shrubs, and a thorough approach to removing invasives and planting groundcover.

Can I apply herbicides in the Buffer?

Yes. You can manually apply herbicides in the Buffer for the removal of invasive species. Targeted spraying to eradicate individual plants or treat small areas, using an herbicide appropriate for application near waterways, is recommended. You may need to cover or protect desirable native species so they are not destroyed.

Can I remove invasive or noxious plants such as English Ivy, Japanese Honeysuckle, or Phragmites in the Buffer?

Yes. Removal of invasive or noxious species in the Buffer and replacing them with desirable native species is encouraged. However, a Simplified Buffer Management Plan is required. Also, the removal of invasive species must be done by hand or by using a backpack sprayer. Mowing or bush hogging is not permitted.

Can I trim shrubs and prune trees within the Buffer?

Yes. You can trim shrubs and prune trees within the Buffer using hand tools as long as the pruning and trimming does not affect the water quality and habitat functions of the Buffer. Depending on the number of trees and shrubs to be trimmed or pruned and the size of the area of the Buffer affected, a Simplified or Minor Buffer Management Plan may be required. Check with local planning staff before starting work.

Do I need a Buffer Management Plan to trim or prune trees and shrubs within the Buffer?

A Buffer Management Plan may be required depending on the scope of the work and the size of the area. In general, if live branches are to be pruned or invasive species are to be removed, and three or more trees will be affected, you should contact your local planning office to determine what, if any, authorization is needed. In many cases, a Simplified Buffer Management Plan (see Chapter 5) may be sufficient.

Do I have to plant in the Buffer when I am doing a shore erosion control project?

Yes. Generally planting in the Buffer will be required at a one-to-one ratio for the square footage of shoreline disturbance associated with the project and for the replacement of any canopy trees that are removed. This is usually calculated as the linear feet of shoreline multiplied by the work area along the shoreline or 15 feet, whichever is greater, plus the area of canopy coverage removed.

Why is planting required for shore erosion control projects when the project is being installed to help the Bay by reducing sedimentation?

Planting is necessary to restore the functions of the Buffer after disturbing the sensitive intertidal zone along the shoreline. Planting offsets the temporary impacts on habitat and water quality associated with the construction activity itself and helps to rapidly stabilize the disturbed shoreline area. Mitigation by planting in the Buffer also improves the habitat and water quality benefits of most shore erosion control practices by stabilizing soils, promoting infiltration, building natural resilience, and enhancing nutrient uptake.

Is mitigation required for access to the shoreline and for stockpile areas created when you do a shore erosion control project?

No. As long as the access and stockpile areas do not involve clearing of natural vegetation, grading, or the installation of an access road, mitigation is not required. If natural vegetation is cleared, it must be replaced at a one-to-one ratio. If a temporary road is installed, the road must be removed and the area fully restored.

Can I mow my lawn in the Buffer?

Yes. Mowing an existing lawn in the Buffer is permitted. Mowing of shrub scrub vegetation, marsh vegetation, or forest understory vegetation is not permitted. New areas of lawn cannot be created in the Buffer.

Is mitigation required for trimming and pruning trees within the Buffer?

No. Mitigation is not required as long as the pruning and trimming does not remove more than 25 percent of the living canopy and limbing up of lower branches is limited to the lower one-third of the height of the tree.

Important Terms

Buffer Management Plan. A narrative, graphic description, or plan of the Buffer that is necessary when an applicant proposes a development activity that will affect a portion of the Buffer, alter the Buffer (including existing vegetation in the Buffer), or will require the establishment of a portion of the Buffer.

Caliper. The diameter of a tree measured at its base, approximately two inches above the root collar.

Canopy Tree. A tree that is at least 35 feet tall when fully grown.

Container Stock. Plant material that is sold rooted in a pot or container of soil as opposed to a seedling or bare root plant.

Critical Area. All waters of and lands under the Chesapeake Bay and its tributaries and the Atlantic Coastal Bays and their tributaries to the head of tide; all State and private tidal wetlands; and all land and water areas within 1,000 feet of tidal waters and tidal wetlands as identified and mapped by the State in coordination with the affected county or town.

