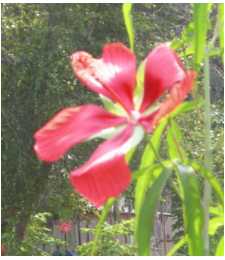


Guide to Selection and Installation of Stormwater Pond Plants



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Plant Selection

Selecting aquatic and shoreline plants for stormwater ponds is more challenging than selecting plants for a typical landscape. The site conditions can vary greatly and are more difficult

to control. Water depth can fluctuate widely over the year and create wet and dry conditions that the plants must be able to tolerate. The water quality can also vary with rainfall and fertilizer inputs and steep slopes can make plant establishment difficult.

The concept of using the right plant in the right place is important in the shoreline environment because the shoreline includes a variety of conditions including a dry slope, a littoral shelf, and deeper water areas. Selecting the right plant requires knowledge of plants, including function, aesthetics, and environmental/growing requirements and knowledge of site characteristics. Three questions to ask about plants are:

1. Aesthetically: what do you want the plant to look like?
2. Functionally: what do you want the plant to do?
3. Environmentally: what conditions does the plant need to grow?

Aesthetics

There are common plant characteristics that are generally considered to have aesthetic value. Most people enjoy a variety of color, texture, and forms in plant material. Aesthetic characteristics describe the look of the plant and can be used to create a pleasing composition that enhances the aquatic habitat. Aesthetics also refers to the organization of plants in the landscape through repetition of plants and color, form, or texture at specific locations in the landscape to create a recognizable pattern.

Color- Color is usually the most attractive visual characteristic of plants, but it also is the most fleeting, as most plants only display prominent color during short bloom periods. Light qualities of the site--sunny or shady areas--affect the perception of color. Warm colors such as white, yellow, orange, and red show up more in aquatic and shady environments because they contrast with the darker blues, greens, and browns of water and foliage. Cool colors such as blues and dark purples are less noticeable because they tend to blend with greens. Including a variety of greens in the aquatic plants will create interest year-around.

References

Denny, G. and Hansen, G. (2012) *Right Plant– Right Place: The Art and Science of Landscape Design-Plant Selection and Siting*. <http://edis.ifas.ufl.edu/ep416>.

Hansen, G. & Alvarez, E. (20120) *Landscape Design: Aesthetic Characteristics of Plants*. <http://edis.ifas.ufl.edu/ep433>.

Texture- Textures are typically described as coarse (large, broad leaves and big stems) medium (average leaves and stems), or fine (tiny leaves, thin stems). Texture can provide contrast and interest, particularly when there is a lack of variety in color. Texture is the most variable quality of a plant- it can change with the seasons when plants lose their foliage, and it can change with viewing distance. Stormwater ponds are often viewed from a distance so bold textured plants with large, broad leaves and big flowers show better. Use a fine textured plant, such as a grass, to contrast with the bold texture and provide more interest.

Form– Growth habit or form, is the most recognizable quality of a plant. Choose the plant form most appropriate for the desired function. It is important to remember that plant change over time as they grow. Form also helps determine if plant material should be used in masses or as individual specimens. In large open areas such as ponds large upright plants with well defined leaves that grow in large clumps are often preferred. Floating plants with broad flat leaves, such as water lilies, work well as long as they don't spread and cover the entire pond surface.

Size- It is important to consider the size of the plant when it is fully mature. Tall plants can sometimes block views when they are mature so consider height as well as spread. The slope to the water affects the visual height of the plant depending on the location of the plant on the slope. Tall plants at the top of the slope will block the view of the water so locate low growing plants at the top of slope and taller plants at the bottom.

Function

When choosing plants for a particular site, consider the Function of the plants. Functional characteristics include density of foliage to block views, density of root mass to prevent erosion, and ability to take up nutrients and pollutants to improve water quality.

Erosion control - Trees in the water at the pond edge can help control erosion by breaking up the wind and wave action that contributes to shore erosion. Large trees that do well in wet conditions include: Red Maple (*Acer rubrum*), Loblolly Bay (*Gordonia lasianthus*), and Bald Cypress (*Taxodium spp.*). Strongly rooted emergent plants also help prevent erosion . Emergent plants include: Bulrush (*Scirpus spp.*), Spike Rush (*Eleocharis app.*), Pickerel weed (*Pontederia cordata*), and Duck Potato



Growing Conditions

A site inventory and analysis will guide plant choices by noting environmental conditions in the pond and on the shoreline. Conditions that affect plants in aquatic habitats include water depth, fluctuating water levels,

foraging fish, soil structure, the slope of the littoral shelf, and light availability. Conditions that affect landside plants include bank slope and soil structure.

Water Depth

Water depth must be considered when choosing plants because wetland plants grow in three different groups or zones with varying water depths. Emergent wetland plants are rooted in the soil in the shallow water of the upper littoral zone with the upper portion of the plant out of the water. Emergent wetland plants are further divided into short-stemmed marginal plants that do well in wet mud or sand and marginal plants that grow on the bank and prefer changing water levels. Submerged plants grow entirely underwater and are typically located in the lower littoral zone where the water is deepest. The floating wetland plants have roots that dangle and are rooted in the pond bottom in the middle littoral zone. Creating deeper areas by excavation can help expand the size of planted areas.

Fluctuating Water Levels

Ponds that have fluctuating water levels present a challenge when selecting plants. The plants need to thrive in both wet and dry conditions, sometimes for extended periods. Emergent plants that are more tolerant of draw-downs (exposed pond soil) include: Pickerel-weed, (*Pontederia* spp.), Duck Potato (*Sagittaria lancifolia*), Bulrush (*Scirpus* spp.), Golden Canna (*Canna flaccida*), Spike Rush (*Eleocharis* sp.) and Blue Flag Iris (*Iris virginica*).

