



Jimmy Carter Plant Materials Center Americus, Georgia

WETLAND PLANTS SELECTED for CONSTRUCTED WETLANDS and STORMWATER SYSTEMS



From the Plant Materials Specialist Notebook



This publication provides specific information on wetland plants for stormwater constructed wetlands. It contains recommendations for selection of wetland vegetation for stormwater management systems. The wetland plant technology was developed by the USDA Natural Resources Conservation Service; the Jimmy Carter Plant Materials Center in Americus, Georgia.

The Jimmy Carter Plant Materials Center located in Americus, Georgia, has released 'Restorer' giant bulrush, *Scirpus californicus* and 'Wetlander' giant cutgrass, *Zizaneopsis miliacea* as new proven wetland native plant materials for constructed wetlands, and both are available from commercial nurseries.

Stormwater wetlands perform by temporarily storing stormwater runoff in shallow pools that create favorable growing conditions for emergent and riparian wetland plants. The stormwater storage, contact area, microtopography, and the emergent plants together form an ideal matrix for the removal of pollutants normally associated with urban development. Emergent wetland vegetation such as, 'Restorer' giant bulrush, *Scirpus californicus*, Maidencane, *Panicum hemitomon* and blue flag iris, *Iris versicolor*, canna lily, canna spp, are quite attractive and provide adequate removal of contaminants.

The use of constructed wetlands for stormwater quality control has attracted a great deal of attention. The 1987 amendments to the Clean Water Act focused attention on urban runoff. Stormwater (runoff) is the surface and ground water that results from precipitation. In developed areas, urban stormwater is the major component of sewer and stream flows. Stormwater runoff from parking lots, roofs, contains fertilizer, pesticides, animal waste, oil, grease, heavy metals, and other potential pollutants. Stormwater wetlands provide an alternative to improve water quality by removing pollutants normally associated with urban development. With proper vegetation selection, stormwater treatment systems can be attractive; typically providing green space, bird habitat, and educational opportunities.

-Donald Surrency-

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-July 2004-

Wetland Vegetative Design

The wetland plants selected have been evaluated and used on demonstration sites in Alabama and South Carolina. The wetland plants will prevent erosion, retard the entry of pollutants, and prevent the degradation of water quality in our natural waterways, and will function as an attractive environmental study area.

Wetland Species

Once the general size and location are selected for a site, the owner needs to consider the kind of vegetation that fits into the rest of the landscape. There are numerous types of suitable plants for a wetland wastewater filter. The amount of time and interest the owner has in caring for the plants should determine what type to install. If the homeowner is not interested in gardening, then select only from the list of basic, low-care plants. The more time and care the owner can commit to maintenance, the more variety and color can be designed into the wetland.

The vegetative component is a major factor in the waste treatment processes that occur in constructed wetlands. The principal function of vegetation in constructed wetland systems is to create additional environments for microbial population. The stems and leaves in the water column obstruct flow and facilitate sedimentation, provide substantial quantities of surface area for attachment of microbes, and constitute thin-film reactive surfaces. Plants increase the amount of aerobic microbial environment in the substrate.

Selecting Wetland Plant Materials

Constructed wetlands should be planted with emergent vegetation. Selection of species appropriate to project goals is important since the plants in wetland systems provide the basis for animal life, as well as conduct important hydrologic buffering and water purification functions.

Low Maintenance Species

- ◆ Rush, *Juncus effusus* are the most important “worker plants” in a sub surface filter. Their roots go down quickly and deeply. They spread across the media and are very pest resistant and winter hardy.
- ◆ Iris, *Iris spp.* is very attractive in the landscape and each spring produces a spectacular show of color. Hybrid Louisiana varieties can have as many as five blooms per stalk. An infinite variety of colors can be selected to match any landscape. Iris does not usually put down deep roots. There is still debate about how much nutrient, especially nitrogen, they remove. They stay green in winter and seem to reduce nutrient loads.

- ◆ Umbrella palms, *Cyperus alternifolius* add a graceful element to the foliage of the wetland. They are winter hardy in the southern parts of Georgia and seem to be effective filters since they put down deep roots. They are highly recommended as an all-around sturdy plant that is drought and insect resistant and effective in treating wastewater. However, experience shows that umbrella palms have a hard time recovering from a severe freeze. They are, however, easy to grow if the seeds are collected in late spring.
- ◆ Cattails, *Typha latifolia* are the plants most often associated with wetlands around the world. The larger, native varieties, however, are too dominant and take over a small filter. They do work well and seem to have a positive impact on treatment. They take work to control and in later years may need to be removed.
- ◆ ‘Restorer’ Bulrush, *Scirpus californicus* was released by the USDA-NRCS Jimmy Carter Plant Materials Center in Americus, Georgia. It is a dominant species, large deep root plant. It is very winter hardy and has a positive impact on treatment.

