



WORKING WITH NATURE TRAINING SERIES

JUNE 15, 2022

*Operating and maintaining nature-based
solutions*

LOUISIANA
WATERSHED
INITIATIVE

working together for sustainability and resilience



AGENDA

- Program overview
- Operating and maintaining nature-based solutions
- Maintaining green infrastructure in urban parks
- Questions



NATURE-BASED SOLUTIONS PROGRAM OVERVIEW

MAXIMIZE NATURAL FUNCTIONS OF THE FLOODPLAIN

- Fund projects that harness natural features to reduce flood risk, improve water quality and provide additional co-benefits
- Provide training and technical resources to advance understanding and adoption of nature-based solutions
- Prioritize nature-based solutions throughout state programs and projects
- Use tools to quantify benefits and measure performance of nature-based projects



OPERATING AND MAINTAINING NATURE-BASED SOLUTIONS



Wes Michaels

PRINCIPAL | SPACKMAN MOSSOP MICHAELS
LANDSCAPE ARCHITECTS

Wes has worked on a wide range of projects from sustainable campus design to urban waterfronts on a national and international scale. His work focuses on the interplay between culture and the environment in parks, streets and urban open space networks. Wes was awarded the ASLA National Award of Excellence in 2008, 2009 and 2012, as well as a Fulbright Fellowship in 2009 for research and travel in Estonia and Scandinavia.



Overview

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THREE KEY PRINCIPLES FOR SUSTAINABLE NATURE-BASED SOLUTIONS

1. The community is the foundation.
2. Operations and maintenance begin with the design.
3. Start with simplicity and learn complexity.



Free Trees? Many Detroit Residents Say No Thanks

It's not that residents don't like trees, a recent study found. They just don't quite trust the city to take care of them.

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 Give this article    29



Members of The Greening of Detroit, a nonprofit group, planting a tree in the city's Osborn neighborhood in 2016. Carlos Osorio/Associated Press

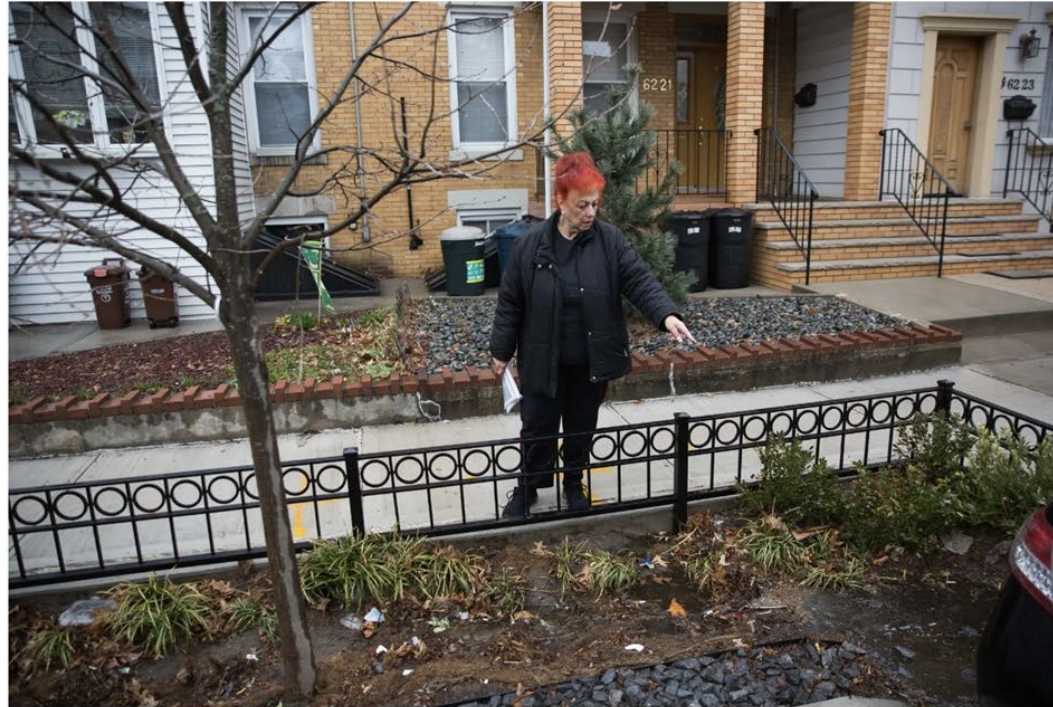


To the City, a Pollution Fighter. To Some Residents, an Eyesore

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Give this article



Jeanette Romano is not pleased with the bioswale placed in front of her house in Queens. She has spent \$2,600 to repair what she says was poorly laid concrete after the pit was dug. Kevin Hagen for The New York Times



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Community is the foundation

CONTEXT IS CRITICAL

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- Different communities have different needs.
 - Streetscapes vs. neighborhood parks vs. large parks, etc.
 - Rural vs. suburban vs. urban
 - Marginalized vs. privileged
- “Heritage narratives” are important.



