CSREES
Southern
Regional Water Quality Program
Backyard Stream Repair:
Using Native Plants
NC State University
A&T State University
COOPERATIVE EXTENSION
Empowering People · Providing Solutions
ALABAMA COOPERATIVE
Extension
SYSTEM
Alabama A&M and Auburn Universities

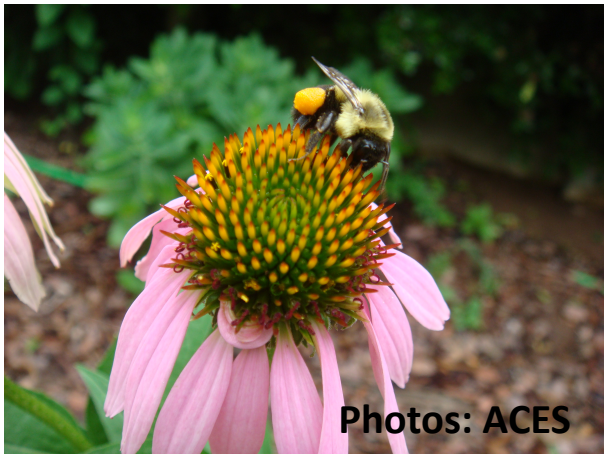
Native Plant Benefits

- Natives are **naturally occurring** in the area without human interaction
- **Promote** native **wildlife**
- Low maintenance
- Relatively few pests
- **Adapted** to our climate conditions

Photos: www.duke.edu

Enhancing Wildlife

- Fish, aquatic invertebrates, birds and small mammals need plants as sources of cover
  - **Plants** reduce water temperatures for fish
  - Submerged plants and branches provide **habitat** for fish and insects
- Plants provide food (**seeds**) for birds and small mammals
- Plants provide **larval source**
- Provide **nectar source** for bees, butterflies, and moths



Photos: ACES

Wildlife Corridors

- Wider buffer is better (> 100 ft)
  - Abundance in reptile, amphibians, small mammals, birds, insects, and fish (Rudolf and Dickenson, 1990; Dicken and William, 1998; Sudduth and Meyer, 2006; Smith et al., 2008)
- Connect forested areas
- Promote species richness in detached wildlife communities

Streamside Benefits

- Cooler water temperatures
- Detritus to the stream
- Habitat
- Balanced ecosystem
- Floodplain connection
- Roots = stronger soil

Right plant, right place, right time

- Wetland Indicator Status
- Where to plant
- Plant sizes
- Costs
- Timing

Photo: ACES

Hydro = water, phyte = plant

Hydrophytes

- Adapted to wet conditions, flood tolerant
- Structural adaptations

Non-hydrophytes

- Do not tolerate flooding
- Upland plants

Photos: ACES

Structural Adaptations

- Extensive root systems for **stability**
  - Roots can **tolerate hypoxic** conditions
  - **New roots** may form only at **surface** where oxygen is in higher concentration
- **Adventitious** root development
- **Aerenchyma** tissue development

Photos: ACES

Wetland Indicator Status

- Previously based on the frequency of a species occurring naturally in a wetland
- List was revised by USACE, FWS, EPA, and NRCS
- New list based on ecological regions

OBL – Almost always a hydrophyte, rarely in uplands

FACW – Usually a hydrophyte, but occasionally in uplands

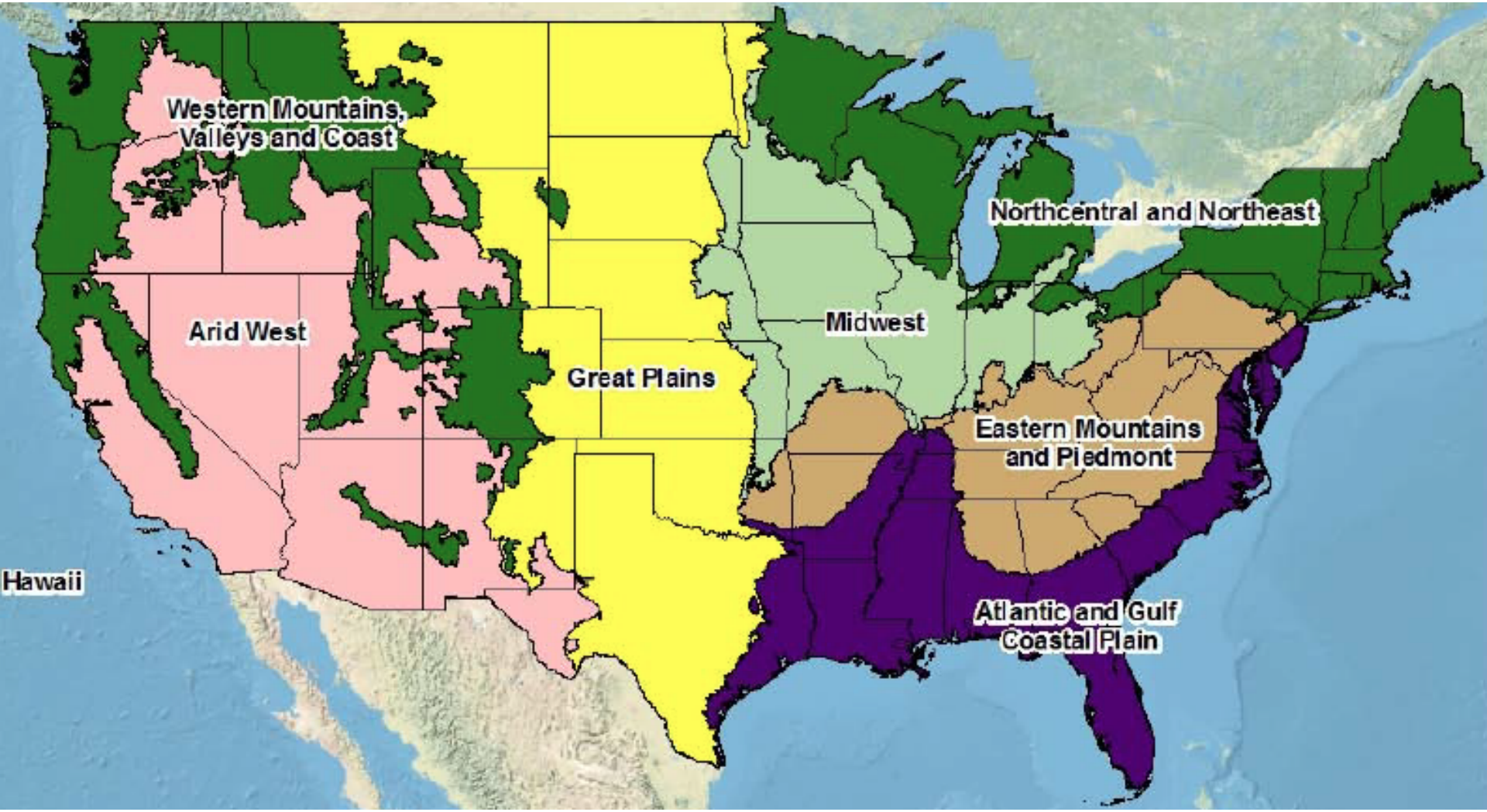
FAC – Commonly occurs as hydrophyte or non-hydrophyte

