

Sustainable Wildlife Habitat

Comprehensive Master Plan

Spring, Texas



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A collaborative effort between the MLA
students of Spring Land 621 Studio

Sustainable Wildlife Habitat Comprehensive Master Plan

Spring, Texas

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First Edition

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Texas A&M University College of Architecture
Landscape Architecture and Urban Planning Department
College Station, TX 77843-3137

Dedication

Timber Lane Utility District, Spring, Texas



Since 2005 the graduate program in Landscape Architecture at the Department of Landscape Architecture and Urban Planning, College of Architecture, Texas A&M University has worked with the TLUD to develop a strategy of providing its citizens with open space and recreation resources. The results of this collaboration have produced park lands, recreational facilities and natural open spaces for all to enjoy.

The citizens of the district have been able to access nearby open spaces that would not have been possible without this ongoing collaboration. The graduate Landscape Architecture students were able to engage in real land use planning projects, the TLUD was able to provide the needed leadership to get the projects converted into open space lands and recreational facilities for its residents.

We wish to dedicate this "Sustainable Wildlife Habitat Comprehensive Master Plan" in honor of the TLUD leaders who made it all possible. Mr. Dan Meacham, Mr. Bob Schenck, Mr. Jim Messer, Mr. Eric Langstaff and Mr. Bud Gessel, client representative and contact person who was there for every project to help us along the way. Their work and guidance made it all possible.



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UNIVERSITY

All students scheduled
to graduate in 2019

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Palustrine Forest on-site

Part 1. The Study Area

Sustainable Wildlife Habitat Comprehensive Master Plan
Spring, Texas

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I. Introduction

The Requirements for Future Planners

The world in which we practice planning and design has become very complex. The designer-planner of tomorrow's world must enter into the practice arena armed with much more technical, scientific, legal and social knowledge.

Technical



Scientific, Legal



Social Knowledge



How to Meet the Requirements

This challenge places enormous responsibility on the design schools to prepare students for a much more evolved and complex setting in which to resolve land use problems in the built environment. The following document will demonstrate how we here in the Department of Landscape Architecture and Urban Planning at Texas A&M University have carried on.



Source:

<https://www.hlayr.com/news/industry/8829.html>

<https://www.filz-gruppe.de/en/blog/filz-news/technical-system-planner.html>

<http://dunwoodynature.org/activities/school/field-trips/>

<https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/delivering-bold-performance-in-an-ever-changing-healthcare-landscape>

