

Chapter Two:  
Rain Gardening and Storm-water Management  
A Landscaping Guide for Missouri



## Introduction

### The Problem

Government studies have shown that up to 70 percent of pollution in aquifers, rivers, lakes and coastal areas is carried there by storm-water runoff coming from rooftops, roads, driveways, sidewalks and mowed lawns. These impervious surfaces have taken the place of soil that readily absorbs rainwater. The result is an increase in storm-water volume and velocity, creating an increase in water pollution, stream-bank erosion and flooding.

### A Natural Solution

In nature, storm water flows down the hill-sides into streams, riverbanks, and low-lying wetlands that form a watershed. In a healthy watershed, the roots of grasses, perennial plants, shrubs and trees capture rainwater, aerate soil and help water percolate into the ground, reducing erosion and flooding. Unfortunately, healthy watersheds and their associated plant communities have been damaged and/or destroyed by urbanization.

Rain gardens function like miniature natural watersheds. They slow water flow by using elements similar to those in nature: plants, rocks, shallow swales and depressions that hold water temporarily rather than let it quickly escape. Rain gardens minimize flooding and loss of soil and improve water quality in lakes and rivers by reducing silt.

Use of rain gardens also can save tax dollars by reducing the need for communities to build larger storm-water retention facilities.

Rain gardens provide beauty, natural diversity and wildlife habitat in areas that otherwise would be a monoculture of lawns, pavement, concrete culverts and storm drains. This landscaping style is increasingly used by homeowners, commercial and residential developments, and by cities for park beautification.



Natural creek bank.



Eroding creek bank.

# Introduction

## Elements of a rain garden

### Retention Area

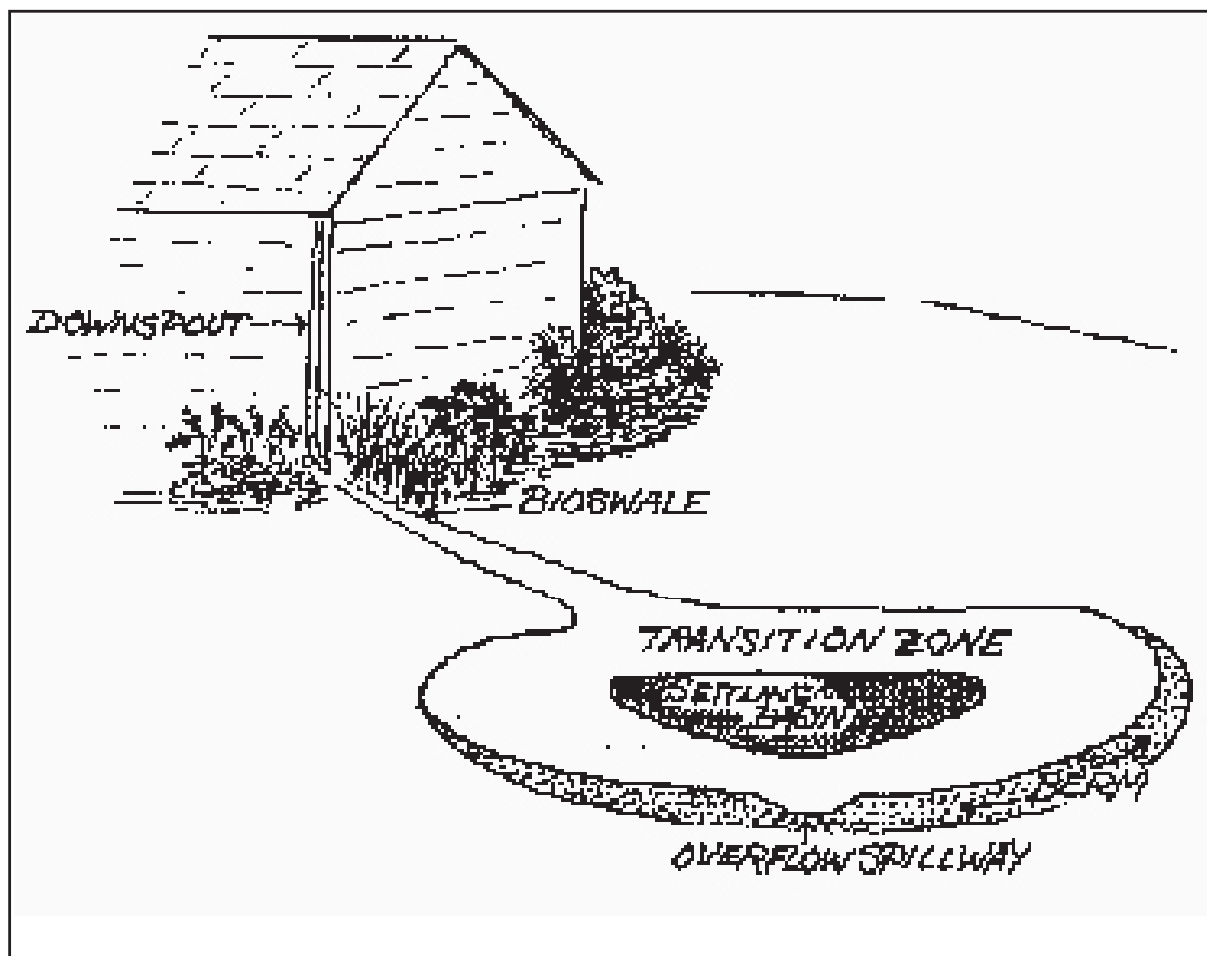
A shallow depression (or series of depressions) that is planted with wetland plants and temporarily holds water. A rain garden may be an existing low area that holds water, or it may be dug and shaped to hold water. Its purpose is to reduce storm-water runoff and the potential pollution and erosion associated with runoff. Rain gardens range from small, conventional, homeowner gardens, to large, engineered wetlands. In either case, they are placed to intercept water runoff near its source and retain it long enough to allow percolation into the soil. In addition, natural "filtering" takes place as water moves through the root systems of plants.

### Berm

Soil excavated from the uphill side of a rain garden is moved to the downhill side to create a dam. Water is retained for a longer period of time, allowing for better percolation into the ground as well as uptake by plants. If the rain garden is on flat ground, the berm will surround the area.

### Settling Basin or Ponding Area

An area that is deeper than the rest of the rain garden (six to ten inches deep). The majority of the water is held in this basin, especially when soil is saturated. Most sedimentation and evaporation take place in the settling basin. If the soil contains more clay, infiltration will be slow. The settling basin may need to be larger to allow for more water storage capacity.



**Transition Zone**

The area that surrounds the settling basin will dry out first. Take this into consideration by selecting plants that tolerate dry conditions at times. Many beautiful native plants have evolved with alternating wet and dry periods and are good choices for this region. (See Species Selection Guide).