FACU – Occasionally is a hydrophyte, usually occurs in uplands

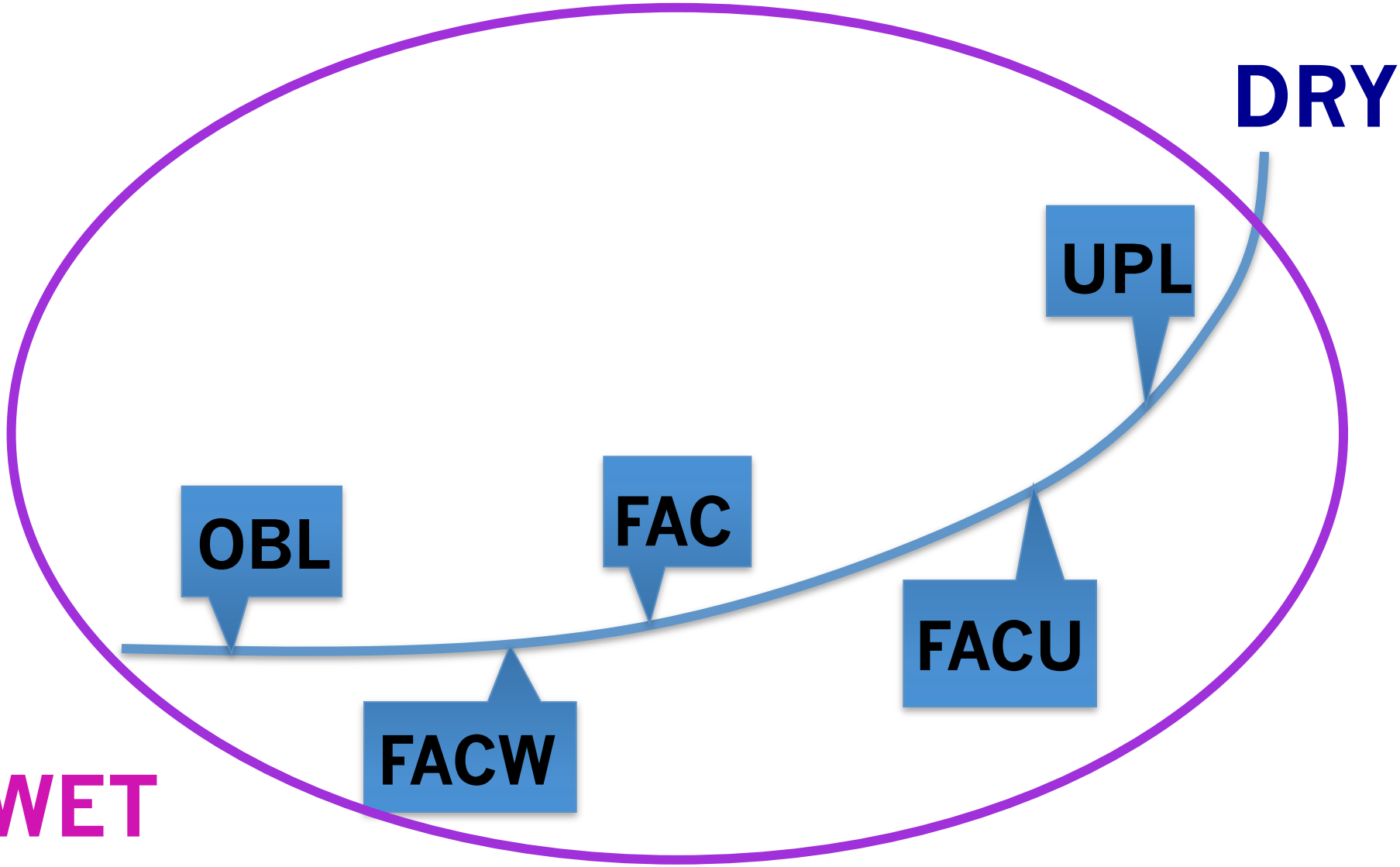
UPL – Rarely a hydrophyte, almost always in uplands