II. The Problem

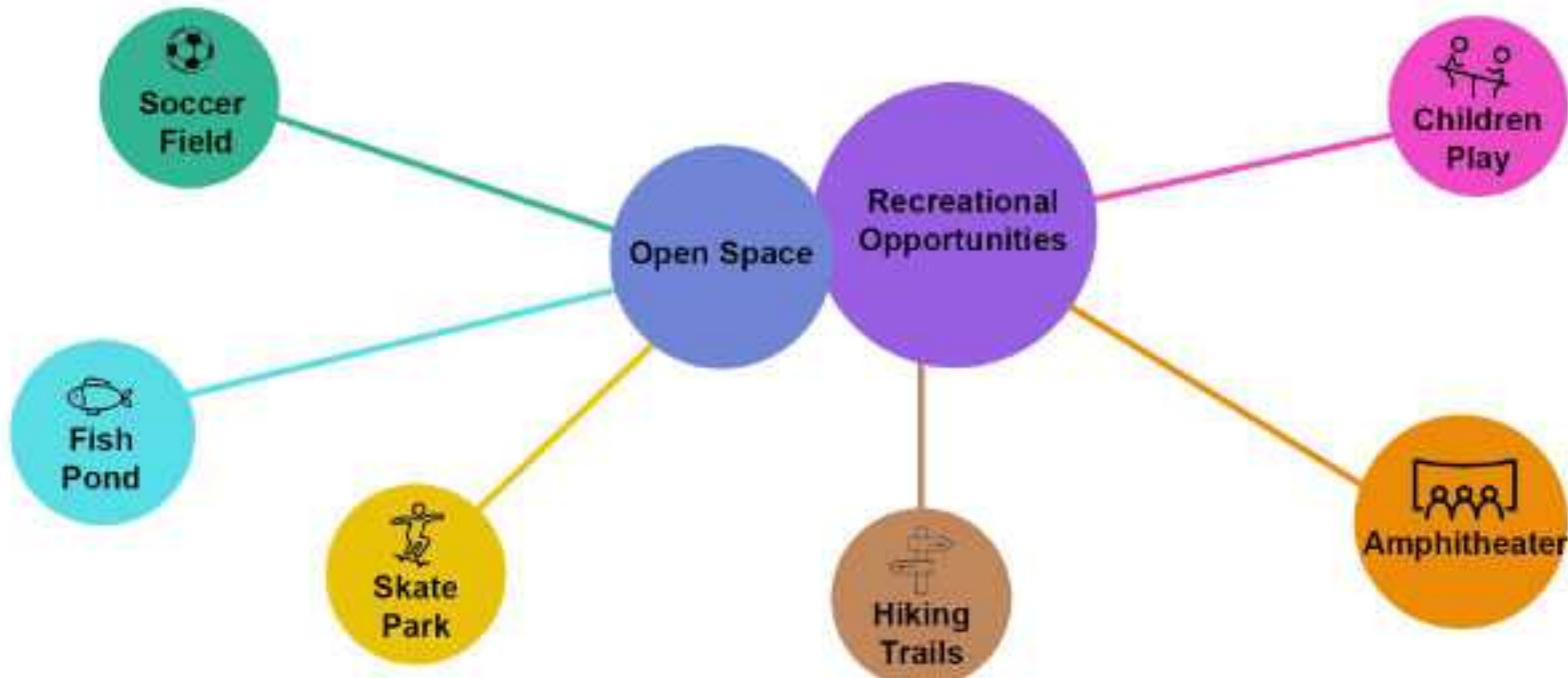
Timber Lane Utility District

The Timber Lane Utility District has been working with us over the last 13 years (2005-2018) to discover better ways to support the needs of their community.



The Needs of Residents

Open space and recreational opportunities were desired by the residents. The need to provide recreation and open space for its citizens was complicated by the low availability of land to provide such needs and the costs for acquiring such land and its development.



II. A. Hurricane Impacts

The Loss and the Tragic Remains

This Sustained Wildlife Habitat Comprehensive Master Plan was originally conceived to carry on the work achieved over the last 13 years. A trail side survey of the remaining residents living in the flooded areas revealed the degree of loss and the tragic remains of many people's homes.



It was decided at that point that the planning study would go on but that it would be done as a gesture of commitment to rebuilding the hopes and lives of the residents of the impacted areas.

Wildlife Habitat and Conservation Planning in Managed Landscapes



Source:

<https://www.nytimes.com/2017/08/27/us/harvey-pictures-hurricane-storm.html>

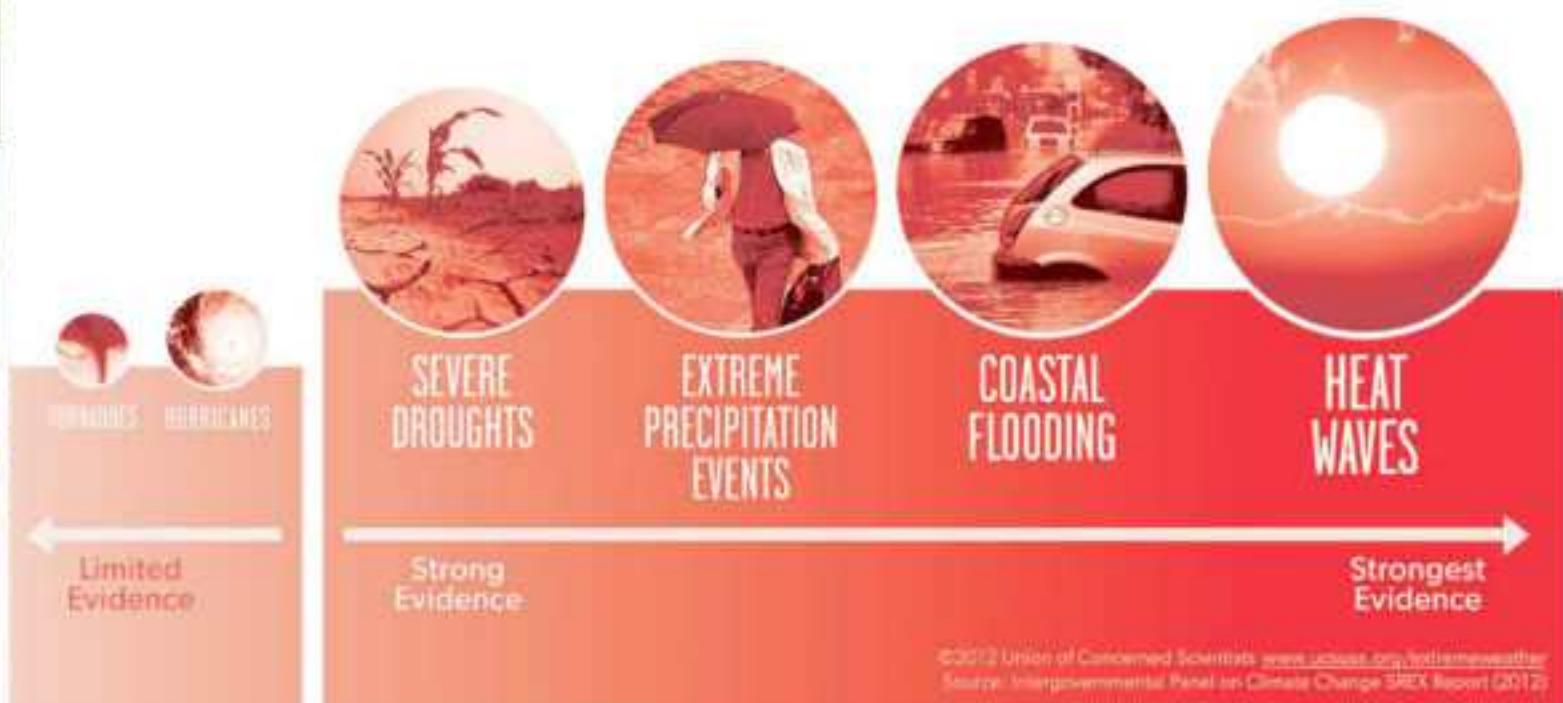
II. B. Flooding in Urban Areas

Climate Change & Floodplain

The premise for creating a Sustainable Wildlife Habitat Comprehensive Plan is to begin with the restoration of the nearby landscapes that are part of the residential neighborhoods located next to these open spaces. The unique thing about these neighborhoods is they were built adjacent to the delineated flood zones where residential building was not carried on. Unfortunately global climate warming has had its effect on the weather and rainfall patterns around the world. Coastal communities have experienced increasing flooding and even more intense storm surges. Consequently formerly unaffected areas are now within the reach of new flood zones.



Scientific evidence suggests human influenced environmental conditions contribute to climate change resulting in increased heat wave occurrences, heavy rains and coastal flooding.



Source:

<https://www.ucsusa.org/global-warming/science-and-impacts/impacts/extreme-weather-climate-change.html#.Wwcc0g-zD4>

II. C. Increased Hurricane Strength

Results of Hurricane Harvey

This time however the circumstances were quite different. The citizens of Spring Texas as well as many other communities were devastated by Hurricane Harvey. On August 25th 2017 Hurricane Harvey hit the city of Houston with winds topping out at 135 miles per hour. It inflicted \$125 billion dollars in damage primarily from rainfall-triggered flooding. The metropolitan area suffered 82 fatalities and loss of property and homes. People most directly impacted by the storm damage as well as those people indirectly affected by the losses suffered greatly.