These are the low-maintenance plants that can be placed in the single-family wetland. These plants can survive drying down, flooding, and insect infestation. They beat out weeds and compete with any fancy plant that tries to grow near them.

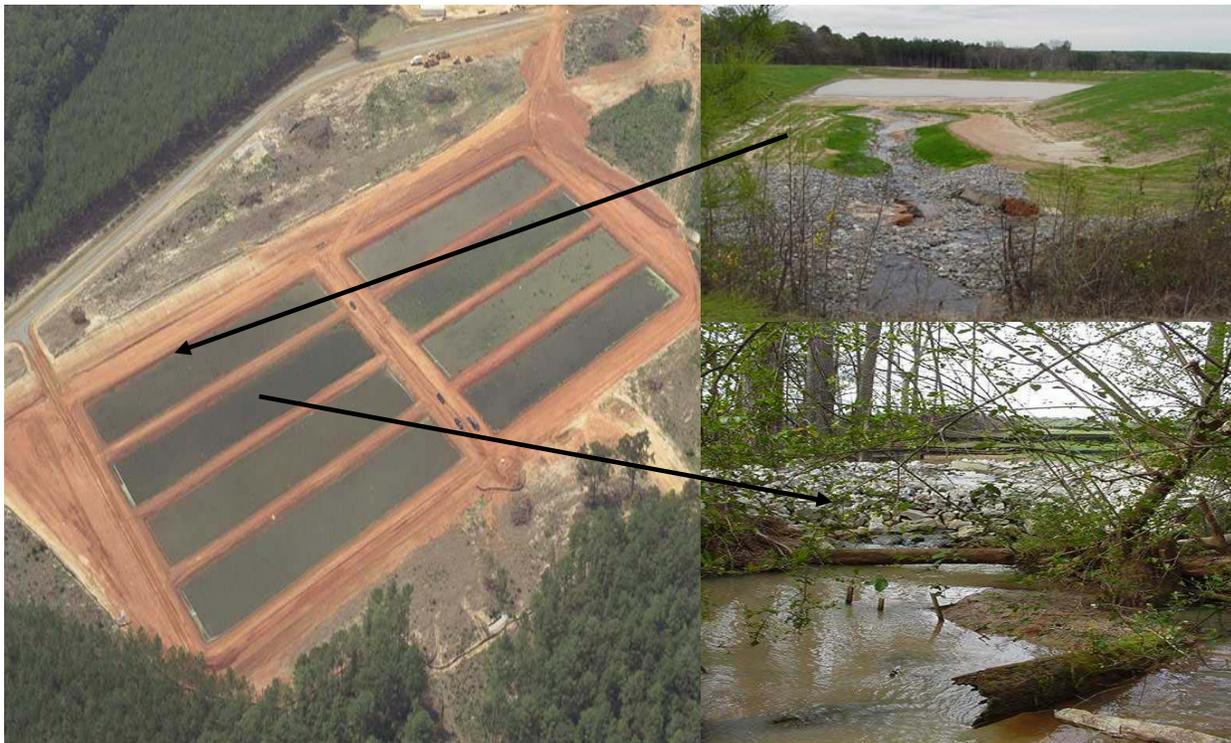
High-Maintenance Plants

If the homeowner is willing to spend a little time each fall and spring clearing out detritus, thinning and mulching after pulling weeds, then the owner may choose to install canna lilies, elephant ear, or Thalia. All of these are attractive, colorful, and extremely aggressive. If any of these are installed, be prepared to pull part of them out at least every other year. Planting them along the edges and at the back of the system allows them to be dug out or just chopped down more easily.

The cannas and elephant ear need to be kept in check each spring. Cut them down to the corm, remove dead material, and make sure they do not “walk out” of the wetland and take hold in the landscape where they are not wanted. Once rooted, they are there to stay. Most of these plants can be found in roadside ditches or neighborhood gardens. They cost little to obtain and install. A homeowner can easily remove an undesirable plant and try another one. Care should be taken to wear gloves and goggles to protect the face and hands from splashes when pulling a plant from septic media. Dispose of the old material in a sealed plastic bag or bury it. Weeding can be reduced or eliminated by covering the exposed media around the new plants with pine bark nuggets. Do not use shredded cyprus or hardwood, as these break down and may clog media pores.