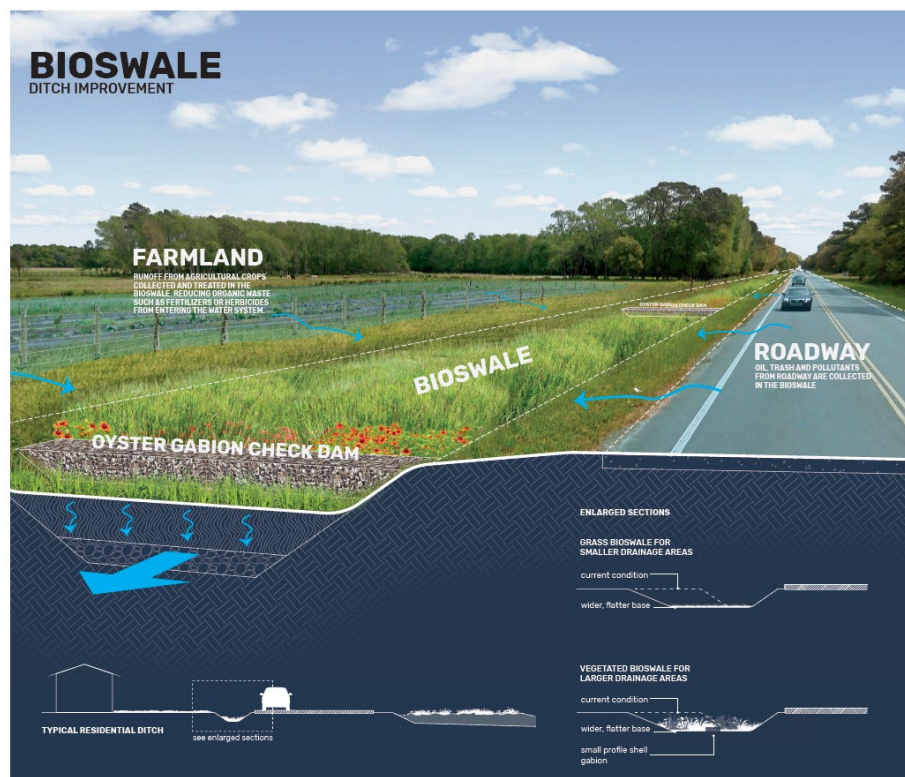
Community is the foundation

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CULTURAL SUSTAINABILITY IS THE GOAL

- Initially, communities often do not accept unfamiliar landscapes.
- Over time, the unfamiliar can become familiar (and even a cherished part of the cultural landscape).
- A maintained landscape is closely related to the users' expectations.
- Maintenance is the perception of care and how closely a landscape adheres to the cultural norms.
- These perceptions can change over time, and as the community grows to accept the novel landscape, the more it will demand that it be preserved.





St. Helena Island, South Carolina
SPACKMAN MOSSOP MICHAELS



Rosa F. Keller Library, New Orleans
SPACKMAN MOSSOP MICHAELS



O&M begins with the design

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WHAT THE RESEARCH SAYS

- Joan Nassauer, University of Michigan
- James Hitchmough, University of Sheffield





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NASSAUER: CUES TO CARE

1. Mowing and orderliness
2. Colorful flowers
3. Edges and rows
4. Boundaries
5. Signs and ornaments

MALINALCO PRIVATE RESIDENCE, MEXICO
MARIO SCHJETNAN





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1. MOWING AND ORDERLINESS

SHANGRI LA BOTANICAL GARDENS, ORANGE, TEXAS

CARBO LANDSCAPE ARCHITECTS



A photograph of a park landscape. In the background, a wooden bridge with a dark brown railing spans across a grassy area. In the foreground, a paved path curves along the left side, bordered by a dense field of tall, green grasses. The scene is set against a backdrop of lush green trees.

