Selecting Vegetation for Riparian Restoration and Stormwater Basin Retrofits

Select Native Vegetation Species Always!

Positive reasons for regional or local native species:

❑ Naturally adapted to climate, water chemistry and soil and therefore higher success rates

❑ More resilient to local insects and wildlife impacts

❑ More receptive/attractive to local pollinator species

❑ Are less likely to become invasive species later

❑ Are more likely to enhance fauna habitat and natural surroundings
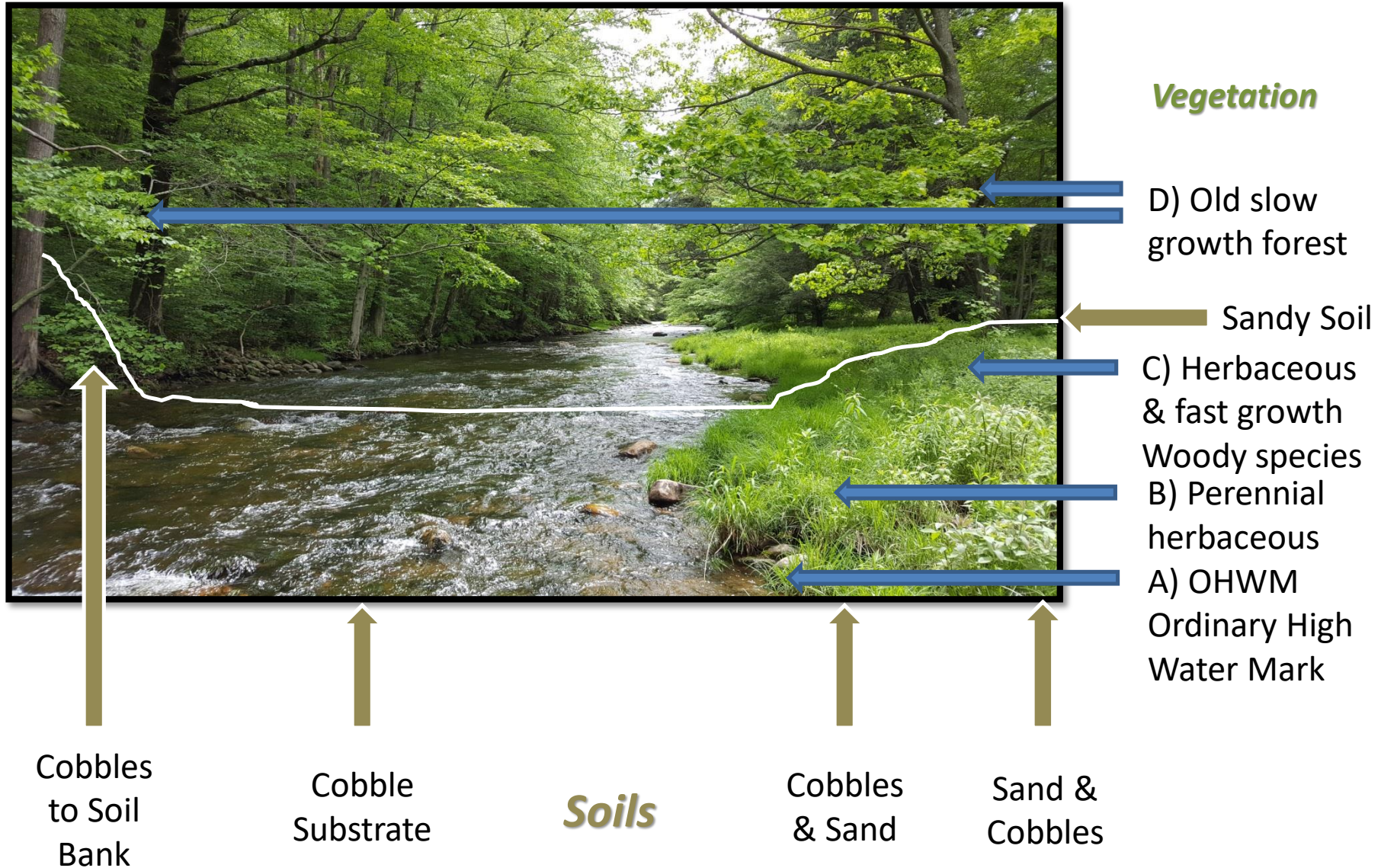
Christmas Fern