Controlling Grass Carp

Although Grass carp (sterile triploid) are sometimes used for biological control of aquatic vegetation they can present problems with new plantings. Grass carp prefer submerged plants, but they also browse on the tips of young tender emergent plants. To prevent loss of new plants install a barricade around the plants, such as four wire fencing or plastic net fencing from the pond bottom to the top of the water until the plants are larger and less tender.

Soil Structure

Soil (substrate) conditions are important for plant growth. Rocky bottoms in the pond are too hard for plant roots to penetrate and muck soil is too soft and unstable to anchor plants. Sandy soil with some organic matter (between rocks and muck) is usually best. Too much organic matter can create high levels of acids, methane, ethylene, and alcohols which are toxic to plants.

Slope of Littoral Shelf

Steep slopes, that create changes in water levels and growing conditions make establishment more difficult. It is important to determine the average water level along the shoreline on a yearly basis because many plants will die if they are too wet or too dry for long periods. Manipulating the depth and slope is one of the best ways to encourage plant growth. Littoral zone size often increases as the pond gets older because increased sedimentation and water movement decreases the depth of the lake.

Slope of Pond Bank

The slope of the bank leading to the waters edge can present challenges for the establishment of the no-mow or no-maintenance zone. Several techniques can be used to prevent erosion and capture irrigation water for the slope plants. Installing mini-baffles (short lengths of plastic edging or landscape timbers) on the downhill side of plants will hold water and keep soil from eroding. Porous landscape fabric such as burlap or jute will also trap sediment and water. Rip rap made from stone, concrete rubble or pavers can help slow water runoff and creating swales and berms along the bank will intercept water and allow it to percolate.

Light Availability

Light availability is the most important factor in plant growth and is primarily determined by water clarity and depth. Water clarity is determined by organic color and suspended particles, both organic and inorganic. Bottom feeding fish such as carp and catfish can increase suspended sediment which blocks light and may limit plant growth. Slowing surface runoff with plant buffers and no-mow zones and using rip-rap at drain discharge areas will help decrease turbidity caused by water movement. Nutrient levels in ponds, both from soil and human-caused, can affect light availability by increasing algal growth which decreases water clarity. Reducing algae growth will increase light available to plants.

References

White, Gilbert, F., Worthington, E.B., and Ackerman, V.C. (1973) *Man-Made Lakes: Their Problems and Environmental Effects* American Geophysical Union, William Byrd Press, Richmond Virginia.

UF/IFAS Communications, Florida LAKEWATCH, Dept. of Fisheries and Aquatic Sciences. *A Beginner's Guide to Water Management, Aquatic Plants in Florida Lakes*, Information Circular 111, October 2007

Shoreline Plant Installation

1. Shoreline preparation

Remove undesirable plant species in the shoreline area. Remove roots of undesirable species to prevent regrowth.

Determine the average shoreline water level on a yearly basis. This is especially important because water levels may vary dramatically that making plants harder to survive if they are kept too wet or too dry for extended periods.

Measure maximum water depth in areas to be planted. These measurements will assist in deciding the numbers and types of plants you need and the boundaries in which to plant them.

Consider increasing the size of planting zones. Deepening the margins around the edge of a pond can help prevent undesirable plants, such as non-native torpedo grass, from invading into the water.

Develop a detailed planting plan that includes types and numbers of plants needed. The accuracy and detail of your measurements will play a key role in the planting plan. A detailed plan will increase efficiency during planting and promote plant survival.

Note that stormwater ponds are planned and permitted according to Florida Department of Environmental Protection or local Water Management District criteria, and proper approvals must be obtained prior to modifying these types of ponds. Counties and local governments may also have guidelines or policies on stormwater ponds. It is advisable to contact the county public works office to ensure planting plans are permissible.

2. Shoreline plant installation

When to Plant. Perennials and grasses should be planted during peak growing season (in mid-to-late summer) to allow enough time for their root systems to become established before they go dormant in the late fall. Trees and shrubs should be planted in spring and fall when there is adequate rainfall to help them develop strong roots and leafy growth.

Handle wetland plants with care during planting. Plants should be wrapped in wet newspaper to avoid injury and drying. Do not place plants in the trunk of a car or in the back of a truck where they will overheat. When planting, start with plants in the deep water zones and work up the banks. Planting should be conducted in the early morning or late afternoon to avoid the hot midday sun.

Where to Plant. If possible, locate aquatic plants 2 or 3 feet from the planted bank or plant low-growing plants. The gap between the aquatic plants and the shore plants will prevent accidental trimming of aquatic plants with the weed trimmer when maintaining the shore plants on the bank.

Plant in clumps. Planting like species in clumps creates attractive concentrations of color and provides more varied habitat features. Three or four plants of the same species should be installed in the same hole and they will expand into a cluster of plants. Installing plants in clusters will increase survivability of shoreline plants, facilitate management of weeds, and minimize colonization of unwanted plants.

3. Maintenance after installation

Routine maintenance is needed during the initial stage after the installation of plants to allow expansion of the desirable plants and control the growth of invasive species. Desirable native species do not require fertilizers or spray.