Plant Species List

Common Name	Scientific Name
`Restorer` Bulrush	<i>Scirpus californicus</i>
Canna lily, Red	<i>Canna</i> spp.
Canna lily, Yellow	<i>Canna</i> spp.
`Sumter Orange` Daylily	<i>Hemerocallis fulva</i>
Elephant ear, Taro	<i>Colocasia esculenta</i>
Iris, Blue Flag	<i>Iris versicolor</i>
Iris, Louisiana	<i>Iris hexagona</i>
Iris, Yellow Flag	<i>Iris pseudocorus</i>
Umbrella Palm	<i>Cyperus alternifolius</i>
Woolgrass	<i>Scirpus cyperinus</i>
Thalia Powdery	<i>Thalia dealbata</i>
Pickerelweed	<i>Pondetaria cordata</i>



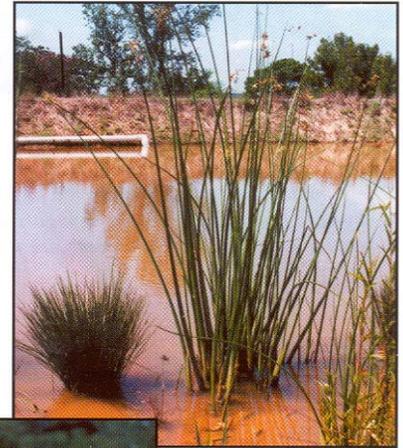
Savannah River Site (SRS) Constructed Wetland Treatment System

`Restorer` Giant Bulrush, *Scirpus californicus* planted in SRS Constructed Wetland Savannah River Plant – Stormwater and Industrial Runoff. Treats copper and mercury in runoff water.

Wetland Plants Selected for Constructed Wetlands and Stormwater Systems

1. 'Restorer' Bulrush, *Scirpus californicus*

- Huge plant which can grow in 3-4 feet of water.
- Do not plant 'Restorer' in home site systems – it will lodge.
- Control should not be necessary; they seldom grow so densely that they seriously block air to water or shade other plants.



'Restorer' Giant Bulrush planted in constructed wetland to reduce nutrients in catfish production pond in Hale County, Alabama.



Constructed Wetland – Failed Septic System in Alabama



**'Restorer' giant bulrush evaluation – Sand Mountain, Alabama
Sand Mountain Sub-Station – Auburn University**



Municipal Constructed Wetland – Augusta, GA
'Restorer' Giant Bulrush

2. Bulrush, Soft Stemmed Schoenoplectus, *Scirpus validus*

- May go dormant in a summer heat, but will green up for winter.
- Control should not be necessary; they never grow so densely that they seriously block air to water or shade other plants.
- Colonizes slowly, especially in rock media.



Wetland Plants Selected for Constructed Wetlands and Stormwater Systems



Runoff from this Gulf Pines Golf Course near Mobile Bay in Mobile, Alabama, contains contaminants that cause serious water quality problems. A five (5) acres watershed area was selected to evaluate the effectiveness of a constructed wetland to treat the runoff before it entered Mobile Bay.



Stormwater runoff from Gulf Pines Golf Course is treated by constructed wetland before it is discharged into Mobile Bay. Wetland vegetation is in the background.