Important design concerns in Riparian Restoration

❑ Select plants that naturally exist in the watershed

❑ Plant each species in proper moisture regime

❑ Avoiding planting near existing allelopathic plants

❑ Plant where enough sunlight is available

❑ Evaluate soil types before planting to select proper species

❑ Plant fast growth near water

❑ Plant slow growth in protected areas

❑ Avoid underground and overhead utilities

Steeple Bush

Stream Assessment of Existing Riparian Zones to Model Natural Growth

Vegetation

D) Old slow growth forest

Sandy Soil

C) Herbaceous & fast growth Woody species

B) Perennial herbaceous

A) OHWM Ordinary High Water Mark

Cobbles to Soil Bank

Cobble Substrate

Soils

Cobbles & Sand

Sand & Cobbles

National Wetland Indicator List to Aid in Planting Selections

Indicator Status	Abrv.	Definitions
Obligate	OBL	Almost always occur in wetlands >99%
Facultative Wetland	FACW	Usually occur in wetlands 99%-66%, but may occur in non-wetlands
Facultative	FAC	Occur in wetlands and non-wetlands 66%-33%
Facultative Upland	FACU	Usually occur in non-wetlands, but may occur in wetlands 33%-1%
Upland	UPL	Almost never occur in wetlands <1%
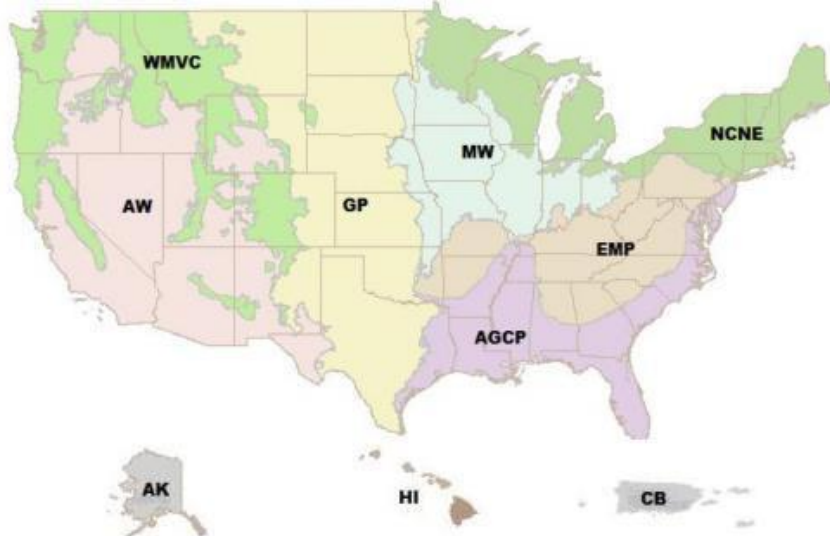
State List of Wetland Indicator Species
http://wetland-plants.usace.army.mil/nwpl_static/v33/home/home.html#
Example: Pin Oak - FACW
Swamp White Oak - FACW
Red Oak - FACU
Chestnut Oak - UPL