Generally, maintenance requirements are minimal after the plantings become established. Herbicides may be needed if undesirable the plants become established after the first year when wetland plants are better established. Only herbicides that are registered specifically for use in wetlands by the U.S. Environmental Protection Agency and the Florida Depart-

Adapted from:

Main, M. B. , Allen, G. M., and Langeland, K. A., 2006. *Creating Wildlife Habitat with Native Florida Freshwater Wetland Plants*. UF IFAS Extension publication. <http://edis.ifas.ufl.edu/fa007>

Seminole County Department of Public Works, (n.d.). *How to Plant Your Lakefront*. <http://www.seminole.wateratlas.usf.edu/upload/documents/How%20to%20Plant%20Your%20Lakefront%20Booklet.pdf>

Wilson, D. and Korb, G., 1999. *Shoreline Plants and Landscaping*. University of Wisconsin–Extension. <http://cfpub.epa.gov/npstbx/files/wiexlandscape.pdf>

Recommended Shoreline Species For Neighborhood Ponds

Water Edge Zone



Height: floating leaves
Light: full sun to partial shade
Water: 30-36"
Distribution: FL Statewide

<http://www.dep.state.fl.us/lands/invaspec/2ndlevpgs/pdfs/Circular4.pdf>

Fragrant Water Lily *Nymphaea odorata*



Height: 2.5 ft.
Light: full sun to partial shade
Water: 6-12"
Distribution: FL Statewide

<http://www.dep.state.fl.us/lands/invaspec/2ndlevpgs/pdfs/Circular4.pdf>

Spikerush *Eleocharis cellulosa & interstincta*



Height: 3 ft.
Light: full sun to partial shade
Water: 6-12"
Hardiness zone: 6-10

<http://www.southeasternflora.com/viewfull.asp?picid=1688>

<http://www.southeasternflora.com/viewfull.asp?picid=1687>

Duck potato *Sagittaria lancifolia*



Height: 3 ft.
Light: full sun to partial shade
Water: 6-18"
Hardiness zone: 3b-10

<http://cherylharner.blogspot.com/2010/02/wetland-plants-and-dragonfly-fever.html>

Pickerelweed *Pontederia cordata*



Height: 3 ft.
Light: full sun to partial shade
Water: 12-18"
Hardiness zone: 8-10

<http://www.dep.state.fl.us/lands/invaspec/2ndlevpgs/pdfs/Circular4.pdf>

http://www.onlineplantguide.com/PlantDetails.aspx?Plant_id=414

Golden canna *Canna flaccida*



Height: 2 ft.
Light: partial shade
Water: 3"
Hardiness zone: 7-11

<http://www.guitarfish.org/2008/08/12/swamp-lilly-flower>

Swamp lily *Crinum americanum*



Height: 4 ft.
Light: full sun
Water: dry to wet; water edge
Hardiness zone: 8b-11

<http://www.apriliani.com/sand-cordgrass>

Sand Cord Grass *Spartina bakerii*



Height: 2 ft.
Light: partial shade
Water: moist to wet; water edge
Hardiness zone: 8b-11

<http://www.wellsphere.com/healthy-living-article/friday-flowers-wild-iris/442029>

Blue Flag Iris *Iris virginica*

Bank Slope Zone



Height: 4 ft.
Light: full sun to partial shade
Water: dry to moist
Hardiness zone: 8-11

http://www.paulverlander.com/index_TR-Tripsacum%20dactyloides-Fakahatchee%20Grass.php

Fakahatchee Grass *Tripsacum dactyloides*



Height: 3 ft.
Light: full sun to partial shade
Water: dry to wet
Hardiness zone: 8-11

http://apofl.com/plants/contract-growing/grasses_/page/2/

Florida Gamagrass *Tripsacum floridanum*



Height: 3 ft.
Light: full sun
Water: dry to wet
Hardiness zone: 7-11

<http://www.dickersonlandscaping.com/nursery/grasses-bamboo.aspx>

Muhly Grass *Muhlenbergia capillaris*



Height: 2 ft.
Light: full sun to partial shade
Water: moist
Hardiness zone: 4-11

http://www.sbs.utexas.edu/bio406d/images/pics/ast/conoclinium_coelestinum.htm

Blue Mistflower *Conoclinium coelestinum*



Height: 1.5 ft.
Light: full sun to partial shade
Water: dry
Hardiness zone: 10-11

<http://vaniliana.wordpress.com/rosliny-plants-plantas/opisy-roslin-plant-files-fichas-de-plantas/>

Scorpion Tail *Heliotropium angiospermum*



Height: 2 ft.
Light: full sun
Water: dry to moist
Hardiness zone: 9-11

<http://www.pbase.com/hjsteed/image/99274631/original>

Blue Porterweed *Stachytarpheta jamaicensis*



Height: 0.5 ft. (as ground cover)
Light: full sun
Water: moist
Hardiness zone: 8-11

http://folsomnps.org/passion_vine.html

Passion Vine *Passiflora incarnata*



Height: 3 ft.
Light: full sun to partial shade
Water: dry to wet
Hardiness zone: 8b-11

<http://njaes.rutgers.edu/images/photos/deerresistance/iris-sibirica.jpg>

African Iris *Dietes iridioides*

Bank Top Zone



Height: 2 ft.
Light: full sun
Water: dry
Hardiness zone:
4-11

<http://www.gossettsnursery.com/plants/juniper-parsons>

Parson's Juniper *Juniperus chinensis 'parsonii'*



Height: 3 ft.
Light: full sun
Water: dry
Hardiness zone:
8-10

<http://www.learn2grow.com/plants/paspalum-quadrifarium-images/>

Crown Grass *Paspalum quadrifolium*



Height: 3 ft.
Light: full sun
Water: dry
Hardiness zone:
8b-11

<http://it.pinellas.k12.fl.us/Teachers7/ByersS/images/BCF4D24A64646B7B7F125C88A2AAD17.jpg>