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1. MOWING AND ORDERLINESS

MOWING ALONG PATH BUFFERING NATURAL
LANDSCAPE AREA



1. MOWING AND ORDERLINESS

NATURALIZED LANDSCAPE WITH ADJACENT
MOWED AREA





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2. COLORFUL FLOWERS

NATURALIZED LANDSCAPE WITH ADJACENT
MOWED AREA





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2. COLORFUL FLOWERS

MILTON HIGH SCHOOL BIORETENTION POND, GEORGIA
BREEDLOVE LAND PLANNING





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3. EDGES AND ROWS

NATIVE PERENNIAL LANDSCAPE EDGING DESIGN



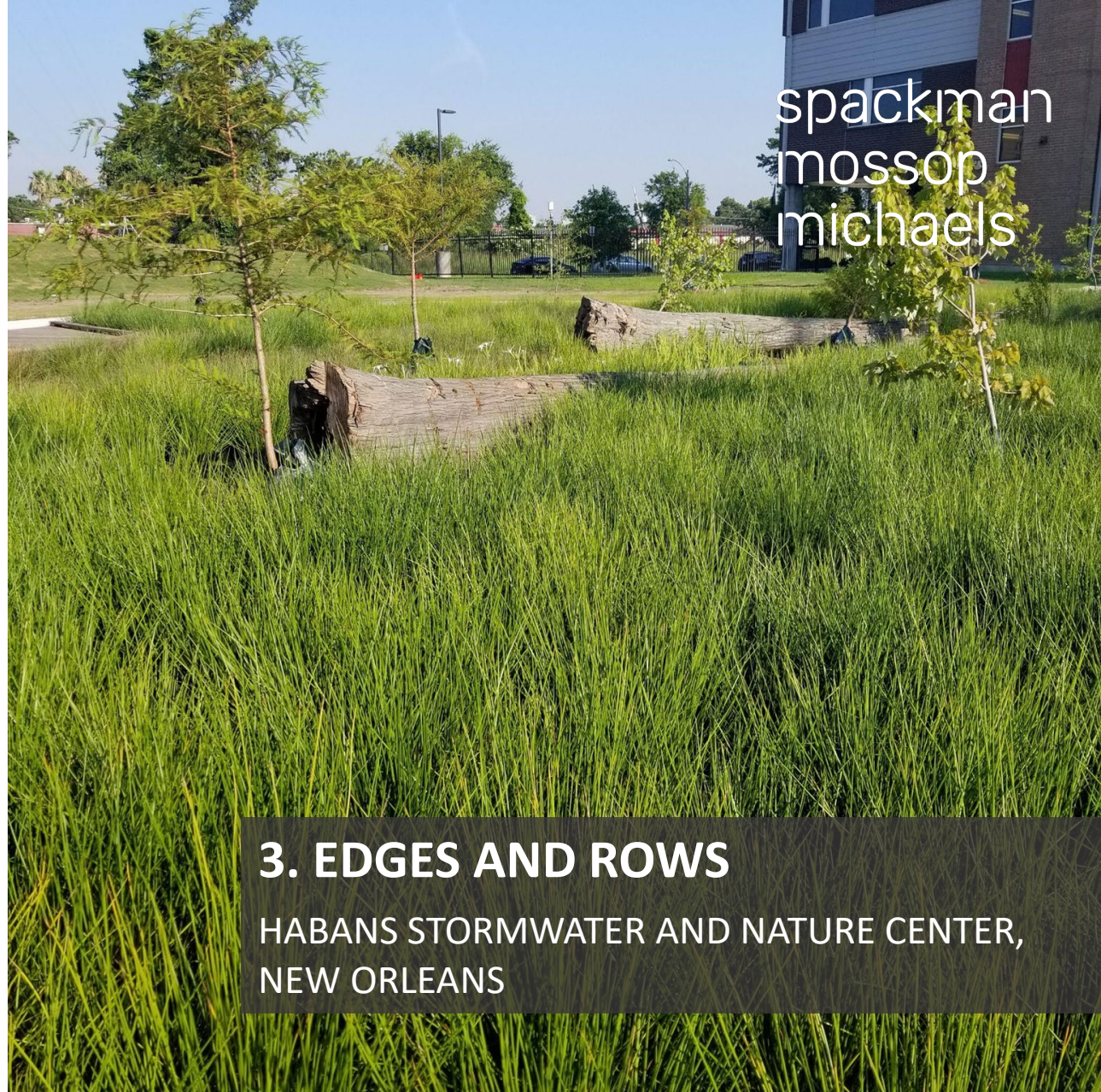


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3. EDGES AND ROWS

NORA REFORESTATION PILOT, NEW ORLEANS





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3. EDGES AND ROWS

HABANS STORMWATER AND NATURE CENTER,
NEW ORLEANS





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4. BOUNDARIES

STORMWATER PLANTER, PORTLAND





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4. BOUNDARIES

COMMUNITY AND ARCHITECTURAL DESIGN
GUIDELINES, ERIN, ONTARIO



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5. SIGNS AND ORNAMENTATION

NE SISKIYOU GREEN STREET, PORTLAND

KEVING ROBERT PERRY





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5. SIGNS AND ORNAMENTATION

BEACON MOUNTAIN, SEATTLE

SVR DESIGN COMPANY





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HITCHMOUGH: PLANTS AND PUBLIC ACCEPTANCE

1. Height
2. Plant structure
3. Seasonal memory
4. Cultural recognition
5. Exotic vs. native

LONDON OLYMPIC PARK MEADOWS

JAMES HITCHMOUGH & NIGEL DUNNETT



A photograph of a landscaped area featuring a dense field of yellow Black-eyed Susans in the foreground. Behind them are taller pink flowers and green grasses. In the background, a modern building with large windows is visible, partially shaded by a large tree with thick branches.

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1. HEIGHT: LOW GRASSES, TALL FLOWERS

LAMAR ADVERTISING HEADQUARTERS, BATON ROUGE





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1. HEIGHT: LOW GRASSES, TALL FLOWERS
RESIDENTIAL BIOSWALE WITH SWAMP SUNFLOWER



MCXXIX.

MCXXXI.

MCXXX

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2. PLANT STRUCTURE

PRIMULA VULGARIS DRAWING

WATSON, L. AND DALLWITZ, MJ. DELTA-INTKEY.COM





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2. PLANT STRUCTURE

LOUISIANA IRIS & BALDCYPRESS (POND CYPRESS)





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2. PLANT STRUCTURE

PRIMULA SPECIES IN URBAN DRAINAGE SWALES

JAMES HITCHMOUGH & MARKUS WAGNER





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3. SEASONAL MEMORY

SHEFFIELD BOTANIC GARDENS, ENGLAND

JAMES HITCHMOUGH





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4. CULTURAL RECOGNITION

LONDON OLYMPIC PARK BIOSWALE

HARGREAVES ASSOCIATES & JAMES HITCHMOUGH






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5. EXOTIC VS. NATIVE

OXFORD BOTANTIC GARDEN, ENGLAND

JAMES HITCHMOUGH





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5. EXOTIC VS. NATIVE

ROSA F. KELLER LIBRARY, NEW ORLEANS

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RESOURCE-BASED DESIGN PROCESS

Buildings are complete on opening day. Landscapes are just beginning.

- Think about maintenance as a design element
- Allocate maintenance resources before design begins
- Do not maintain all areas with the same regime



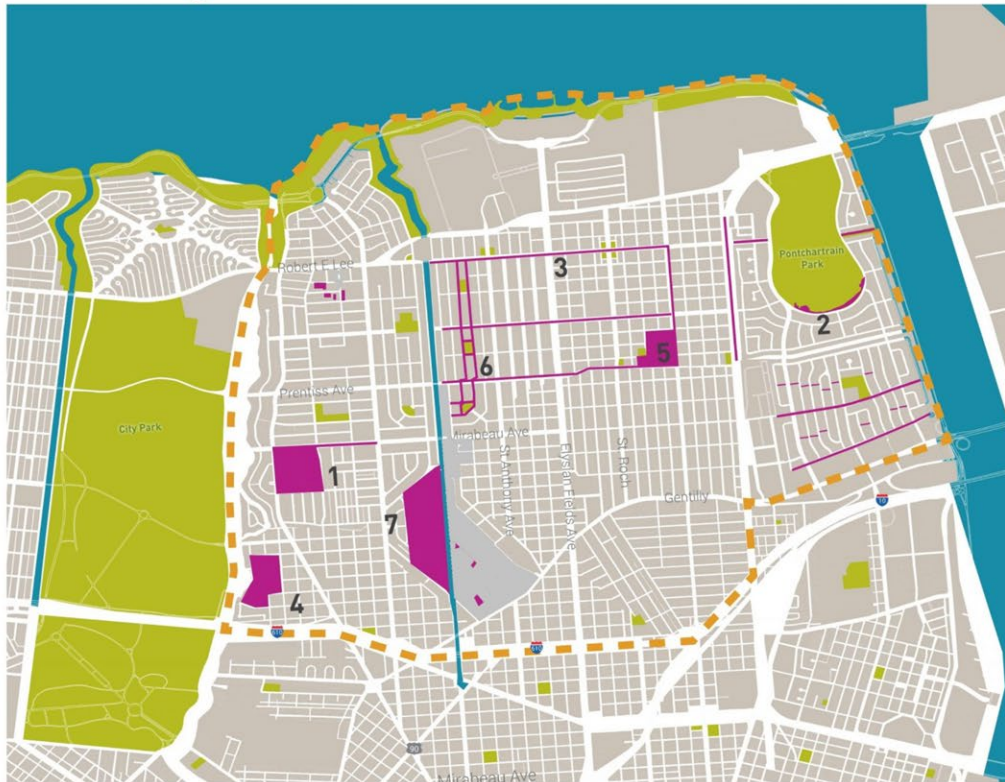
2 SITE SCALE IMPLEMENTATIONS



O&M begins with the design

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Gentilly Resilience District