Plants to Use in Pennsylvania Riparian Restoration						
Scientific Name	**Authorship**	**AGCP**	**EMP**	**NCNE**	**Common Name**	**Typical Habitat**
Acer rubrum	L.	FAC	FAC	FAC	Red Maple	Anywhere not permanently wet
Acer saccharinum	L.	FAC	FACW	FACW	Silver Maple	Sandy loams with constant moisture
Acer saccharum	Marsh.	FACU	FACU	FACU	Sugar Maple	Moist well drained
Alnus incana	(L.) Moench	FACU	FACU	FACW	Speckled Alder	Mucky swamps to well saturated soils
Alnus serrulata	(Ait.) Willd.	FACW	OBL	OBL	Brookside Alder	Forested streambanks with detritus
Amelanchier canadensis	(L.) Medik.	FAC	FAC	FAC	Canadian Service-Berry	Anywhere with moisture
Betula alleghaniensis	Britt.	FACU	FAC	FAC	Yellow Birch	Seasonally wet high streambanks
Betula lenta	L.	FACU	FACU	FACU	Sweet Birch	Dry ridges, well drained streambanks
Betula nigra	L.	FACW	FACW	FACW	River Birch	Sandy loams with water in reach
Betula populifolia	Marsh.	FAC	FAC	FAC	Gray Birch	Wetland borders, coal mine waste
Carex crinita	Lam.	FACW	OBL	OBL	Fringed Sedge	Permanent saturation to flooded
Carex gynandra	Schwein.	FACW	OBL	OBL	Nodding Sedge	Permanent saturation
Carex leporina	L.	FAC	FAC	FAC	Oval Sedge	Seasonal wetness
Carex stricta	Lam.	OBL	OBL	OBL	Tussock Sedge	Stream edges with roots in water
Carex vulpinoidea	Michx.	FACW	OBL	OBL	Common Fox Sedge	Mineral soils permanent to seasonal wet

Stream Assessment of Existing Riparian Soil & Hydrology to Model Restoration for Natural Growth

Hydrology

D) Infrequent Floods (moist to dry)

C) Periodic Flooding (moist To wet)

B) Frequent flooding (wet)

A) OHWM

Facultative Upland & Facultative Species

National Wetland Inventory of Species

Obligate & Facultative Wetland Species

Facultative Wetland & Facultative Species

Flood Frequency

Stream Assessment of Existing Riparian Vegetation & Soil for Restoration Model of Natural Growth

Vegetation

E) Red oak, Yellow birch, beech and Sugar maple

D) Muscle wood, Bass wood, Yellow Birch, Red Maple

C) Black willows, River Birch & moist Sedge species

B) Wet grasses & sedges

A) OHWM

Cobbles to Soil Bank

Freestone Cobble Substrate

Soils

Cobbles & Sand

Sand & Cobbles

Stream Assessment of Existing Riparian Vegetation & Soil for Restoration Model of Natural Growth

Vegetation

D) >3 feet above OHWM

Sandy Soil

C) 1.5 to 3 feet above OHWM

B) 0 to 1.5 feet above OHWM

A) OHWM

Cobbles to Soil Bank

Cobble Substrate

Soils

Cobbles & Sand

Sand & Cobbles

Stream Assessment for Riparian Restoration in Former Lake Bottom

Vegetation

C) Wet meadow sedge & rush sp. Present (DND!)

B) Cut bank out -side bend of stream – coir log with willows

A) Wet fast growing grasses & sedges

Cobbles to muck bank

Cobble Substrate

Soils

Cobbles & Sand

Sand & Cobbles

Riparian Restoration in Former Lake Bottom

Vegetation Selection by Moisture Regime & Soil

C) Wet meadow sedge & rush sp. Present

B) High bank FACW to FACU species

A) Wet OBL fast growing trees & shrubs

Cobbles to muck bank

Silty muck Substrate

Soils

Cobbles & Mucky Sand

Sand & Cobbles

Stream Assessment for Riparian Restoration in Former Mountain Springs Lake Bottom