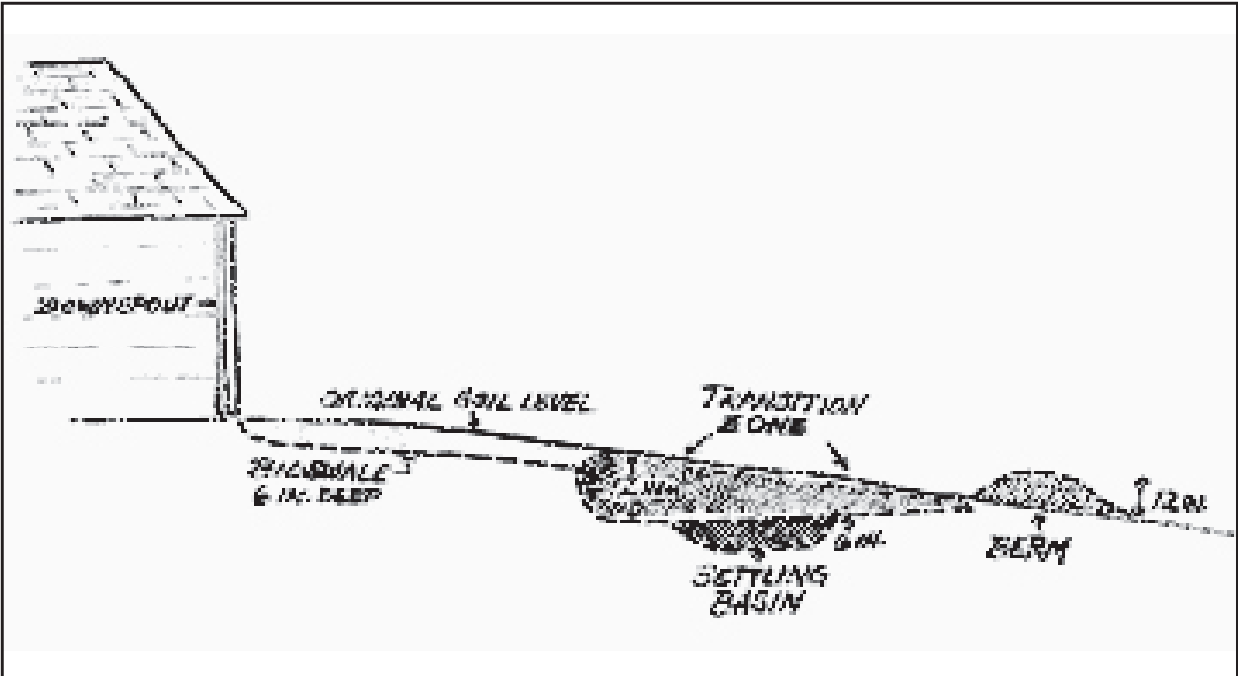
**Bioswale (input)**

A shallow channel (swale) is constructed to direct storm-water runoff from its source (rooftop, pavement, or lawn) to the rain garden. It is planted or seeded with moisture-loving plants. The plants reduce the flow rate of runoff and encourage soil absorption of water even before it enters the rain garden retention area. Bioswales can be constructed independently of a rain garden if space is limited. In this case, they guide runoff to existing storm-water systems.

**Overflow Spillway (output)**

A small area in the berm should be somewhat lower, creating an outlet for water. In the event of a major downpour and a full rain garden, a bioswale below the overflow is used to direct water to the storm-water system.

Please Note: Overflow spillways may not be necessary in some situations. If you have not altered the flow patterns of the yard, the rain garden should not create any further runoff than before and the existing drainage path should be adequate.



## Determine Goals

Before beginning rain garden construction, evaluate the site. Ask yourself why you are building a rain garden and what objectives you have. The answers will help with the decisions on site location, layout, size and plant choices.

## Storm-water Containment and Erosion Control

Consider these five reasons to build a rain garden:

### Erosion Control

Soil loss can be reduced or eliminated by installing water-retaining rain gardens. They help prevent water from quickly running off a site, reducing water volume and rate of flow.

### Maintenance

Poorly drained sites are difficult to mow and care for in rainy seasons because of standing water. Mowing can be eliminated by planting moisture-loving native plants in low-lying areas.



Swamp Milkweed and rose mallow in bloom

Rain gardens planted with wildflowers and sedges bloom throughout the season, attracting a variety of colorful birds, butterflies and insects.

### Education

Over 85 percent of Missouri’s wetlands are gone. A rain garden provides opportunities to teach the importance of water cycles, storm-water containment, and biological diversity.

### Wildlife Habitat

A rain garden with a diversity of native plants attracts many insects, birds, amphibians and mammals, providing opportunities to observe nature up close.



## Site Evaluation

### Map the area.

Note the size and shape of the site. Add structures, location of utility lines and traffic use.

Next, note the north-south aspect, soil types, vegetation, patterns of shade and sunlight. Slope, soil moisture, drainage and the potential for erosion also are important.

A map, drawn to scale, will help decide where to locate the rain garden and what size and shape it will be. A scale drawing will help determine the number and placement of plants. This map will be useful in explaining the project to neighbors, city officials or maintenance crews.

### Survey vegetation.

A plant survey of the area may reveal remnants of the plant community that previously existed on the site. For example, if native wetland grasses and forbs grow nearby or on the site, include those in the plant list. Seeds of these plants could be collected and used in the project. The site may be covered with shrubs, vines or weedy vegetation. If so, determine what vegetation should be removed.

### Research land use history.

(Call 1-800-DIG-RITE or local utility companies to locate underground pipes and power lines.)

Are there existing low depressions, swales, or ponds? Sometimes damaged ponds are difficult to see since they no longer hold water, but they have the potential to make excellent rain gardens or overflow areas. Look for evidence that a wetland existed

on the site. Do neighbors talk about wet areas, flooding, or standing water? Do wetland plants exist in the area?

### Percolation Test

Determine the percolation rate by digging a test hole one foot deep. Fill it with water, let it drain, then fill it again and observe how quickly the water disappears.

- If water drains at a rate of a quarter inch per hour or more then a rain garden will work on that site.
- If water drains less than a quarter inch per hour, walk to a different place in the yard and perform another test.
- If you can't find a site that drains at this rate, you may attempt to increase the percolation rate by tilling compost into the soil or drilling holes and filling them with compost or clean gravel. You may also install rain barrels or cisterns to capture water.
- If you can't attain the recommended percolation rate, consider replacing some of your lawn with a regular native plant garden. Gardens planted with native plants are better than lawn for increasing stormwater infiltration.

### Rain Garden Placement

- Rain gardens should be at least 10 feet from any structure.
- Rain gardens should overflow to the street, driveway or nearby drainage or creek, not toward any structure or towards a neighboring property.

Case Study: Shooting Star Nursery, Frankfurt, Kentucky.



Left: Downspouts on building flow underground to rain garden. Middle: Rain garden with building in background. Right: Rain garden overflows through rock spillway to lower pond.

Case Study: Missouri Methodist Conference, Columbia, Missouri.



Left: Water flows off roof and into bioswale. Middle: Water runoff from parking lot enters bioswale. Right: Rain garden basin with wetland species and river gravel.

Case Study: Missouri Department of Conservation, Columbia, Missouri.



Left: Rain water enters rain barrel from downspout. Rain barrel overflows into basin. Middle: Rain garden basin with pickerel weed. Right: Rain garden overflows into parking lot.

## Planning and Design

### Location and Layout

Observe topography and water flow during periods of heavy rainfall. Ideal sites have a gentle slope and a naturally occurring low area or an area where downspouts and other runoff can be directed. You may need to direct runoff from its source to the rain garden by reshaping existing soil contours.