Lickvar and Minkin, 2008

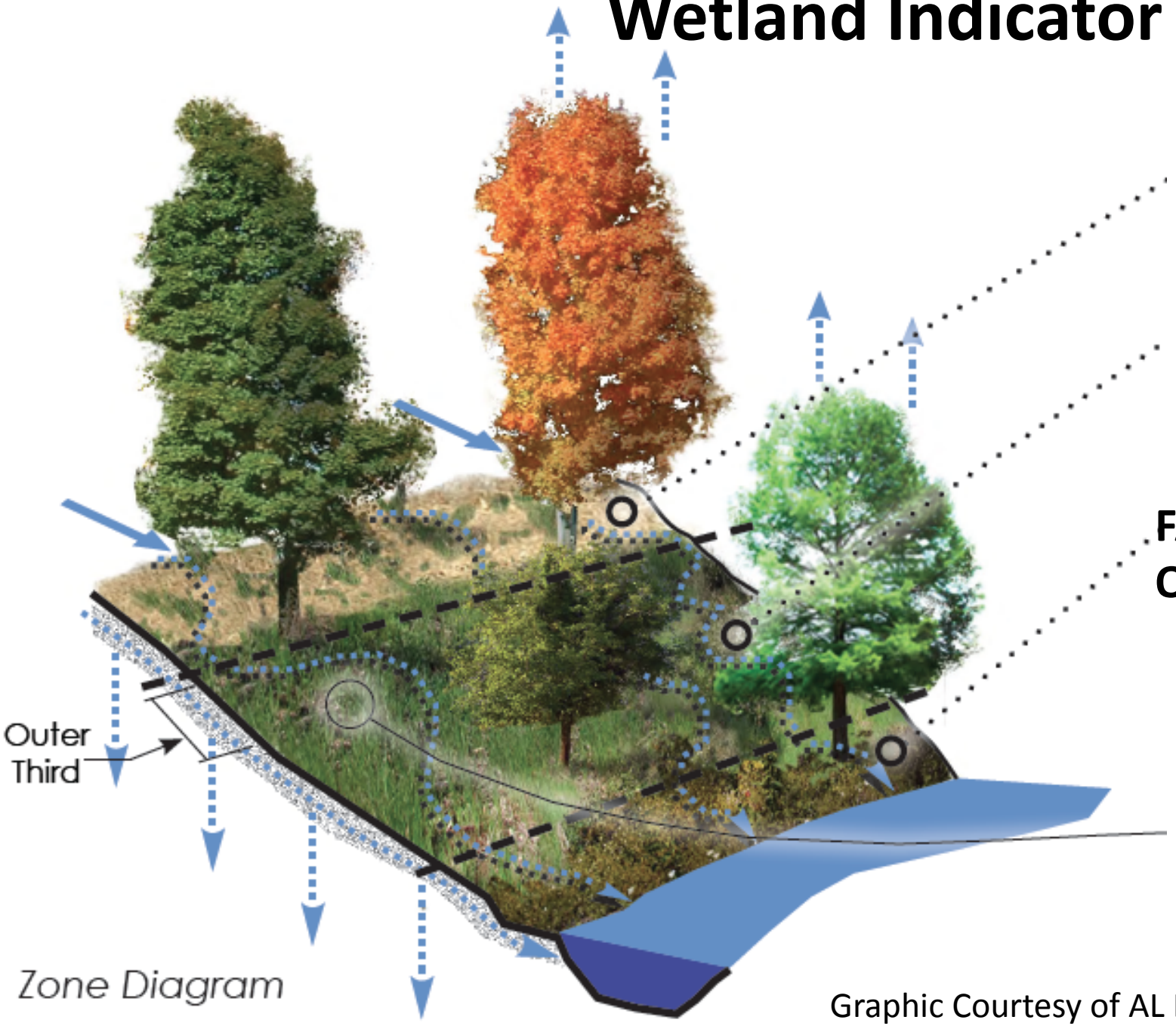
Wetland Plant List Eco-regions



Wetland Indicator Status

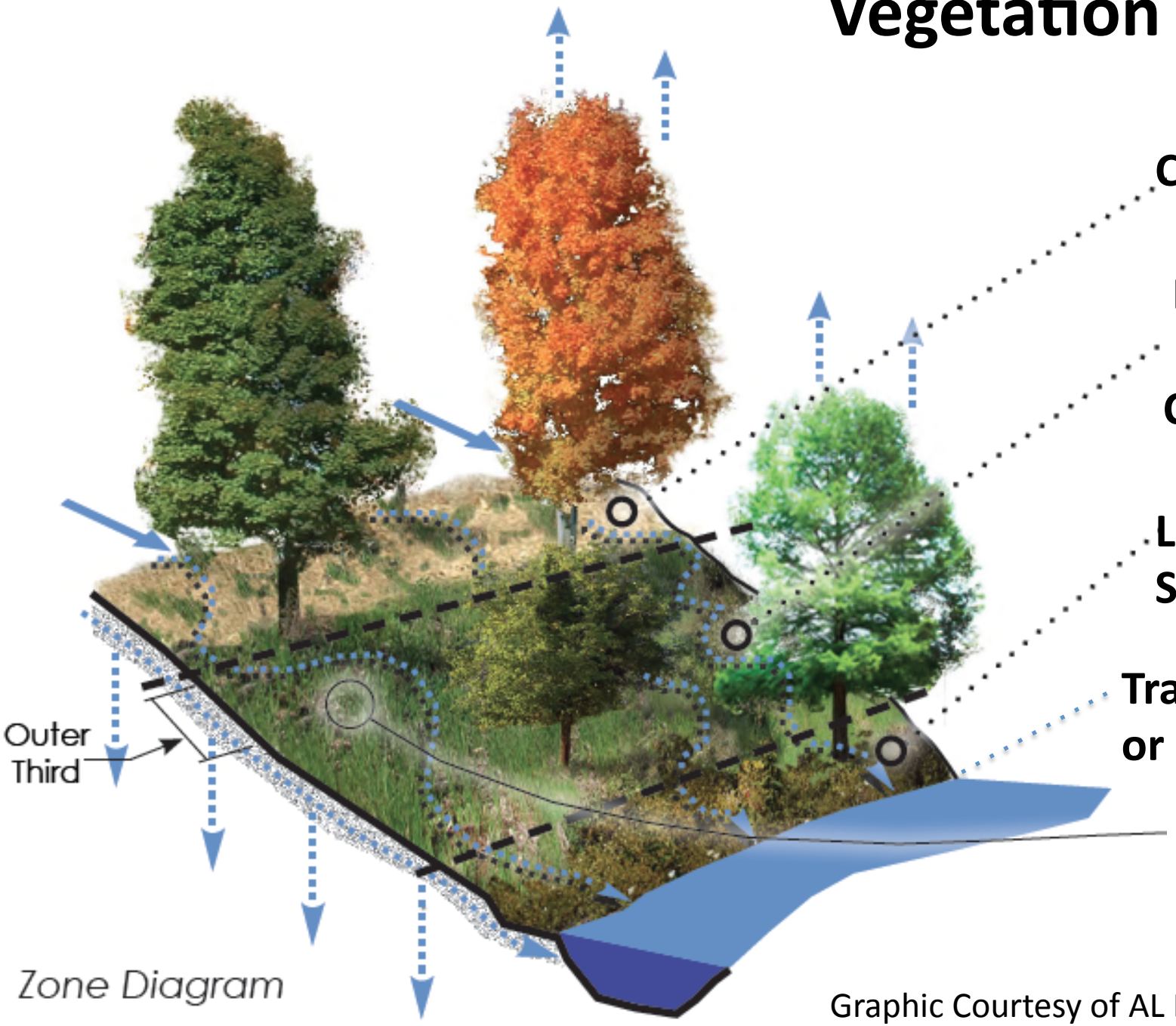


Wetland Indicator Status

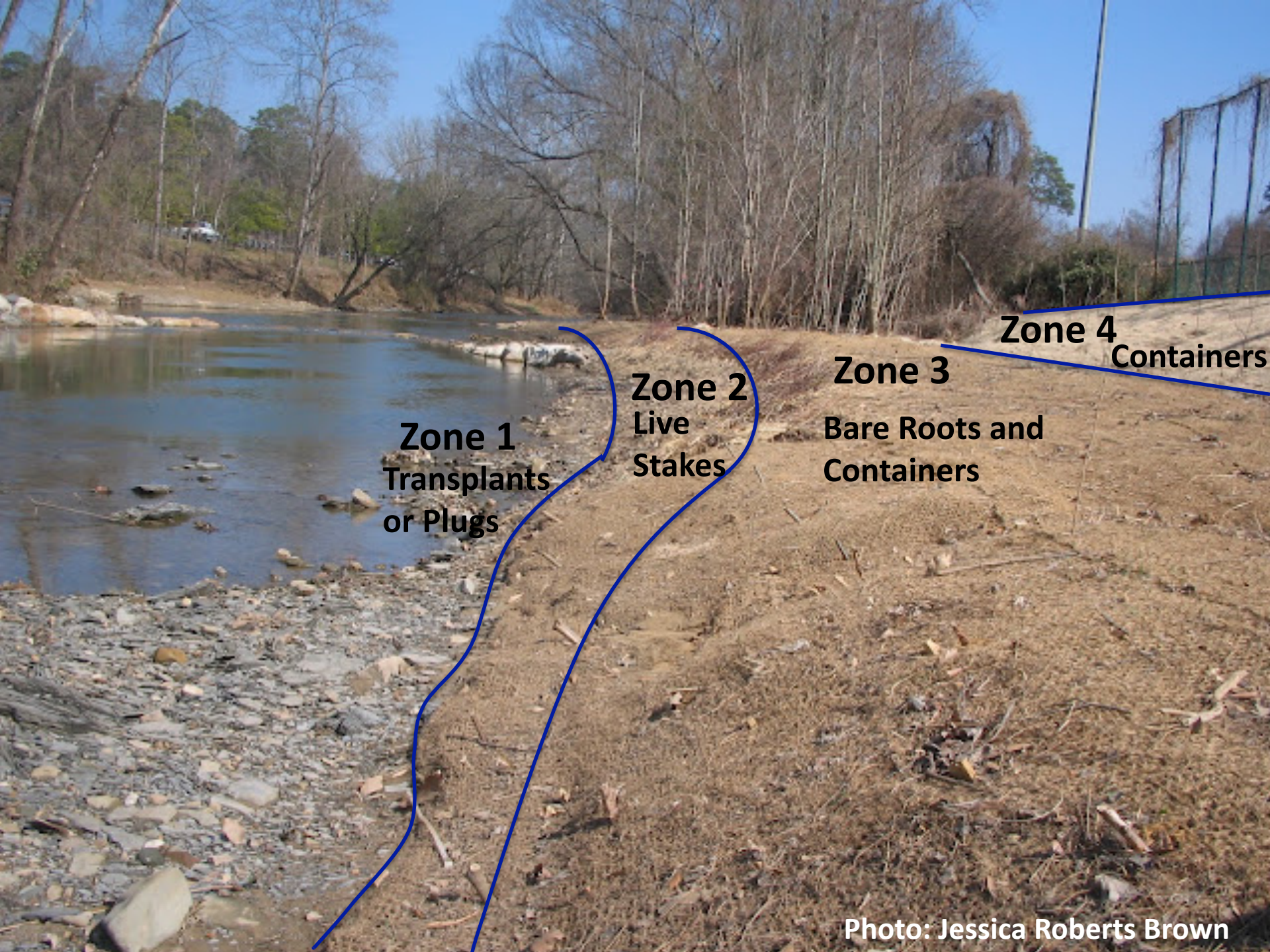


Graphic Courtesy of AL LID Handbook

Vegetation Sizes



Graphic Courtesy of AL LID Handbook


Zone 1
Transplants
or Plugs
Zone 2
Live
Stakes
Zone 3
Bare Roots and
Containers
Zone 4
Containers
Photo: Jessica Roberts Brown

Plant Sizes

Photo: ACES

Photo: Coastal Plain Conservation Nursery

Photo: ACES

Photo: ACES

Zone 1 Plants

- Water's edge
  - Transplants
  - plugs
  - herbaceous

Photos: ACES

Juncus effusus– soft rush

Photo: ACES

Photo: Mellow Marsh Farm

- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: OBL**
- **Light Requirement:** Sun
- **Size:** 1.5 to 4’ tall and 2 to 2.5’ wide
- **Habit:** grass like, **evergreen**
- **Benefits:** attracts birds, can be harvested and transplanted by division
- **Comments:** flowers in Spring, rushes are round

Carex crinita– fringed sedge

Photo: www.missouriplants.com

Photo: David Funderburk

- **Indicator Status**