Moisture Needs

C) Wet to moist Meadow FACW to FAC species

B) High bank FACW to FACU species
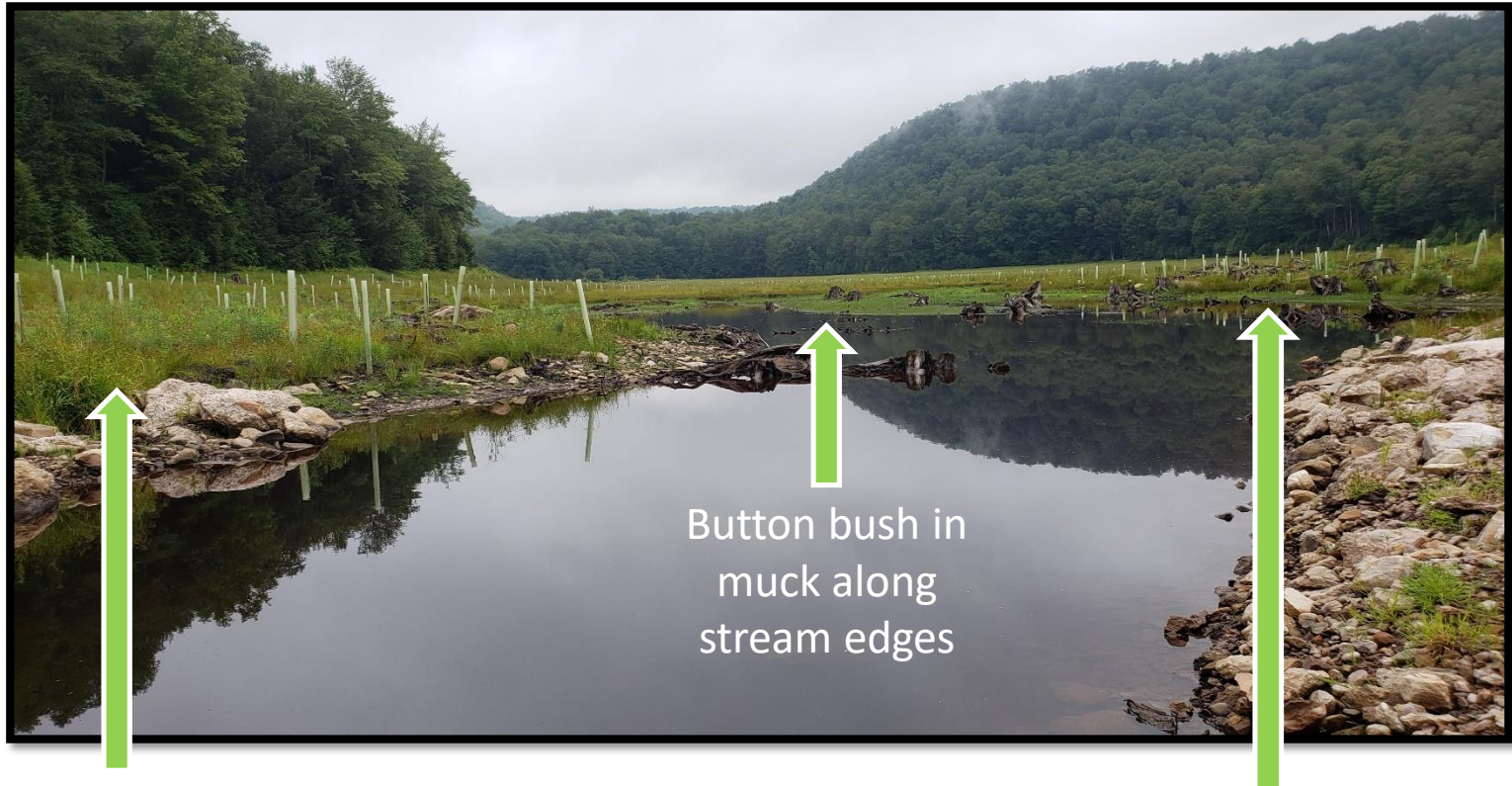
A) Wet OBL fast growing trees & shrubs

Black Willow & Button bush

Button bush along stream edge

Trees/Shrubs Planted 4/2019 >90% Survival

Red oak, Red maple high bank to Sycamore, Silky dogwood low bank

Riparian Restoration in Former Mountain Springs Lake Bottom

Button bush in muck along stream edges

Red oak, Sycamore & River birch from highest to lowest

Trees/Shrubs Planted 4/2019 >90% Survival

Red oak, Red maple high bank to Sycamore, Silky dogwood low bank

South Branch Bowman Creek – Eastern Brook Trout Joint Venture

2000 Trees and shrubs along 2,500 feet of stream in a former lake bottom supported by EBTJV, US Fish and Wildlife, Chesapeake Bay Foundation 10 Million Trees, Trout Unlimited Stanley Cooper Chapter, and PA Fish and Boat

Chesapeake Bay Foundation Keystone 10 Million Trees – 2019 Projects

Common Species for Riparian Restoration

- Saturated to Frequent Flooded Areas – Silty to organic soil Black willow, Button bush, Swamp White oak, Pin oak, Silky dogwood, Winterberry