Beach Sunflower *Helianthus debilis*



Height: 0.5 ft.
Light: full sun
Water: dry
Hardiness zone:
8-11

<http://okeechobee.ifas.ufl.edu/News%20columns/2008.Plants.htm>

Sunshine Mimosa *Mimosa strigillosa*



Height: 4 ft.
Light: full sun
Water: dry
Hardiness zone:
7-10

http://www.floridasnature.com/landscape/lantana_camara.htm

Pineland Lantana *Lantana depressa*



Height: 2 ft.
Light: full sun to
full shade
Water: dry
Hardiness zone:
8b-11

<http://fnpsblog.blogspot.com/2010/08/coonties-captivating-cycads.html>

Coontie *Zamia floridana*



Height: 1.5 ft.
Light: full sun
Water: dry
Hardiness zone:
9-11

<http://nanak-mygardenpath.blogspot.com/2010/04/sunny-blooms.html>

Tampa Vervain *Glandularia tampensis*



Height: 1.5 ft.
Light: full sun to
full shade
Water: dry
Hardiness zone:
8-11

<http://foliagefirst.bestplants.com.au/destiny.html>

Flax Lily *Dianella tasmanica*

Trees and Large/Medium Shrubs– all Zones



<http://www.allnativeflora.com/loblolly>

Loblolly Bay *Gordonia lasianthus*

Height: 50 ft.
Spread: 25 ft.
Light: part sun
Water: wet
Hardiness zone:
8-9



<http://www.arborday.org/trees/detail/Red-Maple>

Red Maple *Acer rubrum*

Height: 45 ft.
Spread: 30 ft.
Light: full sun
Water: wet
Hardiness zone:
8-10



<http://www.texastrees.org/cms/wp-content/uploads/2010/07/bald-cypress>

Bald Cypress *Taxodium spp.*

Height: 60 ft.
Spread: 20 ft.
Light: full sun
Water: wet
Hardiness zone:
8-10



<http://www.awkellys.com/Images/trees/Holly-Dahoon>

Dahoon Holly *Ilex cassine*

Height: 25 ft.
Spread: 15 ft.
Light: full sun/
shade
Water: wet
Hardiness zone:
8-10



<http://www.yorkccd.org/wordpress/wp-content/uploads/2009/12/Buttonbush>

Buttonbush *Cephalanthus occidentalis*

Height: 12 ft.
Spread: 7 ft.
Light: full sun
Water: wet
Hardiness zone:
8-11



<http://www.my-photo-gallery.com/wp-content/uploads/2010/Sweet-Peperb>

Sweet Pepperbush *Clethra alnifolia*

Height: 6 ft.
Spread: 6 ft.
Light: full sun to
full shade
Water: wet
Hardiness zone:
8-9



http://upload.wikimedia.org/wikipedia/commons/1/16/Hamelia_patens_Flowe

Firebush *Hamelia patens*

Height: 15 ft.
Spread: 6 ft.
Light: full sun to
shade
Water: well to
medium drained
Hardiness zone:
9-11