PROJECT AREAS

1. Mirabeau Water Garden
2. Pontilly Neighborhood Stormwater Network
3. Blue & Green Corridors
4. St. Bernard Neighborhood Campus
5. Milne Campus
6. St. Anthony Green Streets
7. Dillard Wetlands

— District Boundary
— Park
— Canal
— Project Area



Start with simplicity, learn complexity

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NATURE-BASED SOLUTIONS ARE INTERCONNECTED SYSTEMS

- Designers need to use resource-based design principles and design for maintenance.
- Nurseries need to know what plants to grow.
- Soil suppliers need to know what kinds of soil to stockpile.
- Contractors/agencies need to be able to train staff to learn the plants and techniques.
- Local colleges (e.g., Delgado's Horticulture Department) and training programs (e.g., LA Green Corps) need to know how to educate students.



10 FUNDAMENTAL PLANTS FOR NEW ORLEANS BIOSWALES

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GRASSES

MUHLY GRASS

LITTLE BLUESTEM

SEDGES

SOFT RUSH

SEDGES, SPP.

FLOWERING

IRIS

CRINUM LILY

BLACK EYED
SUSAN

SHRUBS

SAW PALMETTO

TREES

CYPRESS

SWEETBAY MAGNOLIA



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LARGER SITES

GOLDENROD

SWAMP SUNFLOWER



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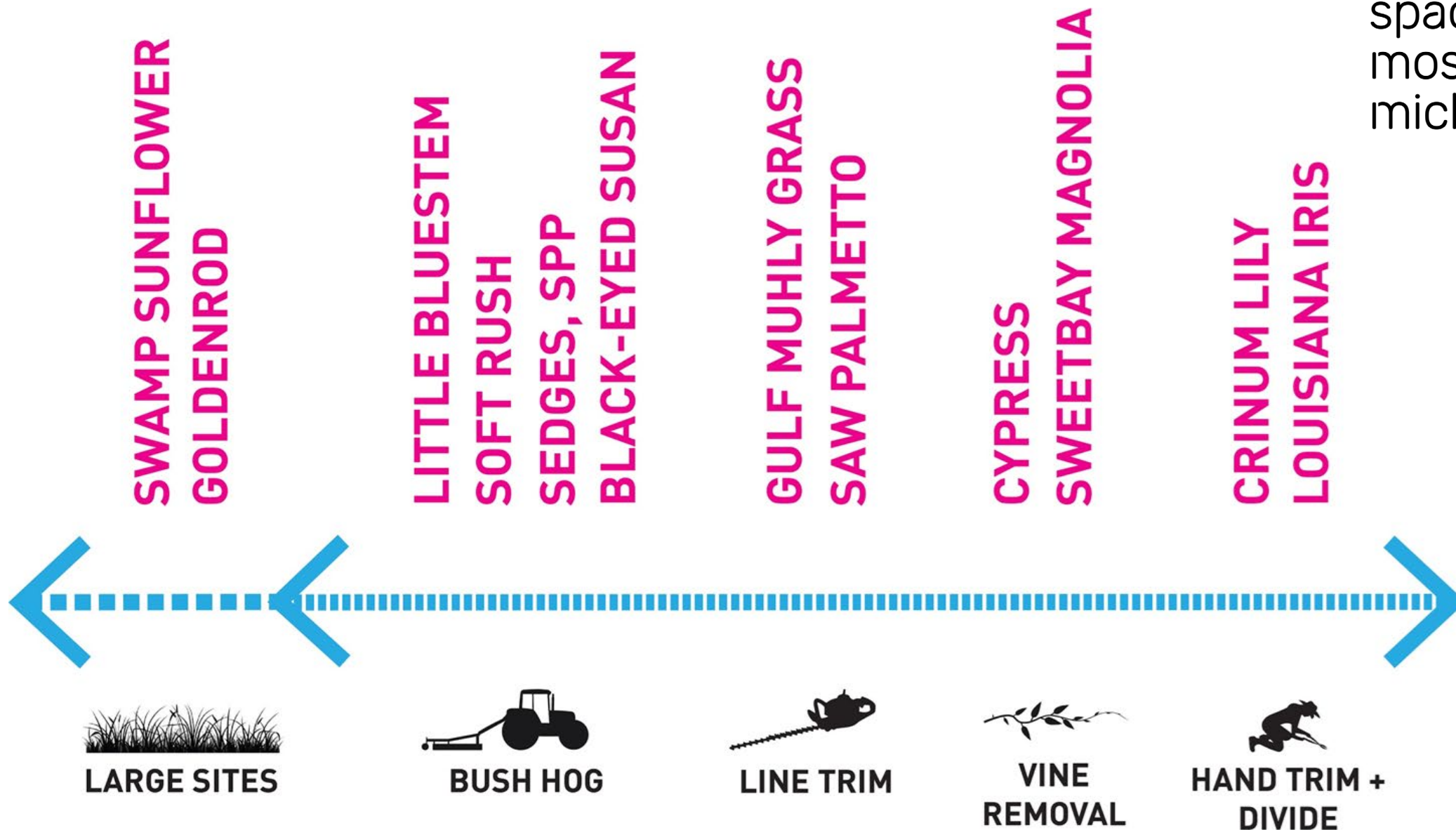
SHADE