- Periodic Flooding that drains and plants can reach water – Sandy to Gravel soil – Trees: Sycamore, River birch, Eastern cottonwood, Yellow birch, Silky dogwood, Winterberry, Highbush Blueberry, American Hornbeam, Hophornbeam, Spicebush

- Never Floods, seasonal high water ~2 feet deep: Red maple, Black Gum, Yellow birch, Eastern cottonwood, Tulip Tree, Basswood, Red oak, Southern Arrowwood, Hobblebush, Nannyberry, Great Rhododendron

- Never floods, seasonal high water >3 feet deep: Red oak, Sugar maple, Red maple, Tulip tree, Basswood, White pine

- OBL & FACW

- FACW & FAC

- FAC & FACU

- FACU

Stormwater Basin Retrofit – Dallas School District

What benefits are created with a flood control storm basin by planting and creating vegetative cover at Schools?
- ☐ *Help School Districts to meet MS4 water quality goals*
- ☐ *Improve water quality leaving the properties*
- ☐ *Increase habitat for flora and fauna on a School campus*
- ☐ *Create on campus biology sites for teachers and students*
- ☐ *Improve ground water absorption for ground water recharge*
- ☐ *Increase evapo-transporation of storm flows during growing season*
- ☐ *Reduce water temperatures and nutrient runoff to surrounding cold water fishery streams*
- ☐ *Increase carbon uptake in woody plants and production of oxygen*
- ☐ *Reduce school maintenance safety issues and costs with no mowing*

Be inventive in discussions with Schools officials on benefits. Include maintenance supervisors on their concerns for mowing steep banks and swampy areas.

Important design concerns in Stormwater Retrofits

- ❑ Select plants that naturally exist in the watershed
- ❑ Plant each species in proper moisture regime
- ❑ Avoiding planting woody species in constructed berms
- ❑ Plant diverse water need species to survive variations
- ❑ Evaluate soil types before planting to select proper species
- ❑ Fast growth helps with an impatient public
- ❑ Pay attention to outlet elevation design
- ❑ Avoid underground and overhead utilities

Dallas School District Stormwater Basin Planting

Dallas School District Stormwater Basin Planting

April 2017 – Pre cease mowing
- 27 species of wetland and upland vegetation
- No cover for wildlife
- Low sediment and nutrient capture
- Maintenance headache for mowing
- No wildlife observed

June 2019 – Post cease mowing
- 52 species of wetland and upland vegetation
- Cover for wildlife with 4 Red-winged blackbird nests
- Sediment and nutrient capture
- Maintenance headache removed
- Green frog, American toad, Wood frog, Cottontail rabbit, House wren

Dallas School District Planting Regime for 3 Basins ~ Total 2.5 Acres

Dallas School District Planting Estimate
Toby Creek Watershed, Dallas Twp., PA

Wet Zone Woody Plants:		Plant Type	Costs Each	Plants	Material Costs
Quercus palustris Pin Oak		Tublings	$ 1.35	30	$ 40.50
Betula nigra River Birch		Tublings	$ 1.35	30	$ 40.50
Ilex verticillata Winterberry		Tublings	$ 1.35	40	$ 54.00
Moist Zone Woody Plants:		Plant Type		Plants	
Amelanchier canadensis Serviceberry		Tublings	$ 1.35	150	$ 202.50
Betula alleghaniensis Yellow Birch		Tublings	$ 1.35	150	$ 202.50
Acer rubrum Red Maple		Tublings	$ 1.35	150	$ 202.50
Dry Zone:		Plant Type		Plants	
Cornus florida Flowering Dogwood		Tublings	$ 1.35	25	$ 33.75
Liriodendron tulipferaTulip Tree		Tublings	$ 1.35	25	$ 33.75
**Seeding Throughout All Areas:		Seed Entire area		Lbs	
Ernst mix ERNMX-127 Wildlife Habitat Retention Basin Mix		Seed	$ 29.17	20	$ 583.40
Stabilization Coir Logs:				Logs	
Premium Coir Logs 12" x 12'	12 LF each		$ 102.00	9	$ 918.00
Shipping Costs					$ 500.00
				Total	$ 2,865.40

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