  - **EMP: OBL**
  - **ACGP: FACW**
- **Light Requirement:** Part shade
- **Size:** up to 2’ tall and as wide
- **Habit:** grass like, evergreen
- **Benefits:** seeds eaten by waterfowl, **can be divided and transplanted**
- **Comments:** drooping inflorescence blooms in May, sedges have edges

Iris virginica – blue flag iris

- **Indicator Status**
  - **EMP: OBL**
  - **ACGP: OBL**
- **Light Requirement:** Sun
- **Size:** 3-6’ tall
- **Habit:** Aquatic herb, **clumping** perennial
- **Benefits: Bird attractant**
- **Comments:** Blooms white to blue to pink Early Summer (May – July), spreads by rhizomes
- *Yellow Flag Iris is invasive – **specify** to nursery or grower that **you want Blue Flag**

Zone 2 Plants

Sparganium americanum – bur-reed *

- **Indicator Status**
  - **EMP: OBL**
  - **ACGP: OBL**
- **Light Requirement:** Sun to Part Shade
- **Size:** 2.5’ tall
- **Habit:** Aquatic herb, perennial
- **Benefits:** seeds are consumed by waterfowl
- **Comments:** Blooms yellowish green in bur-like clusters Spring to Summer (May to Sept.), **colonizes by slender underground rhizomes,** tolerates flowing water