INLAND SEA OATS

WOOD FERN

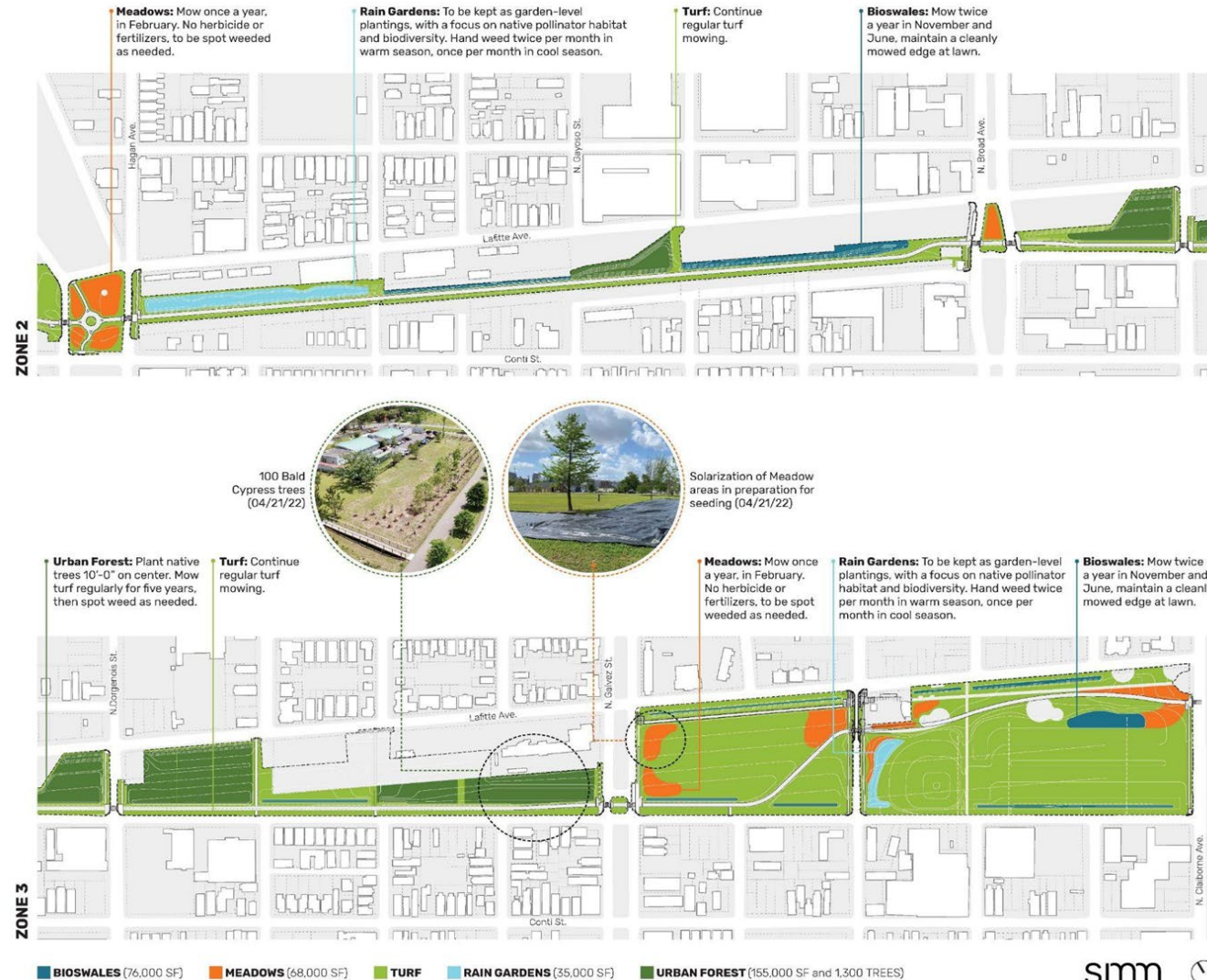


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Multiple management practices within one project