A good rule of thumb is to locate your rain garden at least 10 feet away from buildings. Direct the overflow spillway into existing drainage ditches, storm-water sewers, ponds or creeks and away from neighboring houses, driveways, or sidewalks. (See rain garden illustration starting on p. 4)

### Size and Shape

Rain garden size is related to soil type and the amount of impervious surfaces (rooftops, driveways, sidewalks or mowed lawns). The larger the surface, the larger the rain garden. Also, clay soils require larger rain gardens.

### How to Calculate Size

Your rain garden should be 10-30% of the size of the impermeable surfaces that you choose to collect from (roof, driveway or sidewalk) and 6 inches deep.

If you have 1,000 square feet of impermeable surface and you choose 10%, your rain garden will be 100 square feet. At 20% it will be 200 square feet and at 30% it will be 300 square feet. The bigger you choose to make the rain garden, the greater your capacity to capture rainwater.



Above: Examples of natural style rain gardens.





Above: Examples of traditional style rain gardens.

## Design Elements

Determine the design style.

### Natural style

This style emulates a natural wetland. Plants are randomly placed, approximately one plant per square foot. The design should include elements such as groundcover or mowed turf edges, split-rail fencing, boulders, birdhouses or feeders to give the garden an intended appearance. Natural gardens often have equal portions of forbs (showy flowering plants) to grasses and sedges. These gardens are often seeded or planted with small plugs.

### Traditional style

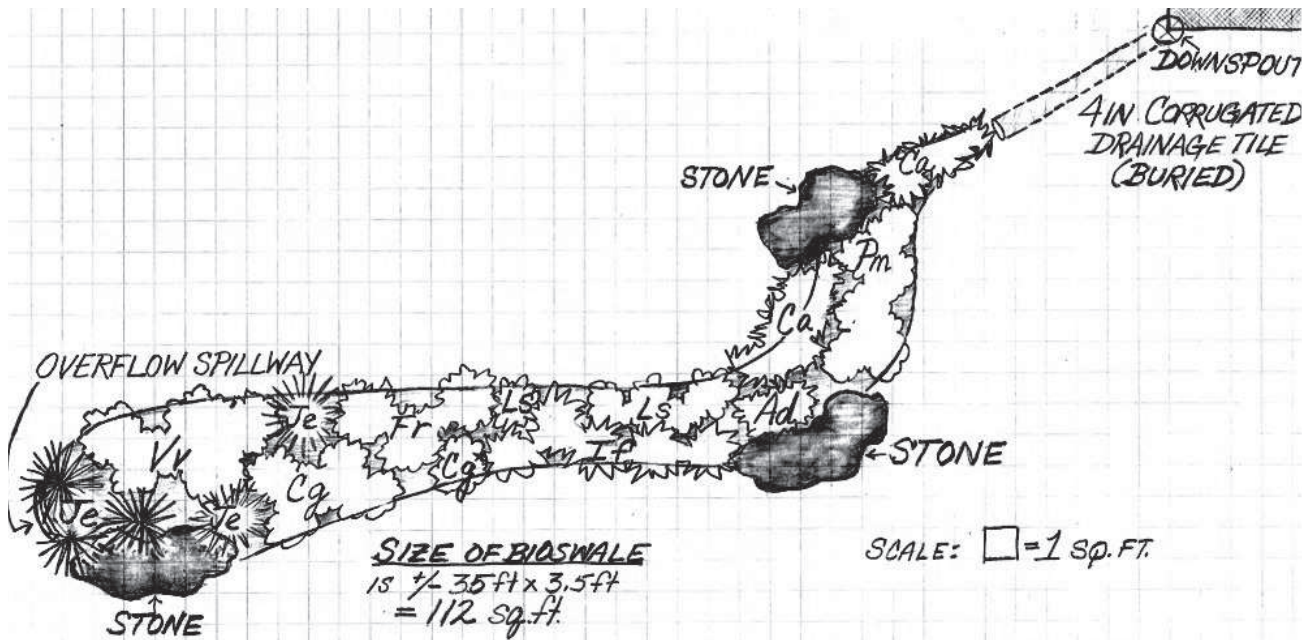
This style is considered a conventional approach to garden design. It may involve massing single species, repetition or planting in regular lines or curves. Also, a larger portion of flowers to grasses results in a more conventional appearance. This style of garden is planted with three inch to one gallon size plants. For a dramatic effect, choose plants whose leaf textures and forms have good contrast. In other words, combine plants with large coarse leaves next to those with narrow fine leaves. Also include plants that flower during spring, summer, and fall for color all season.

## Typical Schedule

Before going further, create a step-by-step schedule so each step is done in sequence.

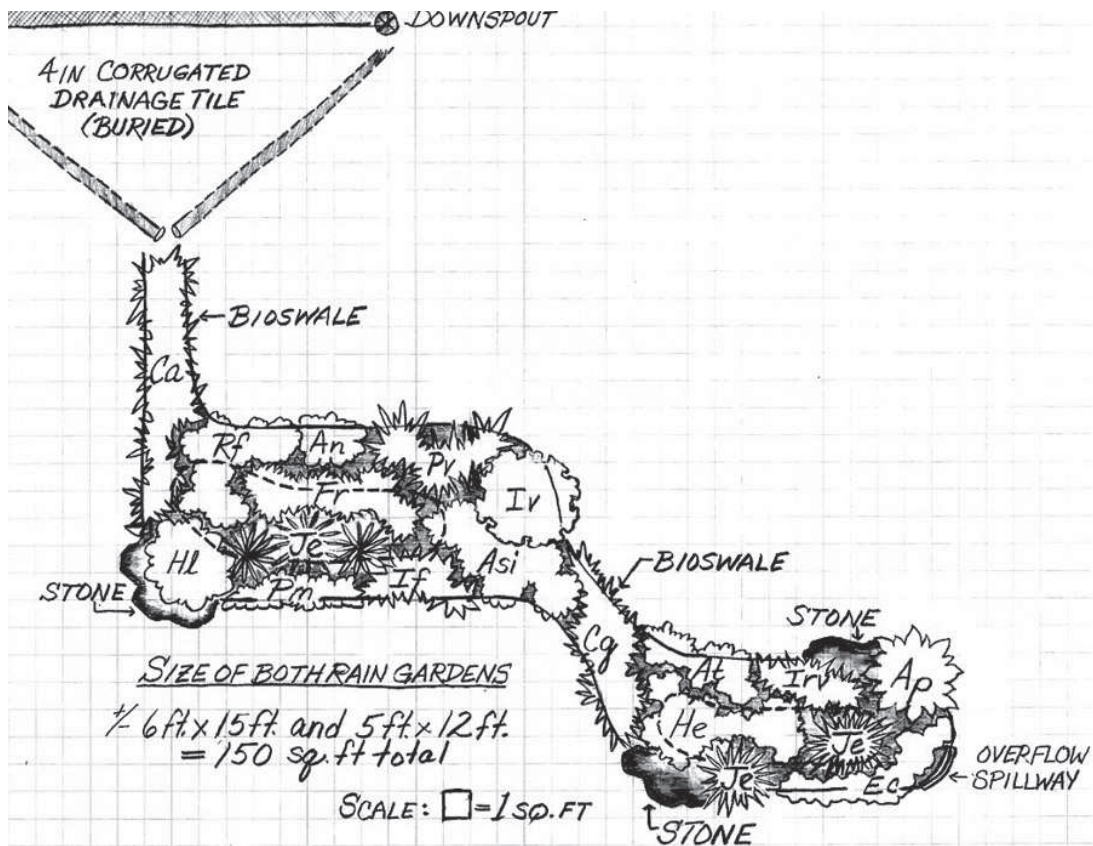
Rain Garden Construction Schedule	
If planting...	Gardens less than 300 square feet
Winter	Evaluate site, create design, select plants, call 1-(800)-DIG-RITE.
Winter/Spring plants.	Layout garden, lay pipe, shape soil, construct berm, acquire
Spring/Summer	Plant, mulch, water, weed. Cut back plants that grow faster than others. During the first growing season, vigorous plants will take over if not pruned.
If seeding...	Gardens more than 300 square feet
Year 1	
Winter	Evaluate site, select plants, design space.
Winter/Spring	Lay out garden, lay pipe, shape soil, construct berm, acquire plants.
Summer/Fall	Eliminate weeds with repeated applications of herbicide. Follow label recommendations carefully. Acquire seed collecting or purchasing. See sample seed mix on p. 17 + 18.
Winter	Seed rain garden. No tilling, discing, or harrowing required. Sow seed on bare soil and press it in with tractor tires or cultipacker. When sowing on slopes, follow recommendations for dealing with slopes below.
Year 2	
Spring	Seedlings germinate. Water during dry spells or drought.
Spring/Fall	Mow area to a height of 6 inches with string trimmer, lawn mower, or brush-hog. Prevent weeds from growing taller than
14 inches.	
Year 3	
	Many species mature and flower. Follow the recommended maintenance on p.19.