Photos: www.missouriplants.com

Carex lupulina – hop sedge

Carex joorii – cypress swamp sedge

Arundinaria gigantea – giant cane

Photo: USGS

Carex lurida – shallow sedge

Carex stricta – tussock sedge

Pontederia cordata – pickerel weed

Zone 2 Plants

- Live Stakes
  - Trees or shrubs
  - Dormant hardwood cuttings
  - 0.5 – 2” diameter, 2 – 3’ long
  - Roots, leaves, and branches in one growing season

Photo: Greg Jennings

Photo: Jessica Roberts Brown

Photo: ACES

Live Stakes

- Used by homeowners or contractors
- Moderate slope (4:1) is best
- Must have contact with stream base flow
- Original soil – not fill!
- Native plants tolerant of wet conditions
- Can be used with erosion control fabric

Photo: ACES

Salix sericea – silky willow

- **Indicator Status**
  - **EMP: OBL**
  - **ACGP: OBL**
- **Light Requirement:** Sun to Shade
- **Size:** 12’ tall
- **Habit:** deciduous large **shrub or small tree**
- **Comments:** Spring bloom, larval host for Acadian Hairstreak, **commonly available, will not flower in shade**

Live Stakes

Cornus amomum – silky dogwood

- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: FACW**
- **Light Requirement:** Part Shade to Shade
- **Size:** 6 - 10’ tall and as wide
- **Habit:** deciduous large shrub
- **Comments:** Spring bloom, attracts birds, medium growth rate, suckers, will layer itself, reddish bark, will not flower as densely or have fall color in deep shade

Live Stakes

Physocarpus opulifolius – ninebark

- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: FAC**
- **Light Requirement:** Sun to Shade
- **Size:** 5-10’ tall and as wide
- **Habit:** deciduous multi-stemmed shrub
- **Comments:** early Summer bloom, **flowers showy**, medium to fast growth rate, attracts birds, tolerates wet and dry

Live Stakes

Photos: www.duke.edu

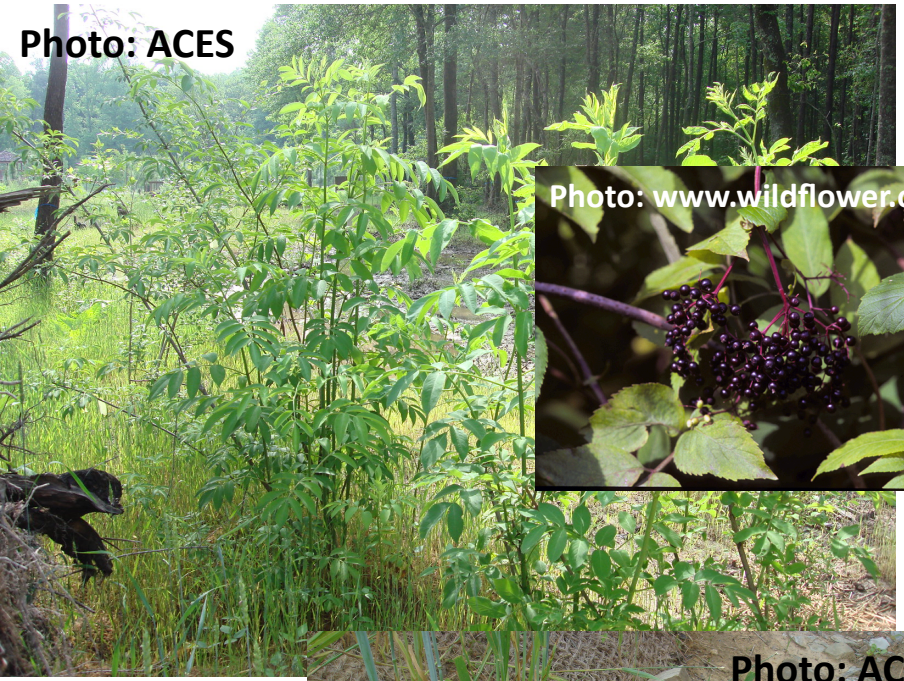
Cephalanthus occidentalis – buttonbush

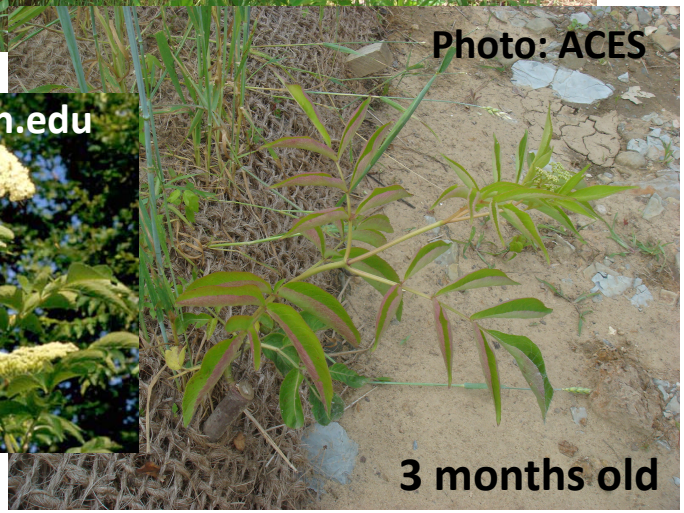
- **Indicator Status**
  - **EMP: OBL**
  - **ACGP: OBL**
- **Light Requirement:** Part Shade to Shade
- **Size:** up to 12’ tall and as wide
- **Habit:** deciduous multi-stemmed shrub
- **Comments:** Summer bloom, **flowers showy**, attracts birds and butterflies, fast growth rate

Live Stakes

*Photos: www.wildflower.org and www.duke.edu

Sambucus nigra var. canadensis – elderberry





- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: FACW**
- **Light Requirement:** Part Shade
- **Size:** 5-12’ tall and wider than tall
- **Habit:** deciduous multi-stemmed shrub
- **Comments:** Summer bloom, **flowers showy**, suckers, transplants well, fruit for birds, fast growth rate

Live Stakes

Itea virginica - Virginia sweetspire

Cornus amomum - silky dogwood

Salix nigra - black willow

Salix sericea - silky willow

Photos: Alicia Hunolt

Zone 3 Plants

Photo: Jessica Roberts Brown

Platanus occidentalis – sycamore

- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: FACW**
- **Light Requirement:** Sun to Shade
- **Size:** 100' to 120' tall
- **Habit:** deciduous tree
- **Benefits:** attracts **birds**
- **Comments:** Fast growth rate (> 3’/yr!), good shade tree, bare root or container