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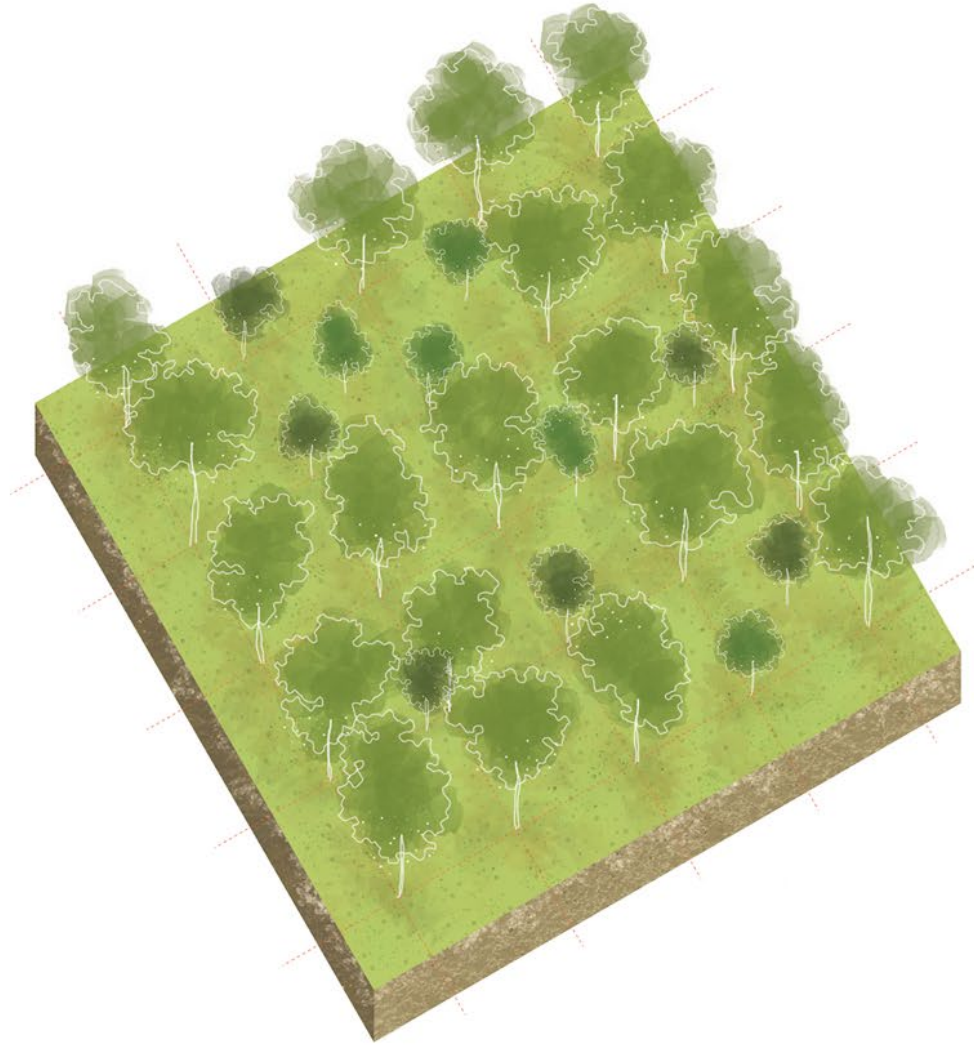
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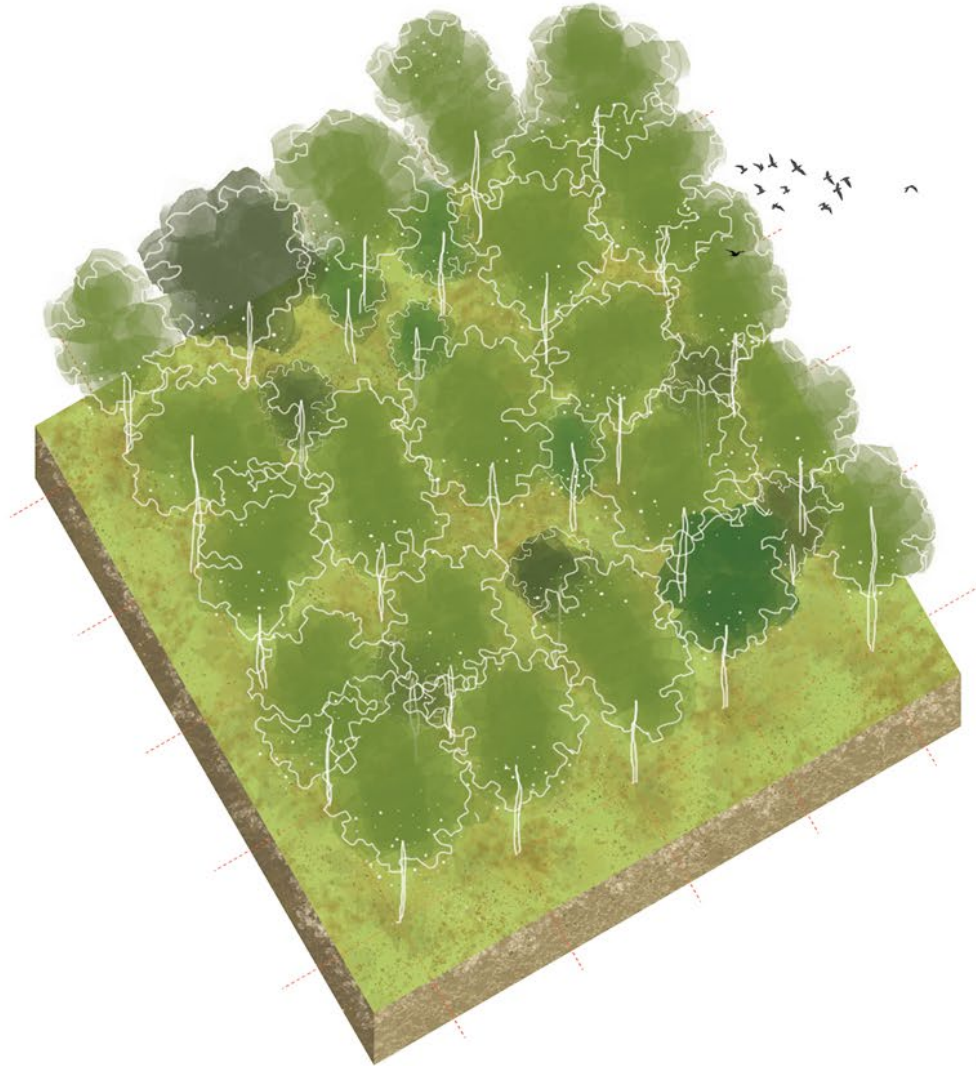


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MAINTAINING GREEN INFRASTRUCTURE IN URBAN PARKS



Cara Lambright

CEO | NEW ORLEANS CITY PARK
IMPROVEMENT ASSOCIATION

Cara leads the 130-year-old New Orleans City Park Improvement Association, overseeing one of the largest urban parks in the nation. She specializes in operations, capital planning, program development, public engagement and fundraising for public spaces. She previously served as executive vice president and chief operating officer for Memorial Park Conservancy in Houston.



The new urban park paradigm



- Parks
 - Culture
 - Recreation
 - Respite from the city
- Now: hub for resilience and biodiversity



Success through preparation



- Financial planning and resources
- Team training
- Adaptive management
- Preparing the public
- Ongoing communication



Financial planning



- Labor
 - (Task hours per landscape type * units of landscape) * 2,080 hours
 - Establishment vs. post establishment
- Equipment
- Material