<http://foliagefirst.bestplants.com.au/destiny.html>

Virginia Sweetspire *Itea virginica*

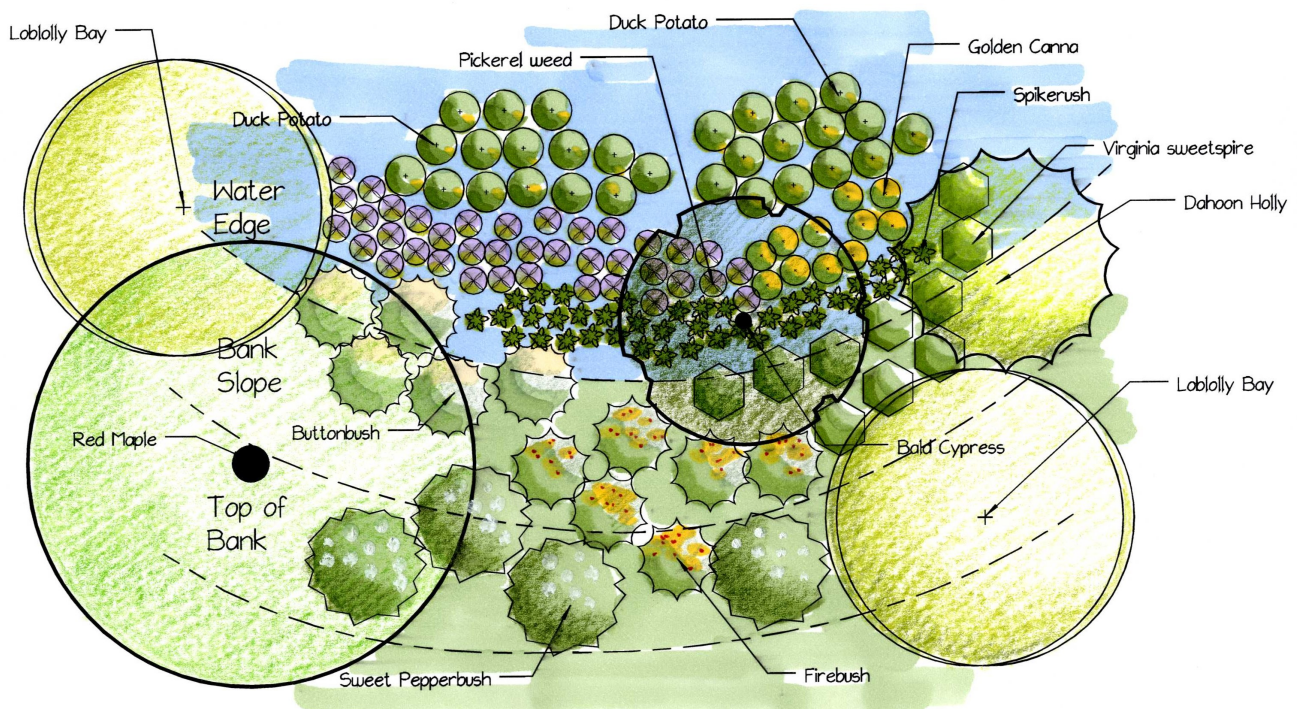
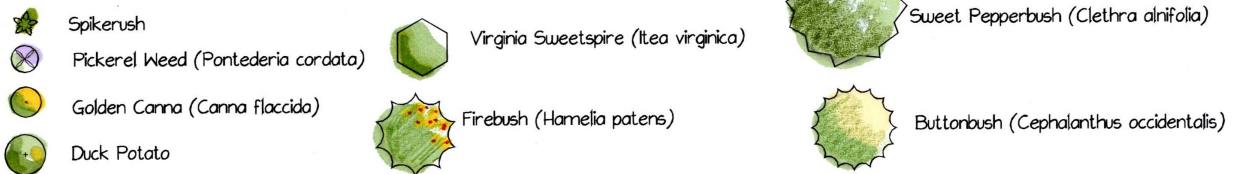
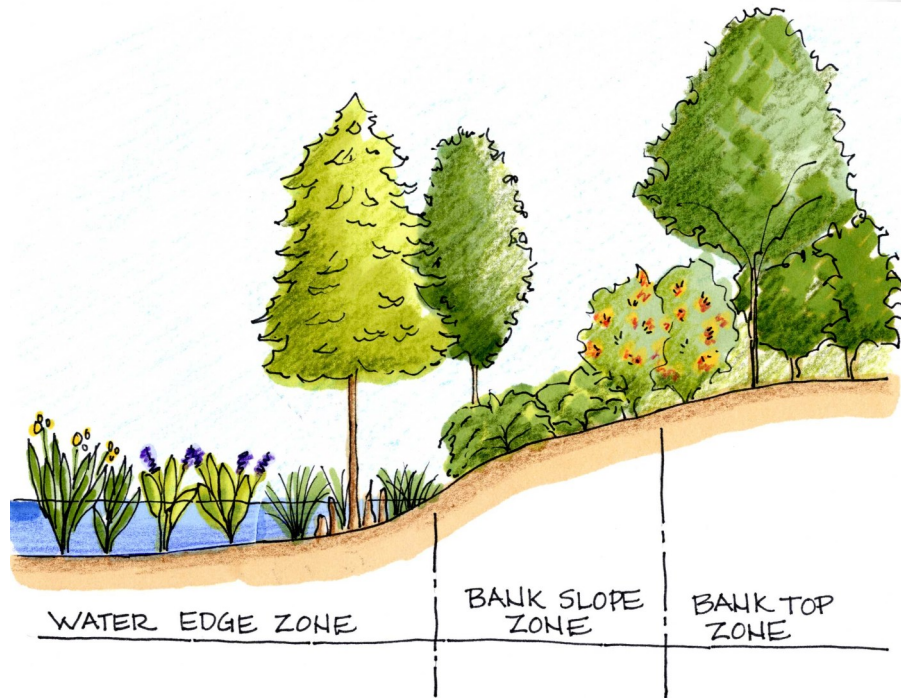
Height: 6 ft.
Spread: 4 ft.
Light: full sun to
full shade
Water: wet
Hardiness zone:
8-9

Moderate to gentle slope with shrubs and trees

10 foot slope and 8 foot top of bank. 60 foot wide lot = 148 plants

The slope and top of bank is planted with large and medium shrubs to provide a transition from the pond edge to a wooded area. Use aquatic plants of various heights for interest. Cluster in the water for a natural look.

(Image credits: Gail Hansen)