Viburnum nudum – possumhaw

- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: FACW**
- **Light Requirement:** Sun to Part Shade
- **Size:** 6-10’ tall and as wide
- **Habit:** deciduous shrub
- **Benefits:** Berries consumed by **birds**
- **Comments:** White flowers in clusters in Summer, bare root or containers, fruit maturity varies

Clethra alnifolia – summersweet

- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: FACW**
- **Light Requirement:** Full sun to Part Shade
- **Size:** 6’ tall and as wide
- **Habit:** deciduous shrub
- **Benefits: attracts birds, hummingbirds, and butterflies**
- **Comments:** white to pink flowers in Summer, suckers easily to colonize, moderate growth rate, moderate salt tolerance (Glen et al., 2004), plant as containers

Magnolia virginiana – sweetbay magnolia

- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: FACW**
- **Light Requirement:** Part Shade
- **Size:** 20 - 60’ tall, 20’ spread
- **Habit:** Multi-stemmed **semi-evergreen to evergreen** small tree, open or pyramidal form
- **Benefits:** Attracts **Sweetbay silkmoths**
- **Comments:** Blooms creamy white in Summer, medium growth rate

Betula nigra – river birch

- **Indicator Status**
  - **EMP: FACW**
  - **ACGP: FACW**
- **Light Requirement:** Sun to Part Shade
- **Size:** 40-70’ tall, 40’ spread
- **Habit:** Deciduous tree, more attractive as **multi-trunked tree**, spreading crown and weeping branches create nice form
- **Benefits:** **Seeds** are **food source** for birds and small mammals
- **Comments:** Blooms early Spring (Feb. – Mar.), nice **exfoliating bark**, insect/ disease free, medium to fast growth rate

Itea virginica – Virginia sweetspire

Photo: ACES

Photo: ACES

Photo: ACES

Photo: Alicia Hunolt

Roots after 9 months

Zone 3 Plants

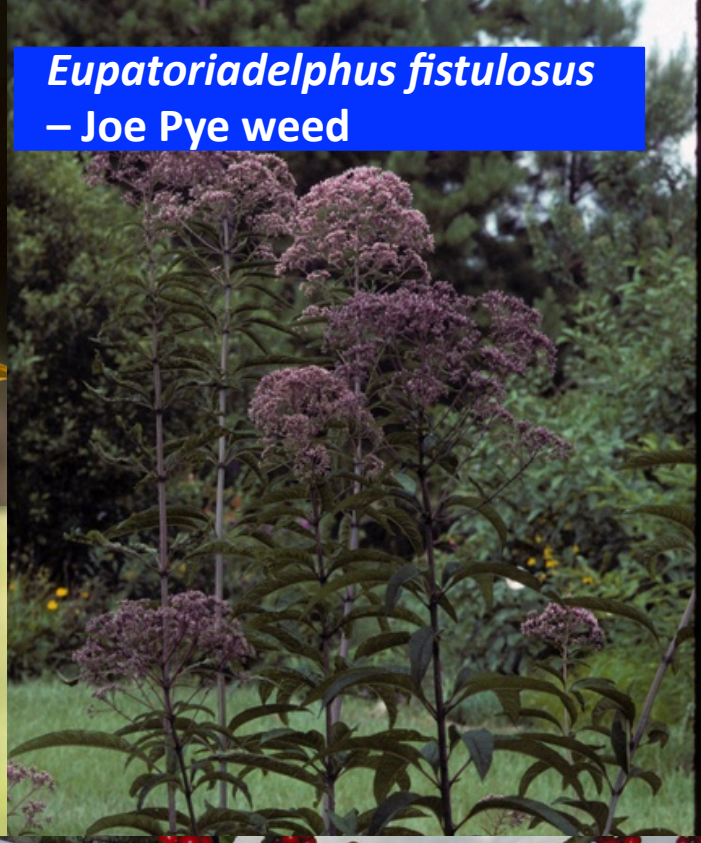
- **Indicator Status**
  - **EMP: OBL**
  - **ACGP: FACW**
- **Light Requirement:** Sun to Part Shade
- **Size:** 3-6’ tall and wider than tall
- **Habit:** **semi-evergreen** to deciduous shrub
- **Comments:** Spring bloom, **flowers showy,** lightly fragrant, good **fall color, can be difficult to install as live stakes, best for “soft” soils**

Chasmanthium latifolium – river oats

- **Indicator Status**
  - **EMP: FACU**
  - **ACGP: FAC**
- **Light Requirement:** Part Shade to Shade
- **Size:** 2’ tall and as wide
- **Habit: perennial grass**
- **Comments:** Summer bloom, good yellow fall color, showy oat like inflorescences, container

Lobelia cardinalis – cardinal flower

Helianthus angustifolius – swamp sunflower



Eupatoriadelphus fistulosus – Joe Pye weed

Verbena hastata– swamp verbena

Acer rubrum – red maple

Viburnum dentatum – arrowwood

Ilex decidua– possumhaw

Photos: www.wildflower.org

Zone 4 Plants

Photo: Jessica Roberts Brown

Asimina parviflora – Dwarf Paw Paw

- **Indicator Status**
  - **EMP: FACU**
  - **ACGP: FACU**
- **Light Requirement:** Shade
- **Size:** 3-5’ tall, 5’ spread
- **Habit:** Small deciduous shrub, open form
- **Benefits:** **Fruit** attracts small mammals
- **Comments:** Blooms maroon early Spring, good **understory shrub**

Callicarpa americana – Beautyberry

- **Indicator Status**
  - **EMP: FACU**
  - **ACGP: FACU**
- **Light Requirement:** Part Shade to Shade
- **Size:** 3-6’ tall, 6’ spread
- **Habit:** Small deciduous shrub, open form, somewhat arching
- **Benefits:** **Fruit** attracts birds (40+ species!), rodents, leaves browsed by **deer**, flowers butterfly attractant
- **Comments:** Blooms light lavender to pink in Summer (June – Aug.), good **understory shrub**