Urban Flooding



Human Fatalities



Loss of Property and Homes



Source:

<https://www.theeyshivaworld.com/news/general/1346928/life-threatening-harvey-set-first-hurricane-strike-texas-decade.html>

<http://www.latimes.com/nation/la-na-houston-floods-before-after-20170831-hmhistory.html>

<http://www.latimes.com/nation/la-na-houston-harvey-bodies-20170831-story.html>

<https://www.mysanantonio.com/business/technology/article/Hurricane-Harvey-leaves-Texans-without-internet-12089233.php>

II. D. Human Suffering & Loss

Result of Hurricane Harvey

Disasters such as these affect the mental health of those people. Nearly everyone affected will experience stress in some way, either brought on by personal loss of a loved one, or the loss of a home. For many it will amount to acute stress or even apathy or despair. At worst the stress can lead to mental trauma, Post Traumatic Stress Disorder, major depression, Generalized Anxiety Disorder or even mental disorder. Disasters have the ability to remind people of the frailty of life. That mental stress realization can be enough to cause long-term mental harm.



Mental Trauma

Post Traumatic Stress Disorder

Depression

Anxiety Disorder

Mental Disorder

Source:

<https://www.livescience.com/2655-hurricane-season-2016-hosa-forecast.html>

<https://agenciainformativavmc.com.mx/archivos/29550>

<https://www.theyeshivaworld.com/news/general/1364454/harveys-insured-losses-estimated-cost-nearly-19-billion.html>

<https://www.theadvocate.com.au/story/5356114/how-natural-disasters-can-affect-our-mental-health/>

II. E. Urban Growth

Rapid Urban Growth

Northern Harris County has been experiencing rapid urban growth for over two decades. Projections for future growth are expected to continue. The dilemma is typical of many such urban fringe communities located near major metropolitan areas. Residential, industrial and commercial enterprises fuel the fire of urban growth.



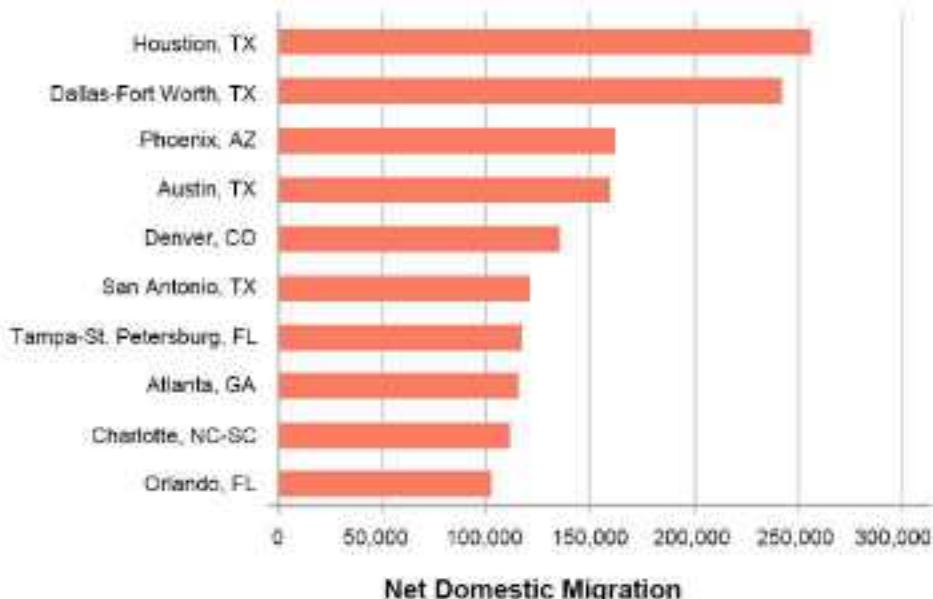
Residential Enterprises



Industrial Enterprises



Metropolitan Area Domestic Migration
2010-2015



Commercial Enterprises



II. F. Habitat Loss

Natural Habitat Loss

In the process natural habitats are lost or fragmented to a degree where the development takes on the look of the metropolitan urban core. The visual and physical quality of the new development converts the area into an environment that leaves little other than suburban residences with no real amenities or natural environmental quality to enjoy.



Timber Lane Utility District's latest activity was to engage the Landscape Architecture program to produce a Sustainable Wildlife Habitat Comprehensive Master Plan for its 327 acre site where recreation and open space facilities have been developed over the last 13 years.