## Sample Designs for Rain Gardens



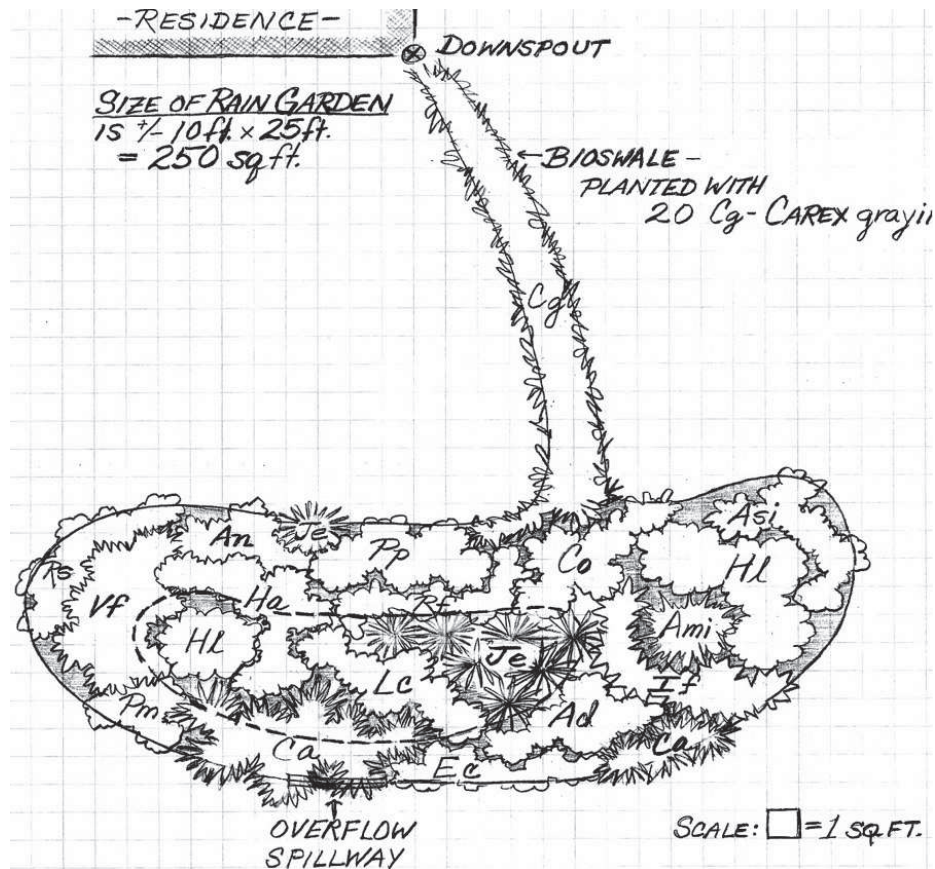
### Plant List: Bioswale

Code	Quantity	Scientific Name	Common Name
Ad	1	Aster drummondii	Drummond's aster
Ca	6	Carex annectans	Yellow-fruited sedge
Cg	5	Chelone glabra	White turtlehead
Fr	3	Filipendula rubra	Queen of the prairie
If	5	Iris fulva	Copper iris
Je	5	Juncus effusus	Soft rush
Ls	5	Lobelia siphilitica	Blue lobelia
Pm	6	Phlox maculata	Meadow phlox
Vv	5	Veronicastrum virginicum	Culver's root



### Plant List: Bioswale and Rain Garden

An	1	Aster novae-angliae	New England aster
Ap	1	Aesculus pavia	Red buckeye
Asi	5	Asclepias incarnata	Swamp milkweed
At	3	Amsonia tabernaemontani	Bluestar
Ca	10	Carex albicans	White tinged sedge
Cg	7	Carex grayii	Bur sedge
Ec	5	Eupatorium coelestinum	Wild ageratum
Fr	6	Filipendula rubra	Queen of the prairie
Ha	8	Helenium autumnale	Sneezeweed
Hl	1	Hibiscus lasiocarpus	Rose mallow
If	3	Iris fulva	Copper iris
Irv	3	Iris virginica	Southern blue flag
Iv	1	Ilex verticillata	Winterberry
Je	3	Juncus effusus	Soft rush
Pm	3	Phlox maculata	Meadow phlox
Pv	3	Panicum virgatum	Switch grass
Rf	6	Rudbeckia fulgida	Orange coneflower



### Plant List: Bioswale and Rain Garden

Code	Quantity	Scientific Name	Common Name
Ad	5	<i>Aster drummondii</i>	Drummond's aster
Ami	1	<i>Amsonia illustris</i>	Shining bluestar
An	3	<i>Aster novae-angliae</i>	New England aster
Asi	5	<i>Asclepias incarnata</i>	Swamp milkweed
Ca	11	<i>Carex albicans</i>	White tinged sedge
Co	5	<i>Chelone obliqua</i>	Rose turtlehead
Ec	6	<i>Eupatorium coelestinum</i>	Wild ageratum
Ha	8	<i>Helenium autumnale</i>	Sneezeweed
HL	4	<i>Hibiscus lasiocarpus</i>	Rose mallow
If	7	<i>Iris fulva</i>	Copper iris
Je	8	<i>Juncus effusus</i>	Soft rush
Lc	6	<i>Lobelia cardinalis</i>	Cardinal flower
Pm	3	<i>Phlox maculata</i>	Meadow phlox
Pp	5	<i>Phlox paniculata</i>	Garden phlox
Rs	6	<i>Rudbeckia subtomentosa</i>	Sweet coneflower
Rf	6	<i>Rudbeckia fulgida</i>	Orange coneflower
Vf	5	<i>Vernonia fasciculata</i>	Prairie ironweed

## Site Preparation

Call 1-(800)-Dig-Rite at least three days before any digging, excavation or bed prep, to have underground pipes and cables located and marked. Stay two feet away from utility lines.