Critical Area Buffer (The Buffer). A naturally vegetated or planted area, at least 100 feet wide, that is immediately adjacent to tidal waters, the edge of a bank of a tributary stream, or the edge of a tidal wetland. It is managed to protect aquatic, wetland, shoreline, and terrestrial environments from human disturbance. The Buffer exists in areas that may be paved or include structures. The Buffer is expanded beyond 100 feet to include contiguous sensitive areas. (Throughout this book, the term “Buffer” is capitalized to indicate the Critical Area Buffer.)

Development Activity. A human activity that results in disturbance to land, natural vegetation, or a structure.

Disturbance. Any alteration or change to the land including clearing, grading, or construction. Disturbance does not include gardening or maintaining an existing lawn.

Establishment. Planting that is required when development takes place outside the Buffer on a lot or parcel that includes a Buffer to tidal waters, tidal wetlands, or a tributary stream.

Hazardous Tree. A tree with a structural defect, such as a crack, canker, decay, or disease, that decreases the structural integrity of the tree and that because of its location, is likely to fall and cause personal injury or property damage, including accelerated soil erosion. A hazardous tree can include a healthy tree that will damage an existing permanent structure or significantly increase the likelihood of soil erosion if allowed to continue growing normally in its current location.

Highly Erodible Soils. Soils that are unstable and tend to wash away easily because of their composition and location in the landscape. They include any soil on a slope of 15 percent or greater and soils with a K-value (a scientific measure of erodibility) greater than 0.35 and on a slope greater than five percent.

Invasive Species. Species that are not native to an area and that cause ecological, environmental, or economic harm when accidentally or intentionally introduced. These species may displace native species and adversely affect wildlife habitat, water quality, recreation, and biological diversity by crowding out beneficial native species.

Large Shrub. A shrub that is six feet high or more when fully grown.

Living Shoreline. An erosion control measure that is dominated by tidal wetland vegetation and is designed to preserve the natural shoreline, minimize erosion, and establish aquatic habitat.

Major Buffer Management Plan. A plan submitted for an establishment requirement or to mitigate for disturbance of at least 5,000 square feet that shows the limit of disturbance, total number and size of trees to be removed and the arrangement of the planting, a landscape schedule, a maintenance plan, a long-term protection plan, and an inspection agreement.

Minor Buffer Management Plan. A plan submitted for an establishment requirement or a disturbance of less than 5,000 square feet that includes all the same elements as a Major Buffer Management Plan except for a long-term protection plan.

Mitigation. An action taken to compensate for an adverse impact to the environment resulting from a development activity or a change in land use or intensity.

Native Plants. Plants that are indigenous to (occur naturally in) the area in Maryland where they are proposed to be planted.

Nontidal Wetland. An area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

Riparian Forest. A forested area of land adjacent to a tidal waterway, wetland, stream, or other watercourse.

Sensitive Areas. In the Critical Area, areas that include the minimum 100-foot Buffer, nontidal wetlands, ecologically significant plant and wildlife habitats, threatened and endangered species' habitats, and anadromous fish (fish that move from tidal waters to fresh water to spawn) spawning areas.

Simplified Buffer Management Plan. A plan that is typically a one-page form that supplies the local government with the name, location, and type of mitigation planting on a site when mitigation is required for riparian access, removing invasive or noxious vegetation, filling to maintain an existing grass lawn, managing storm damage, repairing or replacing a septic system, or cutting up to five dead, diseased, dying, invasive, or hazardous trees.

Small Shrub. A shrub that is up to six feet high when fully grown.

Steep Slopes. Slopes with a 15 percent or greater incline.

Structural Diversity. In defining forests, the presence of a community of plants of varying heights, sizes, and shapes and forms so that there is a canopy layer, an understory layer, a shrub layer, and an herbaceous layer.

Tidal Wetland. All wetlands, swamps, marshes, lands, open waters, and Submerged Aquatic Vegetation (SAV) beds affected by the daily or periodic rise and fall of the tide within the Chesapeake Bay, the Atlantic Coastal Bays, and the Atlantic Ocean to a distance of three miles offshore.

Tributary Stream. A stream that contributes water to, and is physically connected to, tidal wetlands or tidal waters including ponds, creeks, rivers, and bays.