	Establishment Period						
	Units	Hours/Unit	Traditional InT House	Traditional Contracted	Conservation In House	Conservation Contracted	Volunteers
Pine Hard Forest	ACRE	123	21	5	21	67	10
Riparian Forest & Corridors	ACRE	120	24	8	24	56	9
Prairie	ACRE	123	13	5	36	55	14
Pine Hard Savannah	ACRE	134	15	5	32	70	13
Wet Savannah and Prairie	ACRE	127	12	0	39	62	15
Lawns	ACRE	443	365	36	0	0	42
Garden	ACRE	552	294	95	0	0	164
Memorial Grove	ACRE	249	59	13	76	58	43
Buffer Planting	ACRE	96	22	0	32	36	7
Living Bridge	ACRE	88	49	8	15	6	10
Baseball and Softball Fields	ACRE	539	465	23	0	0	51
Sports Fields	ACRE	537	458	29	0	0	51
Tennis Center	ACRE	185	125	13	0	0	47
Fitness Center and Natatorium	ACRE	126	89	9	0	0	27
Trail Center	ACRE	213	133	18	0	0	61
Playground	ACRE	465	293	39	0	0	134
Structures and Hubs	ACRE	250	189	15	0	0	46
Pond	ACRE	68	39	18	12	0	0
Road + Parking	ACRE	96	71	17	0	0	8
Cycle Track	ACRE	230	150	25	0	0	54
Timing Track	ACRE	248	192	11	0	0	46
Stone Dust Trails	1000 LF	51	27	17	0	0	6
Natural Paths	1000 LF	33	18	2	0	0	13
Boardwalk	1000 LF	24	13	5	0	0	6
Allee	ACRE	186	113	16	0	0	57
Restrooms	EACH	743	718	25	0	0	0
TOTAL PROJECT TASK HOURS							





Post-Establishment Period							
	Units	Hours/Unit	Traditional In House	Traditional Contracted	Conservation In House	Conservation Contracted	Volunteers
Pine Hard Forest	ACRE	69	21	5	21	13	10
Riparian Forest & Corridors	ACRE	78	24	8	24	14	9
Prairie	ACRE	80	13	5	36	12	14
Pine Hard Savannah	ACRE	76	15	5	32	12	13
Wet Savannah and Prairie	ACRE	77	12	0	39	12	15
Lawns	ACRE	418	353	49	0	0	41
Garden	ACRE	522	294	95	0	0	164
Memorial Grove	ACRE	224	59	13	76	33	43
Buffer Planting	ACRE	71	22	0	32	11	7
Living Bridge	ACRE	88	49	8	15	6	10
Baseball and Softball Fields	ACRE	539	465	23	0	0	51
Sports Fields	ACRE	537	458	29	0	0	51
Tennis Center	ACRE	185	125	13	0	0	47
Fitness Center and Natatorium	ACRE	126	89	9	0	0	27
Trail Center	ACRE	213	133	18	0	0	61
Playground	ACRE	465	293	39	0	0	134
Structures and Hubs	ACRE	250	189	15	0	0	46
Pond	ACRE	68	39	18	12	0	0
Road + Parking	ACRE	96	71	17	0	0	8
Cycle Track	ACRE	230	150	25	0	0	54
Timing Track	ACRE	248	192	11	0	0	46
Stone Dust Trails	1000 LF	51	27	17	0	0	6
Natural Paths	1000 LF	33	18	2	0	0	13
Boardwalk	1000 LF	24	13	5	0	0	6
Allee	ACRE	186	113	16	0	0	57
Restrooms	EACH	743	718	25	0	0	0
TOTAL PROJECT TASK HOURS							



Memorial Park: Eastern Glades

- Phasing
- Lessons Learned: Bioswales



Eastern Glades Bioswales



- 2 – 4 full-time employees year round
- **Focus on commonly managed species**
- Multiple rounds of native seed plantings
- Additional tasks:
 - Hard trim in spring
 - Fire ant treatment
 - Compost tea twice per year
 - Winter cutback of trees
 - Mowed on three-year rotation in lieu of prescribed burns
- Iterative master plant list
 - Biannual update

Invasives/non-natives

Latin Binomial Name	Common Name
<i>Cyperus enterainus</i>	Deep Rooted Sedge
<i>Cyperus esculentus</i>	Yellow Nutsedge
<i>Cyperus rotundus</i>	Purple Nutsedge
<i>Paspalum urvillei</i>	Vasey Grass
<i>Sorghum halepense</i>	Johnson Grass
<i>Panicum repens</i>	Torpedo Grass
<i>Echinochloa spp</i>	Barneyard Grass
<i>Digitaria spp</i>	Crab Grass
<i>Dichanthium annulatum</i>	Old World Bluestem
<i>Echinochloa colonoa</i>	Jungle Rice
<i>Euphorbia spp</i>	Spurge
<i>Eclipta prostrat</i>	False Daisy
<i>Phyllanthus urinarea</i>	Chamberbitter
<i>Emelia spp</i>	Emelia spp
<i>Pisum sativum</i>	Pea vine
<i>Convolvulus arvensis</i>	Bindweed
<i>Mikania scadens</i>	Climbing Hempweed

Aggressive Natives

Latin Binomial Name	Common Name
<i>Baccharis halimifolia</i>	Eastern Baccharis
<i>Eupatorium capillifolium</i>	Dogfennel
<i>Typha latifolia</i>	Cattail
Genera: <i>Asteacea</i>	Thistle spp
<i>Ludwigia octovalvis</i>	Mexican Primrose Willow
<i>Eupatorium serotinum</i>	Late Boneset
<i>Ambrosia artemisiifolia</i>	Common Ragweed
<i>Andropogon virginicus</i>	Broomsedge Bluestem
<i>Andropogon glomeratus</i>	Bushy Bluestem
<i>Solidago altissima</i>	Goldenrod
<i>Fimbristylis dichotoma</i>	Fringe Rush
<i>Sida rhombifolia</i>	Common Sida
<i>Erigeron canadensis</i>	Horseweed



Memorial Park: Land bridge and prairie



- 45 acres of restored coastal prairie
- 100 acres covering total site
- Wildlife corridors
- Stormwater management
- Native plant palette