### Layout

Use rope or garden hose to define the basic shape. Mark the final layout with stakes before digging.

### Piping

Replace, repair or relocate gutters and downspouts where necessary. If you choose to run water underground to a bioswale or rain garden, connect downspouts to 4-inch, corrugated drainage tile (6-inch or larger for commercial applications).

### Soil Shaping

Soil dug from the bioswale, rain garden, and settling basin typically is used to construct the berm. Step back from time to time to observe elevation and slope. Use a line-level when you are close to the final grade to ensure your rain garden base and berm are level. The overflow spillway should be a few inches lower than the top of the berm.

### Rock Placement

Place large gravel, rocks or boulders in the bioswale to slow waterflow and create visual interest. Place rocks or a flat stone beneath downspouts or at point where drainage tile enters the rain garden to prevent erosion. Rocks also may be placed in the rain garden and within the overflow spillway.

### Soil Compaction

Water infiltration rates can be increased in clay soils by loosening compacted soil with hand-digging, tilling, plowing or with the addition of humus, gypsum or sand.



Above: Wood shavings erosion control mat shown interplanted with sedges.

Below: Rolling out erosion control mat.

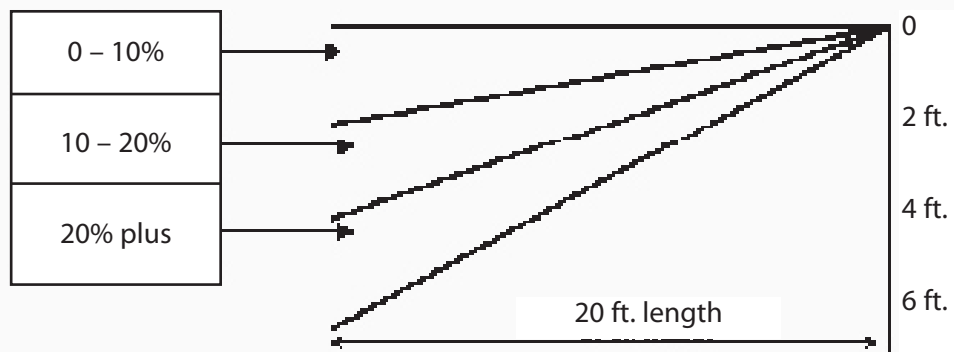
## Dealing with Slopes

Steep slopes pose problems. Slopes with a grade above 10 percent may need to be stabilized. There are several materials available to keep seed, plugs, and soil in place while plants become established.

0 – 10% slope: 2 ft. or less drop in a 20 ft. distance. Gentle slopes are ideal and easy to work with and do not require erosion control fabric.

10 – 20% slope: 4 ft. or less drop in a 20 ft. distance. Steeper slopes can present a challenge and use of erosion control fabric should be considered.

Above 20% slope: 5 ft. or less drop in a 20 ft. distance. Once the percent slope is above 20%, erosion control is strongly recommended.



### Slope-Stabilization Mats For Erosion Control

Type	Brand name	Description
Jute Fiber mat	Geojute	Open mesh construction. Decomposes in two years or less.
Wood shavings mat	Curlex No.1	Recommended for seeded projects. Product is biodegradable in 6-10 months in full sun. Longer in shade.
Coconut Fiber mat	Various brands	Also called Coir or geocoir. Decomposes in one year.



### How to Calculate an Acre of Land

An acre contains 4,840 square yards or 43,560 square feet. If your plot is about 200 feet by 200 feet then you have 40,000 square feet or just under one acre.

## Installation

### Planting

Small rain gardens (up to 300 square feet) should be planted with three-inch to one-gallon size plants in the spring. While more expensive than seeding, plants mature and flower more quickly. If you choose a more traditional garden style, plant larger plants two to three feet apart and mass single species for greater flowering impact. If you desire a natural style, plant plugs on 1-1.5 foot centers. See the "Notes" column of the species selection guide for spacing recommendations. Water every 2-3 days until plants become established and begin new growth (about 3-4 weeks). Mulch can float away during rain events; therefore, mulching is not recommended until spring rains end.

During the first growing season, vigorous species will take over if not kept pruned.

### Seeding

Seeding is recommended for large areas (from 300 square feet to several acres) because planting plugs on this scale can be cost-prohibitive. Seeding should be done in early winter. Seeding requires three years to mature and flower, so patience is needed. For detailed instruction on seed collection, cleaning, storage, mixing, sowing, maintenance, and seedling identification, see [Chapter One: Prairie Reconstruction](#).



## Sample Seed Mix for a One-acre Wetland

Scientific Name	Common Name	Weight Per Acre
Sedges, Rushes & Grasses		
Mixed Sedges		
Carex spp.		3.5 lbs. total sedges if you use mixed sedges
C. annectens	Yellow-fruited sedge	2 oz.
C. complinata		4 oz.
C. cristatella	Crested sedge	2 oz.
C. crus-corvii	Raven's foot sedge	4 oz.
C. frankii	Frank's sedge	4 oz.
C. hyalinolepis	Shoreline sedge	4 oz.
C. lanuginosa	Wooly sedge	4 oz.
C. lupulina	Hop sedge	8 oz.
C. lurida	Sallow sedge	8 oz.
C. muskingumensis	Palm sedge	3 oz.
C. shortiana	Short's sedge	4 oz.
C. squarrosa	Squarrose sedge	4 oz.
C. stipata	Sawbeak edge	4 oz.
C. vulpinoidea	Fox sedge	2 oz.
Rushes		
Juncus effusus	Common rush	1 oz.
Juncus biflorus	Two-flowered rush	1 oz.
Scirpus atrovirens	Dark-Green rush	1 oz.
S. cyperinus	Wool grass	1 oz.
S. pendulus	Reddish bullrush	1 oz.
Grasses		
Andropogon gerardii	Big bluestem	8 oz.
Chasmanthium latifolia	Northern creek oats	8 oz.
Spartina pectinata	Prairie cordgrass	2 oz.
Total Sedges, Rushes and Grasses		80 oz. or 5 lbs.