Stormwater Wetlands

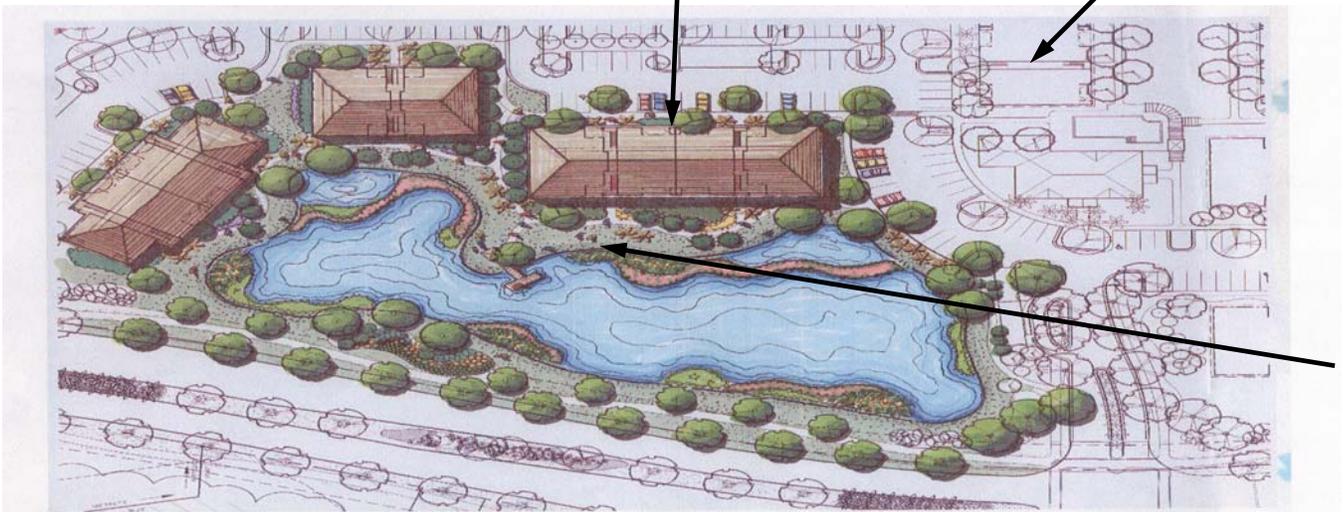


Stormwater wetland for Hank Aaron Baseball Stadium – Mobile, Alabama

Myrtle Park
Bluffton, South Carolina
Conceptual Master Plan

360 Multifamily Units

Parking Lot



Hilton Head, South Carolina

Stormwater System will treat runoff from 100 acre Condo development in Hilton Head, SC. The series of wetlands will treat 100% of the stormwater that drains from the parking decks, streets, roof tops and lawns. Stormwater treatment wetland systems offer a new management technique for addressing stormwater quality, TMDL, as well as addressing flood mitigation, habitat creation, and aesthetics. These systems can be designed into new developments or integrated into the drainage paths of existing developments with relative ease.

3. Iris, Yellow Flag, *Iris Pseudocorus*

- Foliage in spring makes these highly desirable in all systems.
- Invasive and once established, hard to remove.
- In rock systems, they show good treatment and nutrient uptake.
- Can survive over 12 inches of flooding for months.
- Show summer stress by turning brown but come back green for winter.
- Spread by corms which can be pulled up, separated, and replanted.



Iris, Yellow Flag

Wetland Plants Selected for Constructed Wetlands and Stormwater Systems

4. Iris, Louisiana, *Iris hexagona*

- Foliage in spring makes these highly desirable in all systems.
- Invasive and once established, hard to remove.
- In rock systems, they show good treatment and nutrient uptake.
- Can survive deep water and like to grow in 6 inches of water.
- Show summer stress by turning brown but come back green for winter.
- Spread by corms which can be pulled up, separated, and replanted.



**Small Home Constructed wetland treats failed septic system – Decatur, Alabama
Louisiana, iris**

5. Iris, Blue Flag, *Iris versicolor*

- Foliage in spring makes these highly desirable in all systems.
- Invasive and once established, hard to remove.
- In rock system, they show good treatment and nutrient uptake.
- Do not like deep water and can be controlled by flooding.
- Show summer stress by turning brown but come back green for winter.
- Spread by corms which can be pulled up, separated, and replanted.



Iris, Blue flag

6. Soft Rush, *Juncus effusus* and *Juncus balticus*

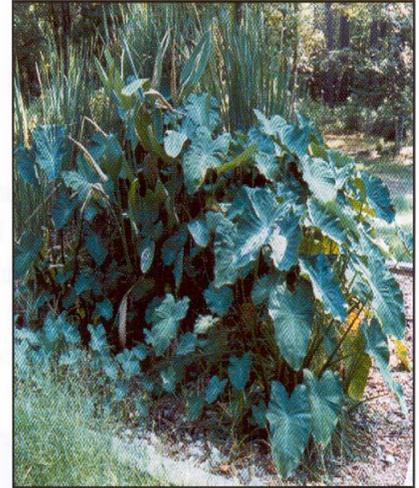
- These two rushes can be distinguished from each other by color, the *effusus* is dark green and the *balticus* looks bluish.
- Both grow to about 3 feet in height and will colonize a rock filter.
- The *balticus* is preferable in rock or tire chip media because it puts roots down to a depth of over 3 feet.
- *Balticus* invades and covers a rock filter more quickly.
- Both are disease resistant and not subject to insect predation.
- Both are very hard to remove once established.
- Both were used in surface-flow systems near the outfall to provide a fine filter for floating detritus and shade to stop algae from growing there.