Zone 4 Plants

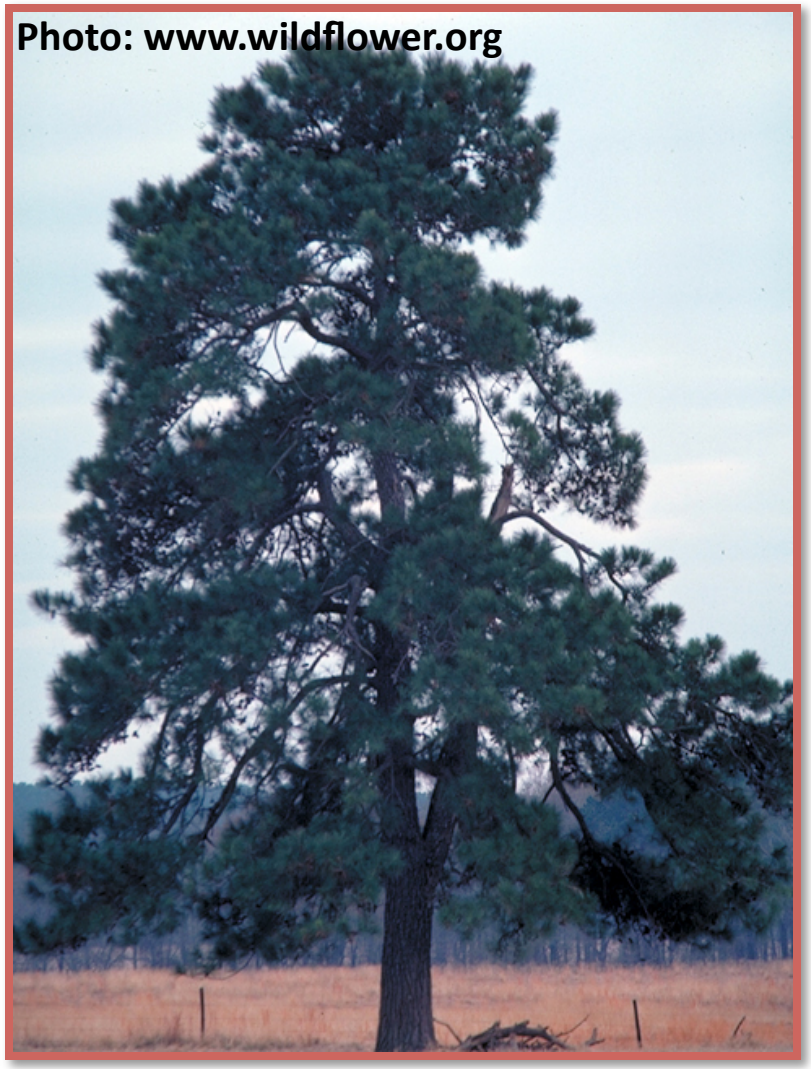
Quercus alba – White Oak

- **Indicator Status:** FACU
- **Light Requirement:** Sun to Part Shade
- **Size:** 72-100’ tall, 60’ spread
- **Habit:** Large deciduous shade tree, upright and **rounded form** at maturity
- **Benefits:** **Acorns** attract birds and rodents
- **Comments:** Do not plant in areas where construction equipment will **damage roots** of mature trees, does not like compacted soils, **native to NC**

Calycanthus floridus – Sweetshrub

- **Indicator Status**
  - **EMP: FACU**
  - **ACGP: FACU**
- **Light Requirement:** Part Shade
- **Size:** 6-9’ tall, 12’ spread
- **Habit:** Deciduous multi stemmed shrub
- **Benefits:** White-tailed **deer browse**, very adaptable
- **Comments:** Blooms maroon in Summer (May – July), flowers fragrant, **suckers easily**

Pinus taeda – Loblolly Pine



- **Indicator Status**
  - **EMP: FAC**
  - **ACGP: FAC**
- **Light Requirement:** Sun to Part Shade
- **Size:** 72-100’ tall, 40’ spread
- **Habit:** Large **evergreen** tree, open and **oval form** at maturity
- **Benefits:** **Nesting** site for birds, small mammals and **birds eat seeds**, **larval host** for moths
- **Comments:** **fast growing**, pioneer species

Cercis canadensis – Eastern Redbud

- **Indicator Status**
  - **EMP: FACU**
  - **ACGP: UPL**
- **Light Requirement:** Sun to Part Shade
- **Size:** 20-30’ tall, 35’ wide
- **Habit:** small deciduous **multi trunked tree**
- **Benefits: Attracts birds**
- **Comments:** Blooms pink in Spring (Mar.), flowers edible

Cornus florida - dogwood

Quercus alba – white oak

Tsuga canadensis- Canadian hemlock

Phlox divaricata – blue phlox

Chionanthus virginicus– fringe tree

Prunus serotina – black cherry

Halesia carolina – Carolina silverbell

Quercus stellata – post oak

Photos: www.ag.auburn.edu/hort/landscape

Ferns

- Great for shade to part shade
- Divide and transplant
- Don’t dry out
- Note where they are already growing

Onoclea sensilbilis – sensitive fern

Osmunda cinnomomea – cinnamon fern

Polystichum acrostichoides – Christmas fern

Woodwardia areolata – netted chain fern

Photos: www.wildflower.org

Scheduling

- Live stakes and bare root seedlings – Winter
  - When plants are dormant
  - Before bud break
- Containers – anytime of year
  - Summer = more water to irrigate
- Wetland herbaceous – transplants or plugs
  - After last spring frost best

Costs

- Live stakes - ~ $22/ bundle of 50
- 3 gals – ~ $9 - 12 per
- 1 gals – ~$4 – 6 per
- Plugs – ~$1 - 2.15 per
- Bare root seedlings - ~ $.75 – 1 each

Photo: ACES

Photo: ACES

How to Plant - Containers

- Dig hole 2 to 3x width of container and as deep
- Loosen pot bound roots
- Roots matted - cut
- Never plant in compacted soil

Photos: Alabama Smart Yards

Large Scale Projects

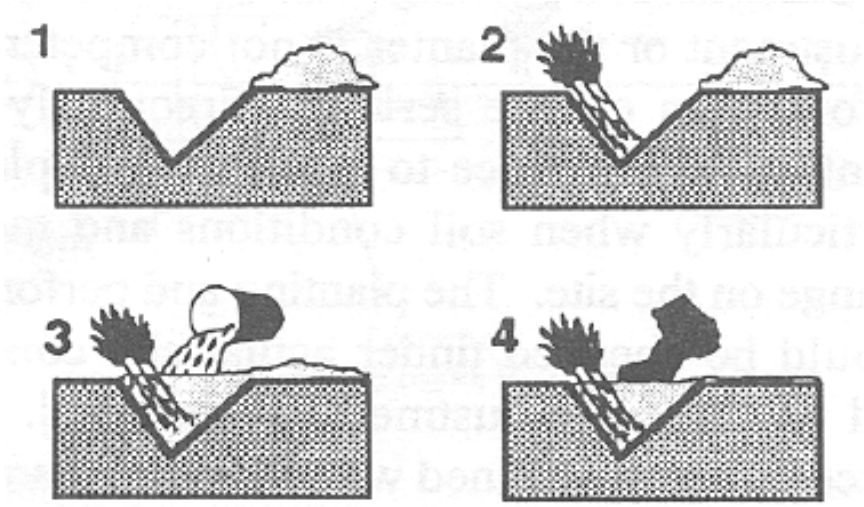
- Save your back – use equipment!