## Sample Seed Mix for a One-acre Wetland (continued)

Scientific Name	Common Name	Weight Per Acre
<b>Forbs</b>		
<i>Alisma plantago-aquatica</i>	Water plantain	1 oz.
<i>Asclepias incarnata</i> or <i>A. sullivantii</i>	Swamp milkweed	5 oz.
<i>Aster novae-angliae</i> or <i>A. puniceus</i>	New England aster	2 oz.
<i>Bidens aristosa</i> or <i>cernua</i>	Marsh marigold	1 oz.
<i>Boltonia asteroides</i>	False aster	1 oz.
<i>Chelone glabra</i> or <i>C.obliqua</i>	Turtlehead	1 oz.
<i>Eupatorium coelestinum</i>	Mist flower or wild ageratum	2 oz.
<i>E. perfoliatum</i> or <i>E. purpureum</i>	Joe Pye weed	3oz.
<i>Helenium autumnale</i>	Sneezeweed	2 oz.
<i>Hibiscus lasiocarpus</i>	Rose mallow	5 oz.
<i>Hibiscus laevis</i>	Rose mallow	5 oz.
<i>Heuchera richardsonii</i>	Alum root	2 oz.
<i>Iris virginica</i>	Southern blue flag	8 oz.
<i>Lobelia cardinalis</i>	Cardinal flower	1 oz.
<i>Lobelia siphilitica</i>	Blue lobelia	1 oz.
<i>Ludwigia alternifolia</i>	Seedbox	1 oz.
<i>Lycopus americanus</i>	Water horehound	1 oz.
<i>Lythrum alatum</i>	Loosestrife	1 oz.
<i>Mimulus ringens</i> or <i>alatus</i>	Monkey flower	1 oz.
<i>Monarda fistulosa</i>	Wild bergamot	2 oz.
<i>Pedicularis lanceolata</i>	Swamp wood betony	3 oz.
<i>Penstemon digitalis</i>	Foxglove beard-tongue	3 oz.
<i>Phlox paniculata</i> or <i>P. maculata</i>	Meadow phlox	5 oz.
<i>Pycnanthemum incanum</i>	Mountain mint	2 oz.
<i>Rudbeckia fulgida</i>	Orange coneflower	3 oz.
<i>R. subtomentosa</i>	Sweet coneflower	3 oz.
<i>Silphium perfoliatum</i>	Cup plant	5 oz.
<i>Solidago ridellii</i> or <i>S. patula</i>	Goldenrod	2 oz.
<i>Verbena hastata</i> or <i>V. stricta</i>	Blue vervain	3 oz.
<i>Vernonia altissima</i>	Prairie ironweed	3 oz.
Total Forbs:		80 oz. or 5 lbs.
Grand Total:		10 lbs. PLS per acre

\*PLS means pure live seed, which is seed that has been tested for purity and viability. This is done by most seed nurseries and should be included in your seed order.

## Maintenance

Maintenance of a mature rain garden is considerably less than a comparable area of lawn.

### Pruning and dead-heading

Leave stems and seed heads standing in fall and winter to add visual interest to the landscape and to provide food and cover for birds. Remove dead vegetation in spring with a string trimmer or pruner.



### Fertilizing

Don't fertilize a rain garden. It is not necessary and will stimulate weed growth. Light annual application of compost improves soil fertility and is beneficial.

### Mulching

Annual one to two-inch applications of compost in late fall or early winter are beneficial in first growing season. An annual application of mulch is not necessary once plants are established. However, mulch does add a manicured look and provides a "garden" appearance.

### Weeding

Most weed seedlings cannot survive periods of flooding, a definite advantage in weed control. Weeds that persist after flooding should be pulled manually. By the third year, plants should be mature enough to compete and crowd out most weed species so weeding will be minimal.

### Maintaining edges

Borders are important. A border defines the edge of the garden just as a frame defines a painting. A strip of mowed turf, buffalo grass, or a walking path at the edge of a rain garden helps set the area apart. Borders may include split-rail fences, low walls, shrub masses or a simple trellis.



Stepping stone path at edge of rain garden.



Gravel path edge.



Split-rail fence and prairie dropseed edge.

### Mosquitos

Rain gardens typically don't have standing water for more than a few days, which is not long enough for mosquitoes to complete a life cycle. Gardens that have a settling basin planted with a diversity of native plants will attract mosquito predators such as aquatic insects, dragonflies, tadpoles, frogs, toads, some bird species and bats. (See facing page).

If your rain garden develops a population of mosquitos in the early phases of installation, a good commercial product to use is Mosquito Dunks™. Top minnows are very effective control. They are available at bait shops, pet stores and garden centers who specialize in aquatic plants.



A diversity of native plants promotes insect diversity which is the best control of mosquitos.



Amphibians and aquatic insects help control mosquitos naturally.

## Species Selection Guide

Rain gardens are full of water during storms and dry out during dry weather. The plants recommended in this manual generally tolerate both extremes.

There are three descriptions in the 'Light and Moisture Requirement' column that merit attention. They are defined below to aid in your decisions on placement of species within the zones of a rain garden.

### Wet to mesic

These species are well suited to the alternating wet and dry zones of a rain garden, specifically the bioswale, the transition zone and the overflow spillway.

### Wet to submerged

These species grow at the consistently moist margins of ponds and rivers. They require an area of constant moisture and are suitable for the settling basin of a rain garden.

### Submerged

These species grow in the water zone of ponds and rivers. Their roots consistently are under water. The settling basin can be made to permanently hold water by constructing the bottom out of compacted clay or a pond liner.

Right (top to bottom): Arrowhead, Copper Iris, Swamp Aster and Touch-me-not. Below: Fringed Sedge.



## Grasses, Sedges and Rushes

Scientific Name	Common Name	Light & Moisture Requirement	Height, etc.
<b>Grasses</b>			
<i>Chasmanthium latifolium</i>	Northern creek oats	Sun to shade/ Wet to mesic.	3-4 ft.
<i>Panicum virgatum</i>	Switch grass	Sun to part shade Wet to mesic	4-5 ft.
<i>Spartina pectinata</i>	Prairie cordgrass	Sun/Wet to mesic by rhizomes	4-8ft. Quickly spreads
<b>Sedges &amp; Rushes</b>			
<i>Carex albicans</i> var <i>albicans</i>	White-tinged sedge	Sun to part shade Dry to mesic	12 inches. Clump-forming
<i>Carex annectens</i>	Yellow-fruited sedge	Sun to part shade Wet to mesic	2-3 ft. Clump-forming
<i>Carex pellita</i>	Woolly sedge	Sun/Wet	Quickly spreads by rhizomes.
<i>Carex lupulina</i>	Hop sedge	Sun to part shade Wet	2-3 ft.
<i>Carex lurida</i>	Shallow sedge	Sun to part shade Wet	2 ft. Clump-forming
<i>Carex muskingumensis</i>	Palm sedge; swamp sedge	Sun to part shade Wet to mesic	2-3 ft.
<i>Carex shortiana</i>	Short's sedge	Sun to part shade Wet to mesic	2-3 ft. Clump-forming
<i>Carex squarrosa</i>	Squarrose sedge	Sun/Wet to mesic	2-3 ft. Clump-forming
<i>Carex vulpinoidea</i>	Fox sedge	Sun to part shade Wet to mesic	2-3 ft. Clump-forming
<i>Juncus effusus</i>	Soft rush	Sun/Wet to mesic	2-3 ft. Clumping initially, then spreads by rhizomes.