Source: <http://bowersandburns.com/properties/235-73-ac-brown-creek-rd-harris-county/>

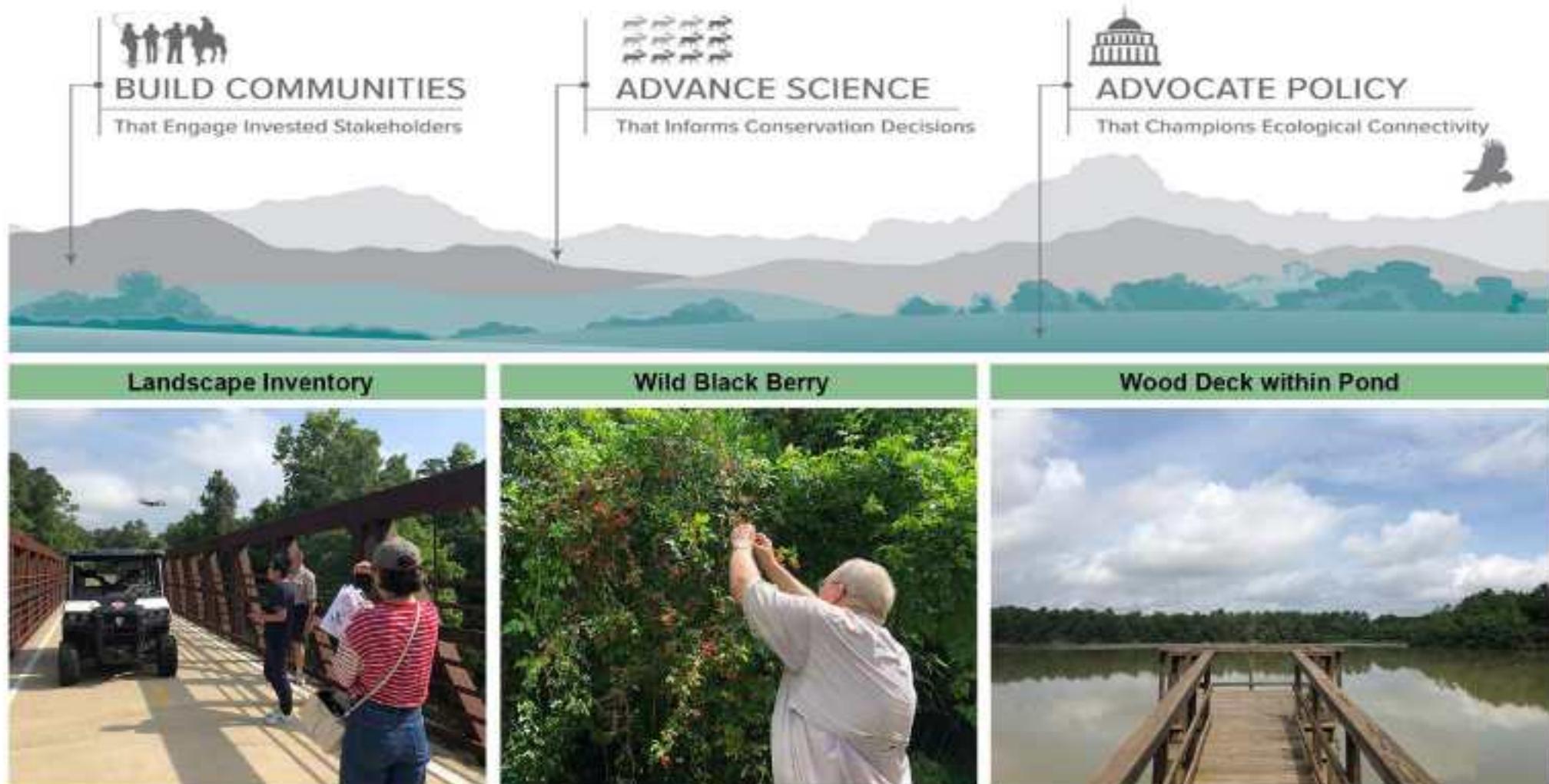
<http://www.greensborodailyphoto.com/abc-wednesday-2012/>

<https://www.chron.com/business/realestate/article/20-Houston-commercial-real-estate-headlines-in-12481801.php>

III. The Planning Response

Conserve Natural Resources and Cultural Heritage

The Land 621 Studio has been operating under the premise of Landscape Conservation. All of the projects created for the Timber Lane Utility District have been conceptualized using Landscape Conservation as its guiding light. Landscape Conservation is the growing practice of people working together across larger geographies, regardless of political boundaries, to conserve natural resources and cultural heritage and ensure a sustainable future for both people and nature.