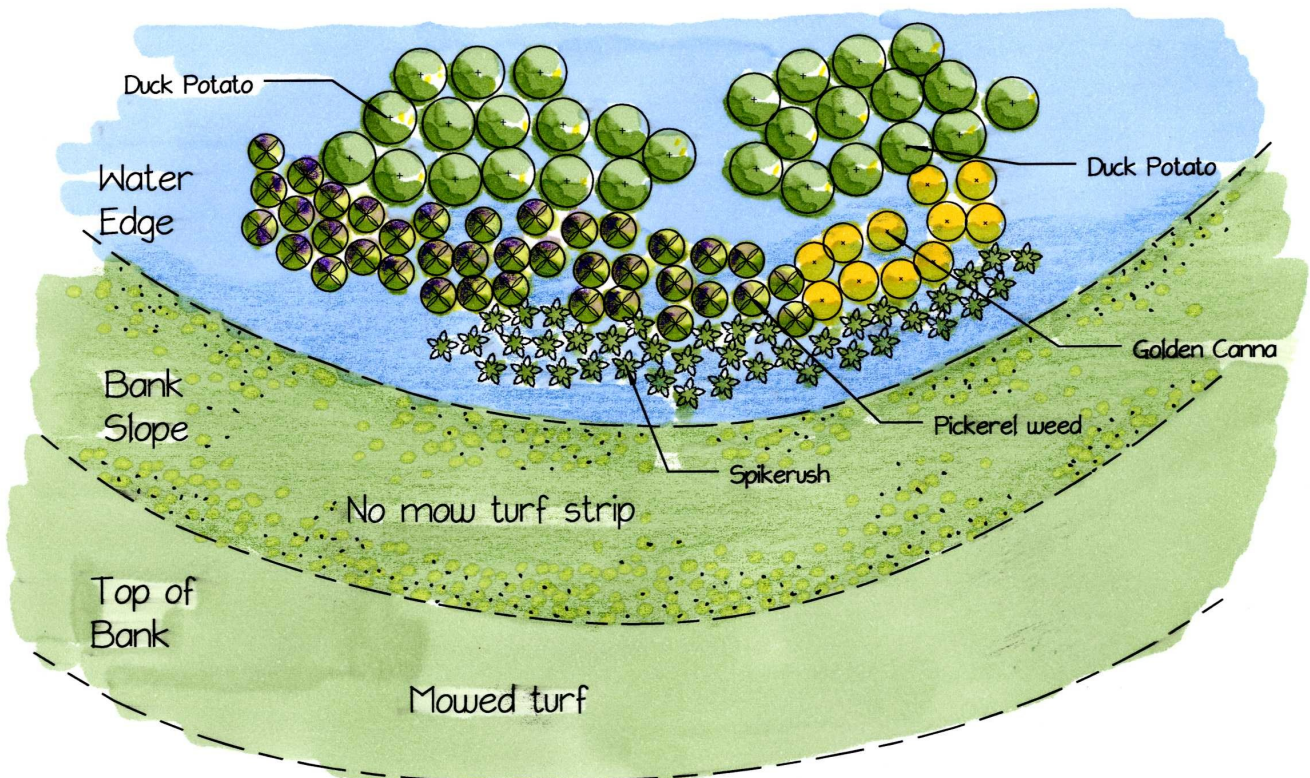
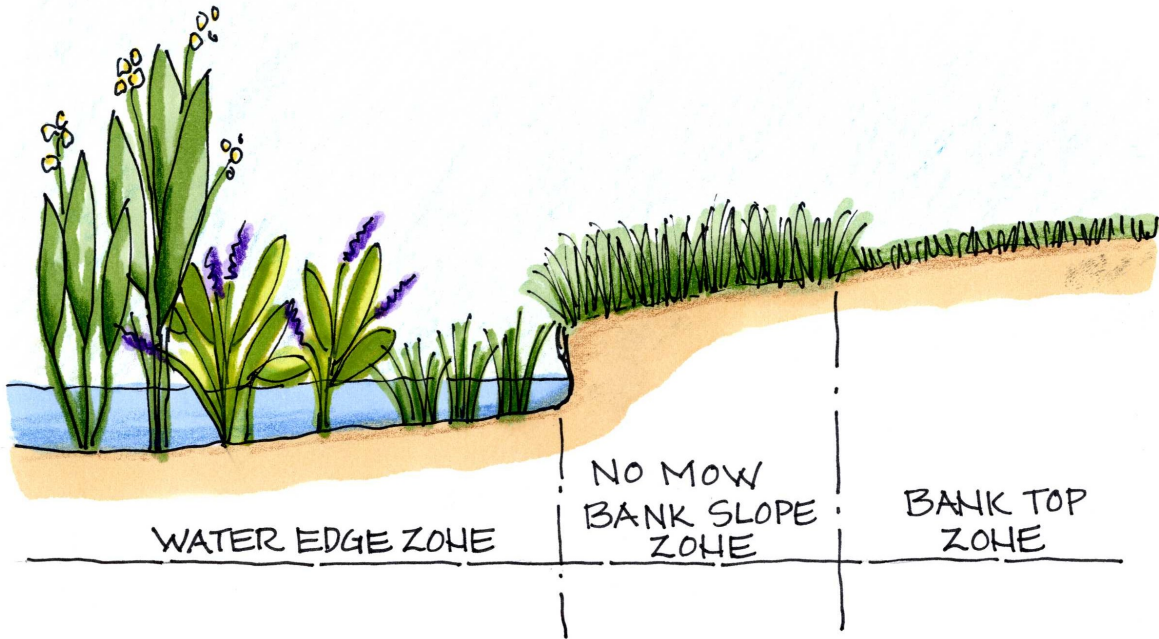


Moderate to Gentle Slope with cut bank

5 to 10 foot no-mow strip (cut bank caused by erosion) – 60 foot wide lot = 119 plants

Turf is planted to the water edge and a no-mow zone is established around the perimeter of the pond. The no-mow strip can be top-trimmed to maintain a neater appearance. Use low aquatic plants or leave a small gap next to the shoreline to avoid cutting aquatic plants with trimmer. Cluster in the water for a natural look.

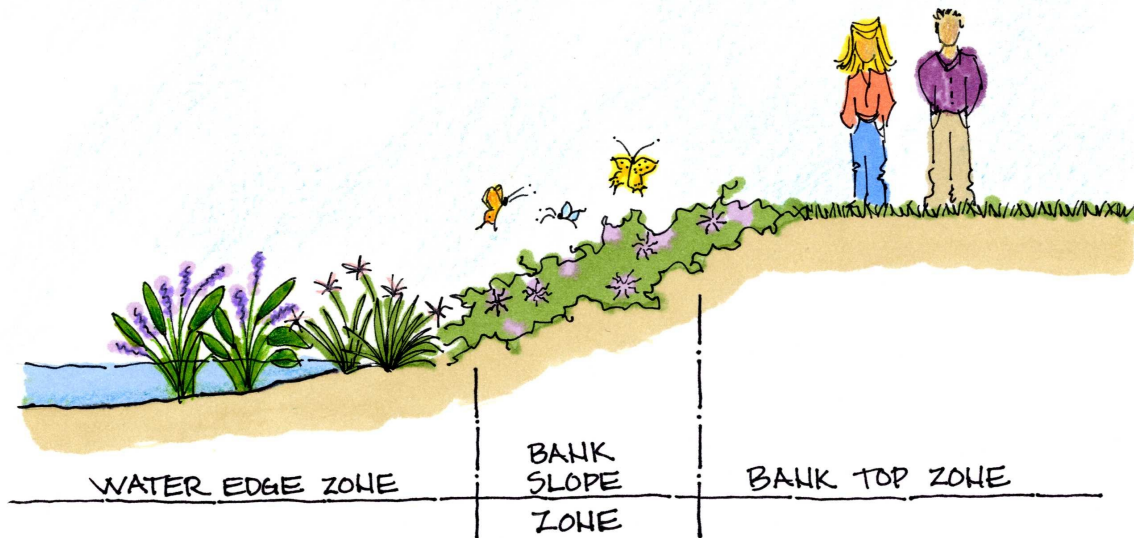
(Image credits: Gail Hansen)