Understory Tree. A tree that is 12 to 35 feet tall when fully grown.

Watershed. The region draining into a river, river system, or other body of water. The area of a watershed is typically determined by topography.

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Resources

COUNTY PLANNING OFFICES

Anne Arundel County Office of Planning and Zoning

2664 Riva Road
Annapolis, MD 21401
410-222-7960
aacounty.org/PlanZone/index.cfm

Baltimore County Department of Environmental Protection and Sustainability

105 W. Chesapeake Avenue, Suite 400
Towson, MD 21204
410-887-3980
baltimorecountymd.gov/Agencies/environment

Calvert County Department of Planning and Zoning

150 Main Street
Prince Frederick, MD 20678
410-535-1600
co.cal.md.us/business/planning

Caroline County Department of Planning, Codes and Engineering

Health & Public Services Building
403 South 7th Street, Suite 210
Denton, MD 21629-1335
410-479-8100
carolineplancode.org

Cecil County Office of Planning and Zoning

200 Chesapeake Blvd., Suite 2300
Elkton, MD 21921
410-996-5220
ccgov.org/dept_planning/index.cfm

Charles County Department of Planning and Growth Management

P.O. Box 2150
La Plata, MD 20646
301-645-0721
charlescounty.org/pgm

Dorchester County Planning and Zoning

County Office Building
P.O. Box 107
Cambridge, MD 21613
410-228-3234
docogonet.com/index.php?page=planning_zoning

Harford County Department of Planning and Zoning

220 South Main Street
Bel Air, MD 21014-3865
410-778-7475
harfordcountymd.gov/planningzoning

Kent County Department of Planning, Housing and Zoning

400 High Street
Chestertown, MD 21620
410-879-2000 X103
kentcounty.com/gov/planzone

Prince George's County Department of Public Works and Transportation

9400 Peppercorn Place, Suite 600
Largo, MD 20774
301-883-5919
princegeorgescountymd.gov/Government/AgencyIndex/DPW&T/index.asp?nivel=foldmenu(0)

Queen Anne's County Land Use, Growth Management and Environment

160 Coursevall Drive
Centreville, MD 21617
410-758-1255
qac.org

St. Mary's County Department of Land Use and Growth Management

23150 Leonard Hall Drive
P.O. Box 653
Leonardtown, MD 20650
301-475-4200 X1500
co.saint-marys.md.us/lugm

**Somerset County Department of
Technical and Community Services**

11916 Somerset Avenue, Room 102
Princess Anne, MD 21853
410-651-1424
somerseabaywatch.org

Talbot County Office of Planning and Zoning

215 East Bay Street, Suite 2
Easton, MD 21601
410-770-8030
talbotcountymd.gov

**Wicomico County Department of
Planning, Zoning & Community Development**

P.O. Box 870
Salisbury, MD 21803
410-548-4860
wicomicocounty.org/departments/planning_zoning/
planning_zoning.asp

**Worcester County Development Review
and Permitting**

One W. Market Street, Room 1201
Snow Hill, MD 21863
410-632-1200 X146
co.worcester.md.us/drp/drpindex.aspx

STATE AND COUNTY GOVERNMENT AGENCIES**Critical Area Commission for the
Chesapeake and Atlantic Coastal Bays**

1804 West Street, Suite 100
Annapolis, MD 21401
410-260-3460
dnr.state.md.us/criticalarea

Home and Garden Information Center

12005 Homewood Road
Ellicott City, MD 21042
800-342-2507
hgic.umd.edu



There must be a concerted effort to restore and increase natural vegetation at the shoreline in order to protect Maryland's waterways for future generations. *Photo courtesy of the Chesapeake Bay Foundation*

Maryland Cooperative Extension Service
extension.umd.edu

Maryland Department of Agriculture
50 Harry S. Truman Parkway
Annapolis, MD 21401
410-841-5871
mda.state.md.us

**Maryland Department of the Environment
Wetland and Waterways Program**
1800 Washington Boulevard
Baltimore, MD 21230
410-537-3745
mde.state.md.us/programs/Water/
WetlandsandWaterways/Pages/Programs/
WaterPrograms/wetlands_waterways/index.aspx