Photo: Riparian and Wetland Tree Planting Guide for NC

Photo: ACES

Bare Root Seedlings

- Temporary Storage (> 2 days)
  - V shaped trench in shady spot
  - Keep moist
- Use dibble, KBC, or planting bar



Graphic from Riparian and Wetland Tree Planting Guide for North Carolina, photo: www.state.sc.us

Step One

- Make hole
- Work bar back and forth

Step Two

- Insert seedling
- Avoid “J” rooting
- Close hole

Step Three

- Tamp soil
- Water in

Photos: Riparian and Wetland Tree Planting Guide for North Carolina

Live Stakes

- Dead blow hammer
- Rebar, 18 – 36” long
- Sledge hammer
- Harvest or order
- Install immediately or soak bundles until installation

Installing Live Stakes

- Install at 90° angle in streambank at or below bankfull
- Make pilot hole with rebar
- Use dead blow hammer to pound stakes into streambank

Photos: ACES

Installing Live Stakes

- Orient leaf buds facing upward
- One stake every 2 – 3’ in triangular spacing pattern
- Remove damaged hammered tip of live stake by making a fresh cut
- 3 to 4” should be left above the soil line

Photos: ACES

Harvesting Live Stakes

- Angle cut branch just below a leaf node
- Straight cut above a leaf node at top
- Remove leaves and branches from stakes
- These branches or “whips” can be pushed into the streambank

Photos: ACES

Harvesting Tips

- Angled cut aids in driving stake into soil and helps avoid confusion later
- Fix cut on parent plant to be straight to help plant recover more quickly from pruning
- Can dip top ends in paint to differentiate between species, ask nursery to do this
- Never leave stored live stakes in the sun or let them dry out

Photo: ACES

Prepare for Seeding

- Soil test to determine lime and fertilizer
- Apply topsoil if necessary
- Loosen soil compacted soil (raking, disking ~ 12 – 15 inches deep)

Photos: ACES

Seeding

- Temporary and/or permanent
- Straw or mulch to cover
- Erosion matting over straw
- Seed around containers and bare root seedlings

Seeding

- Temporary
  - Minimizes immediate erosion
  - Based on season
- Permanent
  - Wetland seed mix for floodplain
  - Seed mix for upland

Photos: ACES

The Reality…

Photo: ACES

2012/02/24
Photo: ACES

Photo: ACES

Photo: ACES

Photo: ACES

Working Together

- Not a lot of $ to spend
- Live stakes
  - Shipping just as much as stakes - @ $280 total
- Containers on top of bank
  - Donated from past project
- Cut stump treatments on privet
  - Expertise from ACES agents – FREE!

Photo: ACES

2012/02/24
Photo: ACES

Photo: ACES

Photos: ACES

Photo: ACES

Photo: ACES

Photos: ACES

en Shoots Foamed
Control invasive
CAUTION!
¡CUIDADO!
EP THIS AND ALL CHEMICALS OUT
UA ESTE Y TODOS LOS QUÍMICOS
and strong caustics may
125 ml
der, for herbicide application
suggestions, visit:
PRODUCT SAMPLE

Photos: ACES

Photos: ACES

Photo: ACES

3 Months Post Installation

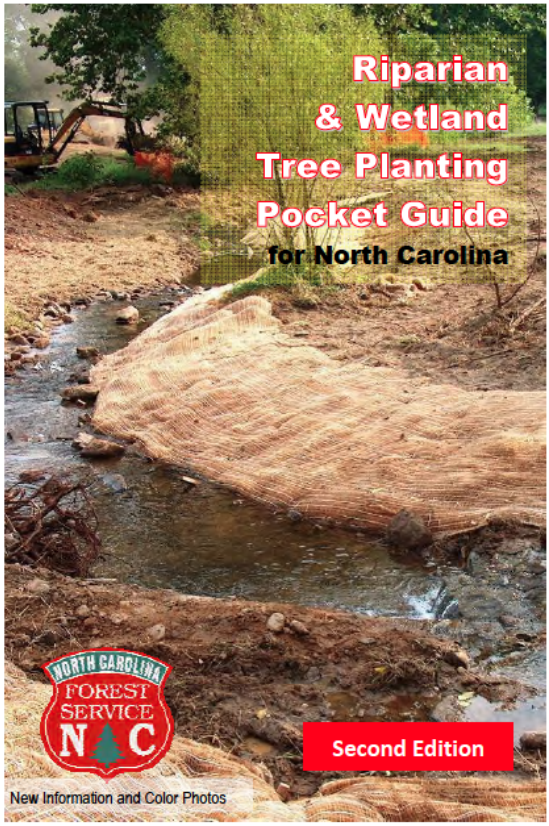
Results So Far…

- Three 9’ subsamples
- Survival counts
- **3 months post** – 93% survival
- **7 months post** – 75% survival

Photo: ACES

Where to Buy Plants

- Baker Environmental (GA) – live stakes, bare roots, containers
- Nearly Native (GA) – containers
- Foggy Mountain Nursery (NC)– live stakes, bare roots, containers
- Mellow Marsh Farm (NC) – live stakes, bare roots, containers
- Coastal Plain Conservation Nursery (NC) – plugs
- Carolina Native nursery (NC) – containers
- Carolina Wild (NC) – containers

Resources

- Dirr, Michael – Manual of Woody Landscape Plants
- National Wetland Plant List
- www.wildflower.org
- www.ag.auburn.edu/hort/landscape
- www.plants.usda.gov
- www.duke.edu
- Riparian and tree planting guide – NC
- Check out www.aces.edu/bufferkit