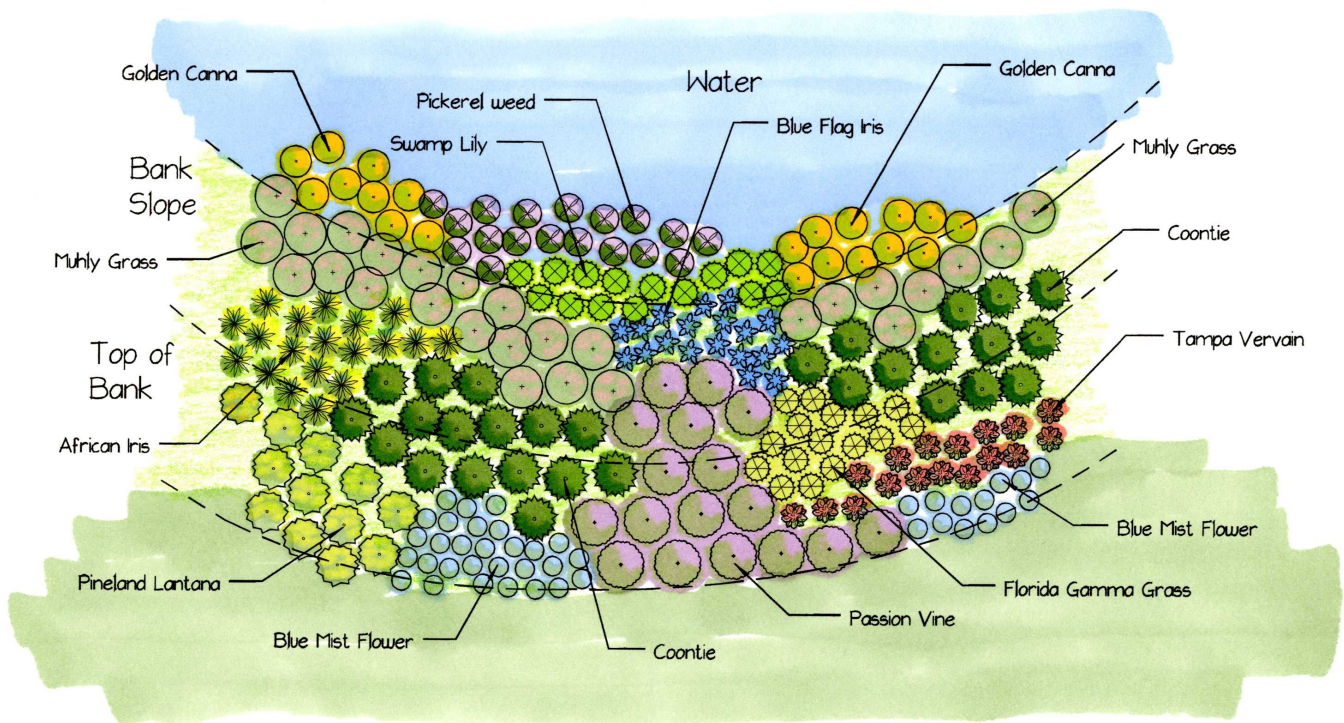
Short, Steep Slope– 15 to >20%

10 foot slope and 5 foot top of bank– 60 foot wide lot = 242 plants

Use low-growing, sprawling ground cover such as Sunshine Mimosa, Beach Sunflower, or Passion Vine on steep slopes. Plant at the top of the bank and encourage plants to grow down the bank by pinning the vines in the direction you want them to grow. Cluster or group similar plants for a natural look. (Image credits: Gail Hansen)



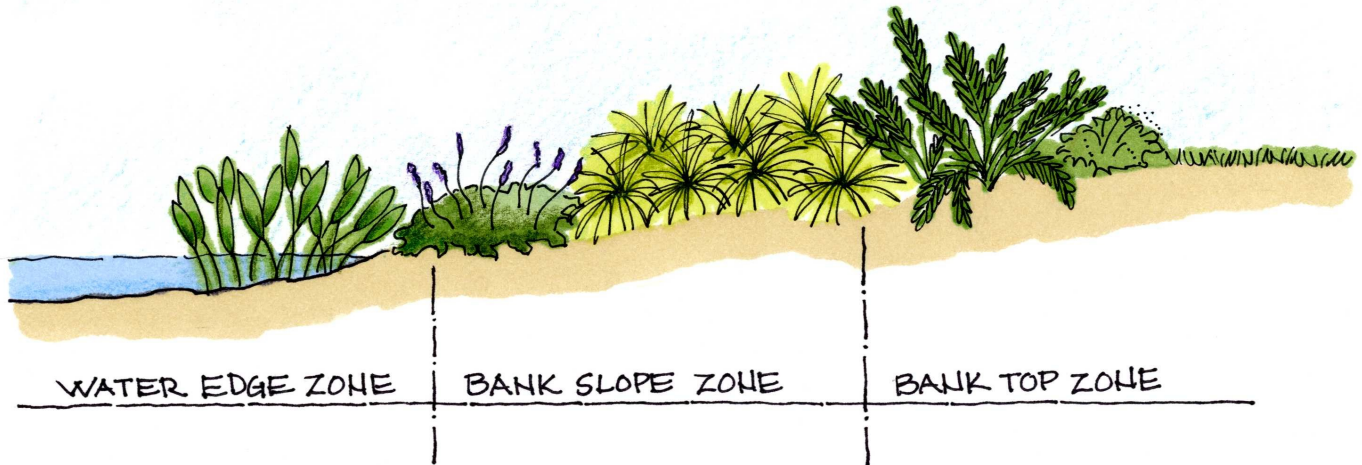
- | | | |
|---|---|---|
| Blue Mist Flower (<i>Conoclinium coelestinum</i>) | Florida Gamma Grass (<i>Tripsacum floridanum</i>) | Blue Flag Iris (<i>Iris virginica</i>) |
| Tampa Vervain (<i>Glandularia tampensis</i>) | Muhly Grass (<i>Muhlenbergia capillaris</i>) | Golden Canna (<i>Canna flaccida</i>) |
| African Iris (<i>Diets iridioides</i>) | Pineland Lantana (<i>Lantana depressa</i>) | Swamp Lily (<i>Crinum americanum</i>) |
| Coontie (<i>Zamia pumila</i>) | Passion Vine (<i>Passiflora incarnata</i>) | Pickerel Weed (<i>Pontederia cordata</i>) |