**Joint Federal/State Application for the
Alteration of Tidal Wetlands in Maryland**
410-537-3762 or 800-876-0200
mde.state.md.us/assets/document/permit/alter_
sf.pdf

Septic Upgrade Grant Program
410-537-4195 or toll free at
800-633-6101
mde.state.md.us/assets/document/water/MDE-
WMA-FIN020.pdf

Maryland Department of Natural Resources
580 Taylor Avenue
Tawes State Office Building
Annapolis, MD 21401
877-620-8DNR
dnr.state.md.us

Natural Resources Conservation Service
Maryland State Office
John Hanson Business Center, Suite 301
339 Busch's Frontage Road
Annapolis, MD 21401-5534
410-757-0861
nracs.usda.gov

FEDERAL AGENCIES

U.S. Army Corps of Engineers
Baltimore District
P.O. Box 1715
Baltimore, MD 21203-1715
410-962-7608 General Information
usace.army.mil

**U.S. Department of Agriculture
Natural Resources Conservation Service**
plants.usda.gov

U.S. Environmental Protection Agency, Region 3
1650 Arch Street
Philadelphia, PA 19103-2029
215-814-5000
epa.gov/region03

Chesapeake Bay Program Office
U.S. Environmental Protection Agency
410 Severn Avenue, Suite 109
Annapolis, MD 21403
800-YOUR-BAY
chesapeakebay.net

Chesapeake Bay Field Office
U.S. Fish and Wildlife Service
177 Admiral Cochrane Drive
Annapolis, MD 21401
410-573-4500
fws.gov/chesapeakebay

NATIVE PLANTS

Native Plant Center—Chesapeake Region
Alliance for the Chesapeake Bay
501 Sixth Street
Annapolis, MD 21403
410-949-0575
nativeplantcenter.net

Maryland Native Plant Society
P.O. Box 4877
Silver Spring, MD 20914
mdflora.org
mdflora.org/publications/nurseries.html

NONPROFITS

Adkins Arboretum
12610 Eveland Road
P.O. Box 100
Ridgely, MD 21660
410-634-2847
adkinsarboretum.org

Alliance for the Chesapeake Bay
6600 York Road, Suite 100
Baltimore, MD 21212
410-377-6270
acb-online.org

Center for Watershed Protection, Inc.

8390 Main Street, Second Floor
 Ellicott City, MD 21043-4605
 410-461-8323
 cwp.org

Chesapeake Bay Environmental Center

P.O. Box 519
 600 Discovery Lane
 Grasonville, MD 21638
 410-827-6694
 bayrestoration.org

Chesapeake Bay Foundation

Philip Merrill Environmental Center
 6 Herndon Avenue
 Annapolis, MD 21403
 410-268-8816
 cbf.org

Chesapeake Bay Trust

60 West Street, Suite 405
 Annapolis, MD 21401
 410-974-2941
 cbtrust.org

Chesapeake Conservation Landscaping Council

chesapeakelandscape.org

Chesapeake Wildlife Heritage

P.O. Box 1745
 46 Pennsylvania Avenue
 Easton, MD 21601
 410-822-5100
 cheswildlife.org

Environmental Concern, Inc.

P.O. Box P
 210 Boundary Lane
 St. Michaels, MD 21663
 410-745-9620
 wetland.org

Low Impact Development Center

5000 Sunnyside Avenue
 Suite 100
 Beltsville, MD 20705
 301-982-5559
 lowimpactdevelopment.org/raingarden_design/
 whataraignarden.htm

Maryland Nursery and Landscape Associations

P.O. Box 726
 Brooklandville, MD 21022
 410-823-8684
 mnlaonline.org

Maryland Eastern Shore Resource Conservation and Development Council, Inc.

28577 Mary's Court, Suite 6
 Easton, MD 21601-7131
 410-822-9300
 md-esrcd.org

National Wildlife Federation

Chesapeake Bay Mid-Atlantic Regional Center
 11100 Wildlife Center Drive
 Reston, VA 20190
 nwf.org

Rainscaping.org

rainscaping.org/index.cfm/fuseaction/home.home/
 index.htm



Many federal, State, and local government agencies, as well as non-profit organizations, can provide information about plant species that will work well on your site.

Photo by Richard Rohlfling