Land bridge and prairie lessons learned



- Know what works before you start
- Use demonstration plots



Establishment task list

Wet Prairie and Savannah	QTY	Unit	Unit (mins)	Once (mins)	Once (hours)	Annual Freq	Total Hours	Comments
Year 1								
Invasives treatment - spray	26	msf	9	234	3.9	1	4	60% of an acre; herbicide treatment of invasive species
Invasives treatment - manual	17	msf	15	255	4.3	4	17	40% of an acre; removal of invasive species by hands and tools
Dead wood removal	11	msf	60	660	11.0	2	22	25% of an acre; cutbacks and hauling of dead woods from existing vegetations and grounds
Monitoring and inspection		allow					5	Check for invasive species
Year 1							48	Annual Hours/Acre
Year 2								
Planting of wetland prairie species - seed broadcasting	17	msf	15	255	4.3	2	9	40% of an acre; percentage currently as a placeholder
Planting of wetland prairie species - plugs	11	msf	45	495	8.3	2	17	25% of an acre; percentage currently as a placeholder
Invasives treatment - manual	11	msf	15	165	2.8	4	11	25% of an acre; removal of invasive species by hands and tools
Monitoring and inspection		allow					5	Check for invasive species, plant conditions, etc.
Watering	11	msf	15	165	2.8	6	17	25% of an acre; percentage currently as a placeholder, done on newly planted materials
Year 2							58	Annual Hours/Acre
Year 3								
Mowing	7	msf	5	35	0.6	2	1	15% of an acre; done after end of spring or summer bloom, with a Batwing Mower (no shorter than 6")
Invasives treatment - spray	22	msf	9	198	3.3	1	3	50% of an acre; herbicide treatment of invasive species
Invasives treatment - manual	11	msf	15	165	2.8	4	11	25% of an acre; removal of invasive species by hands and tools
Dead wood removal	7	msf	60	420	7.0	2	14	15% of an acre
Monitoring and inspection		allow					5	Check for invasive species, plant conditions, etc.
Year 3							34	Annual Hours/Acre
Year 4-6								
Planting of wetland prairie species - seed broadcasting	11	msf	15	165	2.8	2	6	25% of an acre; replant on an as needed basis, percentage currently as a placeholder
Planting of wetland prairie species - plugs	7	msf	45	315	5.3	2	11	15% of an acre; replant on an as needed basis, percentage currently as a placeholder
Invasives treatment - spray	11	msf	9	99	1.7	1	2	25% of an acre; herbicide treatment of invasive species
Invasives treatment - manual	9	msf	15	135	2.3	4	9	20% of an acre; removal of invasive species by hands and tools
Dead wood removal	4	msf	60	240	4.0	2	8	10% of an acre
Monitoring and inspection		allow					5	Check for invasive species, plant conditions, etc.
Watering	9	msf	15	135	2.3	6	14	20% of an acre; percentage currently as a placeholder, done on newly planted materials
Year 4-6							53	Annual Hours/Acre



City Park: In transition

- Volunteer initiative:
 - Big Lake Nature Trail
 - Meadow
- Wisner Tract
- Stormwater plan/lagoon rehabilitation
- No-mow zones
- Forthcoming master plan



Organizational readiness



Strategies for success

- Staff buy-in
- Advance training
- Nine natives
- Pocket guides
- Being a part of the process
 - Seed collection
 - Propagation
 - Stewardship
 - Ambassadorship



Public engagement

- Educate
- Prepare
- Celebrate
- Develop stewards



TREES AND
GREEN WASTE

BECOME **COMPOST**

FOR **HEALTHY**
NEW GROWTH

STORM WATER MANAGEMENT

During heavy rain events, millions of gallons of water sheet flow through Memorial Park to Buffalo Bayou. This project will establish extensive native prairie areas and wetlands within a large watershed that extends both north and south of the future Land Bridge. Tallgrass coastal prairie, a part of this region's native ecology, is more effective at slowing, absorbing and cleansing storm water than the roads, parking lots, ball fields, and current ecology that exists in this area today. The prairie and constructed wetlands will help to absorb and purify the storm water flowing through the Park and will also reduce the amount of chemicals entering Buffalo Bayou.



QUESTIONS?

CONTACT INFORMATION

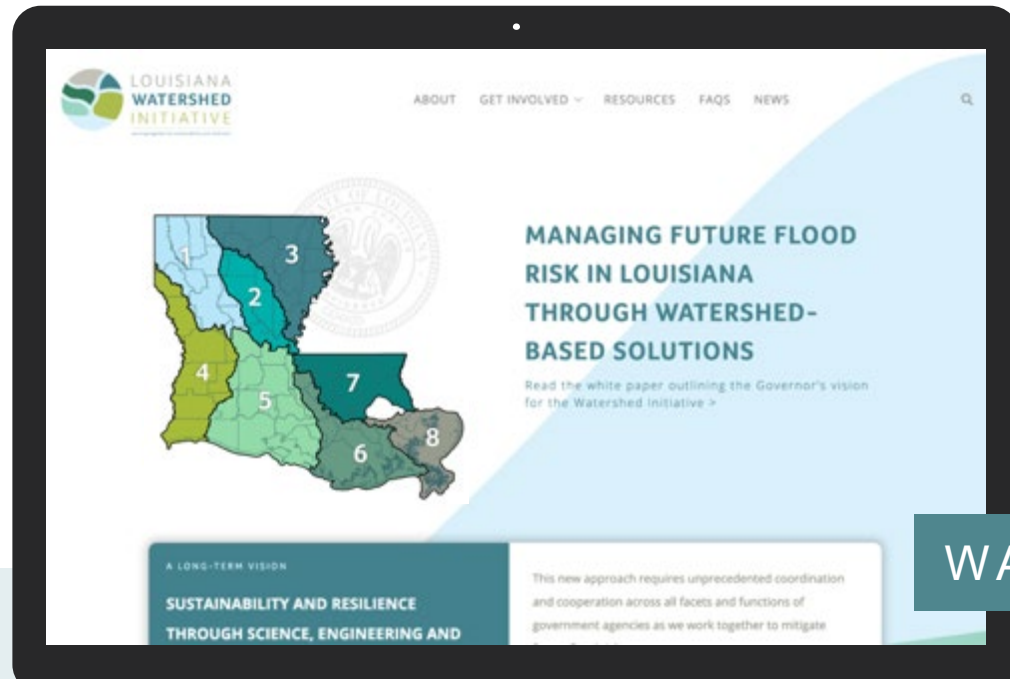
wes@smm.studio

clambright@nocp.org



f @LAWATERSHEDINITIATIVE
t @LAWATERSHED
i @LAWATERSHED
in LOUISIANA WATERSHED INITIATIVE
✉ WATERSHED@LA.GOV

THANK YOU



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