Scientific Name	Common Name	Light & Moisture Requirement	Height, etc.
<i>Scirpus atrovirens</i>	Dark green rush	Sun/Wet	3-4 ft. Clump-forming
<i>Scirpus cyperinus</i>	Wool grass	Sun/Wet	3-4 ft. Clump-forming
<i>Scirpus pendulus</i>	Nodding bulrush	Sun/Wet	2-3 ft. Clump-forming
<i>Scirpus validus</i> ( <i>Schoenoplectus taebarnaemontani</i> )	Great bulrush	Sun/Wet	3-4 ft. Quickly spreads by rhizomes
<i>Amsonia illustris</i>	Shining bluestar	Sun to part shade Wet to mesic	3 ft. Lt. blue fls. April-May

### Flowering Perennials

<i>Amsonia tabernaemontana</i>	Bluestar	Sun to part shade Wet to mesic	2-3 ft. Blue fls. May-June
<i>Asclepias incarnata</i> source for butterflies;	Swamp milkweed	Sun/Wet to mesic July-Oct.; nectar	2-4 ft. Pink to wht. fls. larval food for monarch butterfly
<i>Asclepias sullivantii</i> source for butterflies;	Prairie milkweed	Sun/Wet to mesic June-July; nectar	2-3 ft. Salmon pink fls. larval food for monarch butterfly. Spreads by rhizomes.
<i>Aster drummondii</i> ( <i>Symphiotrichum drummondii</i> )	Drummond aster	Sun to part shade Wet to mesic	2-3 ft. Lt. blue fls. Aug.-Oct.
<i>Aster novae-angliae</i> ( <i>Symphiotrichum novae-angliae</i> )	New England aster	Sun to part shade Wet to mesic	3-4 ft. Purple fls. Aug.-Oct.; good nectar source for butterflies
<i>Aster puniceus</i> ( <i>Symphiotrichum puniceum</i> var <i>firmus</i> )	Swamp aster	Sun to part shade Wet to mesic	3-5 ft. Lavender fls. Aug.-Sept.
<i>Athyrium filix femina</i>	Lady fern	Shade to part shade/Wet to	2 ft. Finely textured fronds



Scientific Name	Common Name	Light & Moisture Requirement	Height, etc.
<i>Boltonia asteroides</i>	False aster	mesic Sun to part shade Wet to mesic	4-7 ft. Large clusters of white fls. Aug.-Sept.
<i>Chelone glabra</i>	White turtlehead	Sun to part shade Wet to mesic	2-3 ft. White fls. Aug.-Sept.
<i>Chelone obliqua</i>	Rose turtlehead	Sun or shade/Wet to mesic	3 ft. Rosy-purple fls. Aug.-Sept.
<i>Eupatorium coelestinum</i>	Mist flower; wild ageratum	Sun to shade/Wet to mesic	1-2 ft. Lavender fls. Aug.-Sept.
<i>Eupatorium fistulosum</i>	Joe Pye weed	Sun to part shade Wet to mesic	5-8 ft. Pink fl. clusters Aug.-Sept.



Rain garden in Whitmire Wildflower Garden.



Private rain garden.

Scientific Name	Common Name	Light & Moisture Requirement	Height, Bloom, etc.
<i>Eupatorium purpureum</i>	Joe Pye weed clusters June-July	Sun/Wet to mesic	4-6 ft. Mauve-pink. fls.
<i>Filipendula rubra</i>	Queen of the prairie	Sun/Wet to mesic	3-4 ft. Pink. fls. June-July
<i>Gentiana andrewsii</i>	Bottle gentian	Shade to part shade/Wet to mesic	1-2 ft. Cobalt blue fls. Sept.-Oct.
<i>Helenium autumnale</i>	Sneezeweed	Sun to part shade Wet to mesic	2-3 ft. Yellow fls. July-Sept.
<i>Hibiscus lasiocarpus</i>	Rose mallow	Sun to part shade Wet to mesic	4-5 ft. White and pink fls. Aug-Sept.
<i>Hibiscus laevis</i>	Rose mallow	Sun to part shade Wet to mesic	3-5 ft. Pink fls. July-Sept.
<i>Iris brevicaulis</i>	Short-stemmed Iris	Sun to shade Wet to mesic	6-12 in. Blue fls. April-May
<i>Iris fulva</i>	Copper Iris	Sun to part shade Wet to mesic	3 ft. Red-copper fls. June-July
<i>Iris virginica</i> var. <i>shrevei</i>	Southern blue flag	Sun/Wet to mesic	2-3 ft. Blue fls. May-June
<i>Lobelia cardinalis</i>	Cardinal flower	Sun or shade Wet to mesic	2-4 ft. Red fls. July-Aug.; source of nectar for hummingbirds
<i>Lobelia siphilitica</i>	Blue lobelia	Sun or shade/Wet to mesic	2-3 ft. Blue fls. Aug.-Oct.
<i>Matteuccia struthiopteris</i>	Ostrich fern	Shade to part shade/Wet to mesic	3-4 ft. Produces cinnamon-colored spore fronds in late summer. Spreads by rhizomes.
<i>Mimulus ringens</i>	Monkey flower	Sun/Wet to mesic	1-2 ft. Lavender fls. July-Sept.

Scientific Name	Common Name	Light & Moisture Requirement	Height, Bloom, etc.
<i>Monarda fistulosa</i>	Wild bergamot	Sun to part shade Wet to mesic	3-4 ft. Pink fls. June-Aug. Butterfly magnet.
<i>Nuphar luteum</i> July-Sept.; leaves float	Spadderdock	Sun/Submerged 1-3 ft.; Yellow fls.	Needs water depth of on surface of water
<i>Nymphaea odorata</i>	Fragrant water lily	Sun/Submerged 1-3 ft.; White fls.	Needs water depth of  July-Sept.; leaves and flwr. float on water surface
<i>Onoclea sensibilis</i>	Sensitive fern	Shade to part shade/Wet to mesic	2-3 ft. Spreads by rhizomes.
<i>Oenothera pilosella</i>	Prairie sundrops	Sun/Wet to mesic	1-2 ft. Yellow fls. June
<i>Penstemon digitalis</i>	Foxglove beard tongue	Sun to part shade Wet to mesic	2-3 ft. White. fls. May-July.; nectar source for hummingbirds
<i>Phlox glaberrima</i>	Smooth phlox	Sun/Wet to mesic	2-3 ft. Pink fls. May-June; nectar source for butterflies and hummingbirds
<i>Phlox maculata</i>	Meadow phlox	Sun to shade Wet to mesic	3-4 ft. Rose-pink fls. June-July; nectar source for butterflies and hummingbirds
<i>Phlox paniculata</i>	Garden phlox	Sun to shade Wet to mesic	3-5 ft. Purple-pink fls. July-Oct; nectar source for butterflies and hummingbirds
<i>Physostegia virginiana</i>	False dragonhead	Sun to part shade Wet to mesic	3-4 ft. Pink fls. July-Sept.
<i>Pontaderia cordata</i>	Pickerel weed	Sun to part shade Submerged	2-3 ft. Lavender fls. July-Sept.
<i>Pycnanthemum virginianum</i>	Mountain mint	Sun to part shade Wet to mesic	3-4 ft. White fls. July-Sept.; excellent