Small constructed wetland for residential use to address fecal coliform contaminator in Lake Murray, South Carolina. Soft rush or *Juncus effusus* is the primary wetland vegetation in the system that is an alternative to malfunctioning conventional septic tanks.

7. Taro / Elephant Ear, *Colacasia esulenta*

- Like the canna, this plant is hard for homeowners to resist installing.
- Once planted in any wetland, it is home to stay.
- Make an attractive contribution to the landscape, no doubt.
- Can grow to huge proportions and dominate wetlands.
- Will walk out of a wetland and colonize any spot that is damp.
- Must be cut back annually to the roots.



Elephant Ear



Elephant Ear

8. Umbrella Palm, *Cyperus alternifolius*

- Recognized because its leaves form little umbrellas.
- Has no photo period so it stays green until frozen back.
- Recommended mulch during winter to prevent root freeze from which it often fails to recover.
- Grows in shallow open water and can be controlled by deep water.
- Easy to propagate by pulling roots apart and planting roots with attached stems again, or dropping seeds in a shallow pan of water.
- Grows in partial shade or full sun, even in rock media.
- Research shows good treatment with this plant.
- One of the best all round plants for home-site systems for little care and good landscape qualities.



Umbrella Palm

9. Thalia, Powdery, *Thalia dealbata*

- The two can be distinguished by size and seed head. The dealbata has a small, purple seed head and the powdery thalia has a grassy head. Both are shown here.
- The tropical thalia is smaller, less invasive and recommended for home site systems.
- The tropical thalia does well in surface-flow systems and loves water for years as deep as 12 inches. It will need some dry down period in spring to get up new shoots.
- Is in the canna family and its leaves are similar, fan-shaped and large.
- Both add a tropical look to a wetland and a lush look to any landscape.
- Subject to heavy insect infestation and disease.
- Have come back from being eaten down to the water and regrow new vegetation in a few months.
- Both can be pulled up after flowering, and root corms can be pulled apart with stems to form new plants, which start growing as soon as they hit water.



Thalia

10. Pickerelweed, *Pondetaria cordata*

- Will not survive in a rock filter, hard to get established in any wetland, and cannot take the heat.
- Its pretty blue flower in summer makes it attractive, but it does not do well in rock filter wetlands.
- Will return all its nutrients to the water when frozen and so may create a spike.
- Likes consistently shallow water and will cover suitable open area, blocking light but also surface re-aeration.



Pickerelweed

11. 'Sumter Orange' Daylily *Hemerocallis fulva* L.

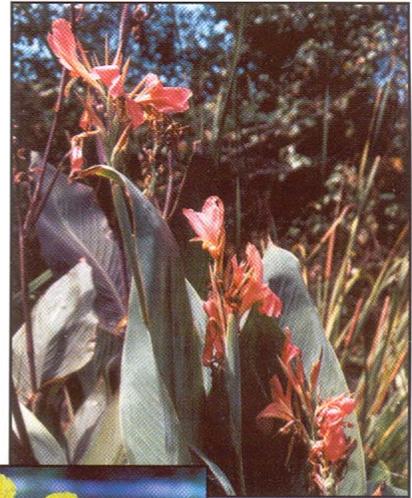
- Well suited as a border planting for use with constructed wetlands
- Reproduce rapidly by spreading its underground stolons and can quickly cover a large area.
- Will tolerate very moist/wet soils for an extended period.
- Is an attractive ornamental having a brilliant double/orange bloom.



'Sumter Orange' Daylily at the Brooksville Florida Plant Materials Center growing in the rock reed filter system.

12. Canna lily, *Canna spp.*

- All varieties love rock media systems but will not grow in standing open water.
- All varieties produce wonderful color in the landscape from spring to late summer.
- Succulent stalks and leaves attract every kind of predator and disease.
- These are high maintenance plants, but the show may be worth it.
- Once established, they are not going to leave.
- Recent studies indicate they do very little for treatment except transpire water.
- Control with herbicide or drowning.



Canna Lily

About This Publication

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All photos are courtesy of USDA-NRCS unless otherwise noted.

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