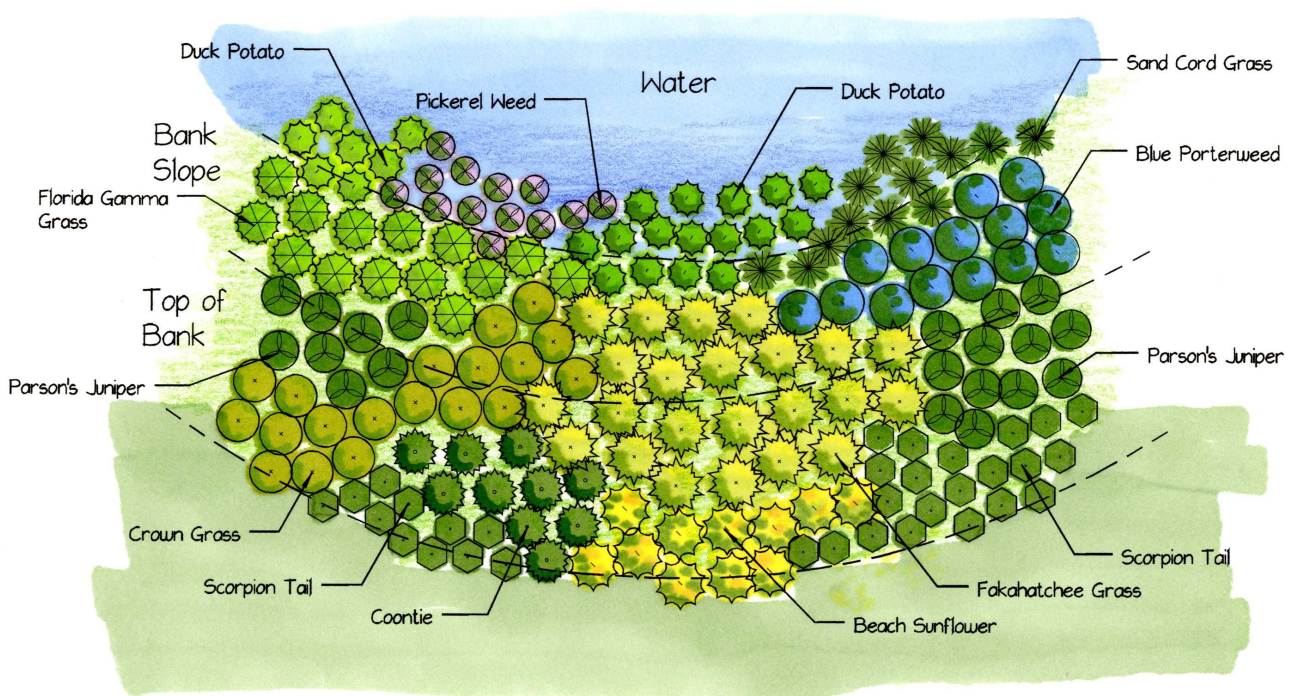
Moderate Slope– 10 to 15%

10 foot slope and 8 foot top of bank– 60 foot wide lot = 192 plants

Use clump grasses and mounding low-growing shrubs or clumping perennials at the top of the bank where the slope starts, such as Coontie, Crown Grass and Fakahatchee Grass. On the slope use sprawling plants such as Blue Porterweed. (Image credits: Gail Hansen)



- | | | |
|--|--|--|
|  Blue Porterweed (<i>Stachytarpheta jamaicensis</i>) |  Fakahatchee Grass (<i>Tripsacum dactyloides</i>) |  Duck Potatoe (<i>Sagittaria lancifolia</i>) |
|  Parson's Juniper (<i>Juniperus chinensis parsonii</i>) |  Beach Sunflower (<i>Helianthus debilis</i>) |  Pickerel Weed (<i>Pontederia cordata</i>) |
|  Coontie (<i>Zamia pumila</i>) |  Crown Grass (<i>Paspalum quadrifolium</i>) |  Sand Cord Grass (<i>Spartina bakerii</i>) |
|  Florida Gamma Grass (<i>Tripsacum floridanum</i>) |  Scorpion Tail (<i>Heliotropium angiospermum</i>) | |



Long, Gentle Slope– 5 to 10%

15 foot slope and 8 foot top of bank– 80 foot wide lot = 260 plants

Use clump grasses, low-growing groundcover and small shrubs, such as Parson's Juniper or Coontie on long, gentle slopes. Plant shrubs at the top of the bank and sprawling plants and grasses such as Beach Sunflower, and Fakahatchee on the slope. Cluster or group plants on land and in the water for a natural look. (Image credits: Gail Hansen)