Scientific Name	Common Name	Light & Moisture Requirement	Height, Bloom, etc.
<i>Rudbeckia fulgida</i>	Orange coneflower	Sun or part shade Wet to mesic	nectar source for butterflies and bees. 2-3 ft. Yellow fls. July-Aug.
<i>Rudbeckia subtomentosa</i>	Sweet coneflower	Sun to part shade Wet to mesic	3-4 ft. Yellow fls. June-Aug.
<i>Sagittaria</i> sp.	Arrowhead	Sun to part shade Submerged	2-4 ft. white fls. In spikes July-Sept.
<i>Saururus cernuus</i>	Lizard's tail	Sun to part shade Submerged	3-4 ft. long white fls. bend over like a tail. June-Aug.
<i>Senecio aureus</i>	Golden ragwort	Shade to part shade/Wet to mesic	6-12 in. Yellow fls. April-May; spreads vigorously by rhizomes.
<i>Silphium perfoliatum</i>	Cup plant	Sun/Wet to mesic	5-12 ft. Yellow fls. July-Sept.; birds drink water from leaves.
<i>Solidago patula</i>	Swamp goldenrod	Sun/Wet to mesic	4-6 ft. Yellow fls. Aug.-Oct.
<i>Solidago riddellii</i> ( <i>Oligoneuron riddellii</i> )	Riddell's goldenrod	Sun/Wet to mesic	3 ft. Yellow. fls. Sept.
<i>Thalia dealbata</i>	Wild canna	Sun/Submerged	4-7 ft. Purple fls. July-Sept.
<i>Vernonia fasciculata</i>	Prairie ironweed	Sun to part shade Wet to mesic	3-5 ft. Purple fls. Aug.-Oct.
<i>Veronicastrum virginicum</i>	Culver's root	Sun - part shade Wet to mesic	3-4 ft. White to pink fls. June-Aug.
Native Shrubs and Small Trees			
<i>Aesculus pavia</i>	Red buckeye	Sun to part shade Wet to mesic	10-15 ft. Red fls. April-May; favorite of hummingbirds

Scientific Name	Common Name	Light & Moisture Requirement	Height, Bloom, etc.
<i>Alnus serrulata</i>	Smooth alder	Sun to part shade Wet to mesic small cones in Sept.	20 ft. Fls. are catkins March-April; produces
<i>Amorpha fruticosa</i>	False indigo	Sun to part shade Wet to mesic	8-12 ft. Purple fls. May-June
<i>Aronia melanocarpa</i>	Black chokecherry	Sun to part shade Wet to mesic April-May.	6-9 ft. White fls. Blk fruit in fall attracts birds
<i>Asimina triloba</i>	Pawpaw	Shade to part shade/Wet to mesic	20-30 ft. Reddish- purple fls. March-May; edible fruit in Sept. provides food for birds and mammals; larval food plant for Zebra swallowtail butterfly
<i>Cephalanthus occidentalis</i>	Buttonbush	Sun to part shade Wet to mesic	6-10 ft. White fls. June-Aug.; favorite necter plant for butterflies
<i>Cornus amomum ssp. obliqua</i>	Swamp dogwood	Sun to shade Wet to mesic	8-10 ft. white fls. May-July; blue fruit in late summer provides food for many birds
<i>Cornus racemosa</i>	Gray dogwood	Shade to part shade/Wet to mesic	6-10 ft. white fls. on red stem May- July; white fruit late summer; food for many birds
<i>Euonymus atropurpureus</i>	Eastern wahoo	Shade to part shade/Wet to mesic	10-15 ft. Purplish fls. May-June; attractive, rose-colored fruit Sept.-Oct. provides food for many birds
<i>Forestiera acuminata</i>	Swamp privet	Sun to part shade Wet	20-30 ft. Yellow fls. March-April
<i>Hamamelis vernalis</i> Wet to mesic	Vernal witch hazel fls. Jan-Feb.	Sun to part shade	8-9 ft. Fragrant yellow
<i>Hamamelis virginiana</i>	Eastern witch hazel	Sun to part shade Wet to mesic	6-10 ft. Fragrant yellow fls. Oct.-Nov.
<i>Ilex decidua</i>	Deciduous holly	Sun to part shade	10-15 ft. White fls.

Scientific Name	Common Name	Light & Moisture Requirement	Height, etc.
Lindera benzoin	Spicebush	Wet to mesic Sun to part shade Wet to mesic	April-May; red fruit in winter attracts birds 10 ft. Fragrant yellow fls. March-May; larval food for the spice bush swallowtail butterfly
Ilex verticillata	Winterberry	Sun to part shade Wet to mesic	6-12 ft. White fls. April-May; red berries in fall attract birds
Itea virginica	Sweetspire	Sun to part shade Wet to mesic	6-10 ft. Fragrant white fls. May-June; excellent red fall color
Rosa setigera	Prairie rose	Sun/Wet to mesic	6-10 ft. Pink fls. June-Aug.; long-arching branches
Sambucus canadensis	Elderberry	Sun to part shade Wet to mesic	6-10 ft. White fls. clusters June-July; black fruit in late summer attracts birds
Betula nigra	River birch	Sun to part shade Wet to mesic	To 40 ft. Produces catkins in spring; attractive exfoliating bark
Celtis laevigata	Sugarberry	Sun to part shade Wet to mesic	50-90 ft. Fls. inconspicuous; dark fruit in fall provides food for birds and small mammals
Nyssa sylvatica	Black gum	Sun to part shade Wet to mesic	50-80 ft. Fls. inconspicuous; dark fruit in fall provides food for birds
Quercus bicolor	Swamp oak	Sun/Wet to mesic food for mammals	50-80 ft. Fls. inconspicuous; produces acorns that are

## Resources

### Native Nurseries

#### Forrest Keeling Nursery

P.O. Box 135

Elsberry, MO 63343

800-356-2401

(native trees and shrubs)

[www.fknursery.com](http://www.fknursery.com)

#### Hamilton Native Outpost

Elk Creek, MO

(native seed, mail order)

417-967-2190

[www.hamiltonnativeoutpost.com](http://www.hamiltonnativeoutpost.com)

#### Missouri Dept. of Conservation

George O. White Stare Forest Nursery

(native tree and shrub seedling bundles,  
mail order)

[mdc.mo.gov](http://mdc.mo.gov)

#### Missouri Wildflowers Nursery

Jefferson City, MO.

(quart and plug containers and seed)

573-496-3492

[www.mowildflowers.net](http://www.mowildflowers.net)

#### Prairie Hill Farm

Auxvasse, MO

(wholesale native plugs and quart containers)

573-387-4680

[www.prairiehillfarm.biz](http://www.prairiehillfarm.biz)

#### Pure Air Natives

(restoration quantity plants and seed)

[www.pureairnatives.com](http://www.pureairnatives.com)

## Rain Garden Design and Installation

Barker Horticultural Services LLC  
Simon Barker  
573-242-3213  
barkerplants@sbcglobal.net

DJM Ecological Services  
Doug Bauer  
314-478-2388  
www.djmecological.com

New Urban Landscaping  
W. John Nekola  
Kirkwood, MO  
314-517-6053

St. Louis Native Plants  
Susie Van de Riet  
svdr1@sbcglobal.net

## Web Site Resources

Shaw Nature Reserve  
[www.shawnature.org](http://www.shawnature.org)

Missouri Botanical Garden  
Rainscaping Guide  
[www.missouribotanicalgarden.org](http://www.missouribotanicalgarden.org)

Grow Native!  
Missouri Prairie Foundation  
[www.grownative.org](http://www.grownative.org)

St. Louis Chapter  
Wild Ones Natural Landscapers  
[www.stwildones.org](http://www.stwildones.org)

Show Me Rain Gardens  
[www.showmeraingardens.org](http://www.showmeraingardens.org)