Source:

<http://largelandscapes.org/>

III. A. Landscape Conservation

Conserve Natural Resources and Cultural Heritage

Landscape conservation is about building a collective conservation and concomitant action on how we wish to shape our relationship with the land we live on and that is vital to sustain us and all future generations. Landscape Conservation initiatives are long term efforts generally characterized by a focus on: 1. Conservation of connected, healthy ecological systems; 2. Use of science-based and culturally sensitive conservation planning; 3. Collaborative network structure (formal or informal); 4. Meaningful multi-sector stakeholder engagement.

1. Conservation of connected, healthy ecological systems

2. Use of science-based and culturally sensitive conservation planning

3. Collaborative network structure (formal or informal)

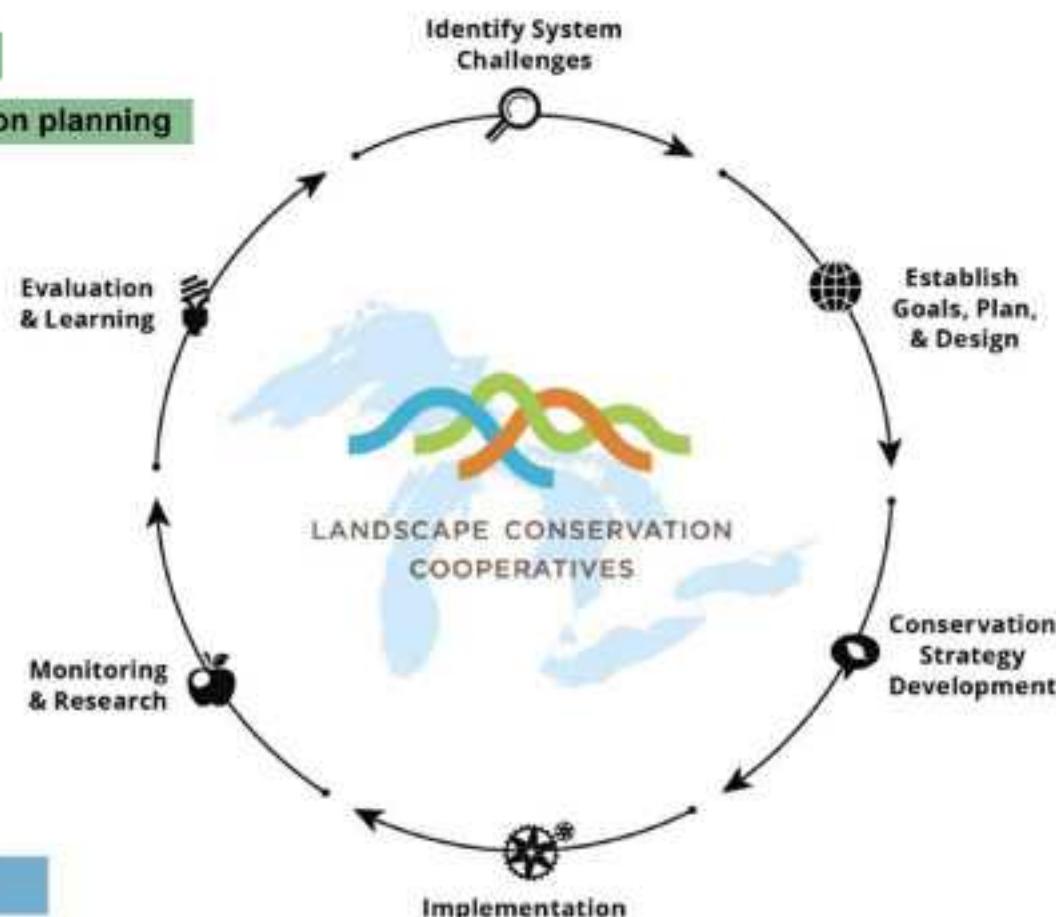
4. Meaningful multi-sector stakeholder engagement



Collaboration

Communications

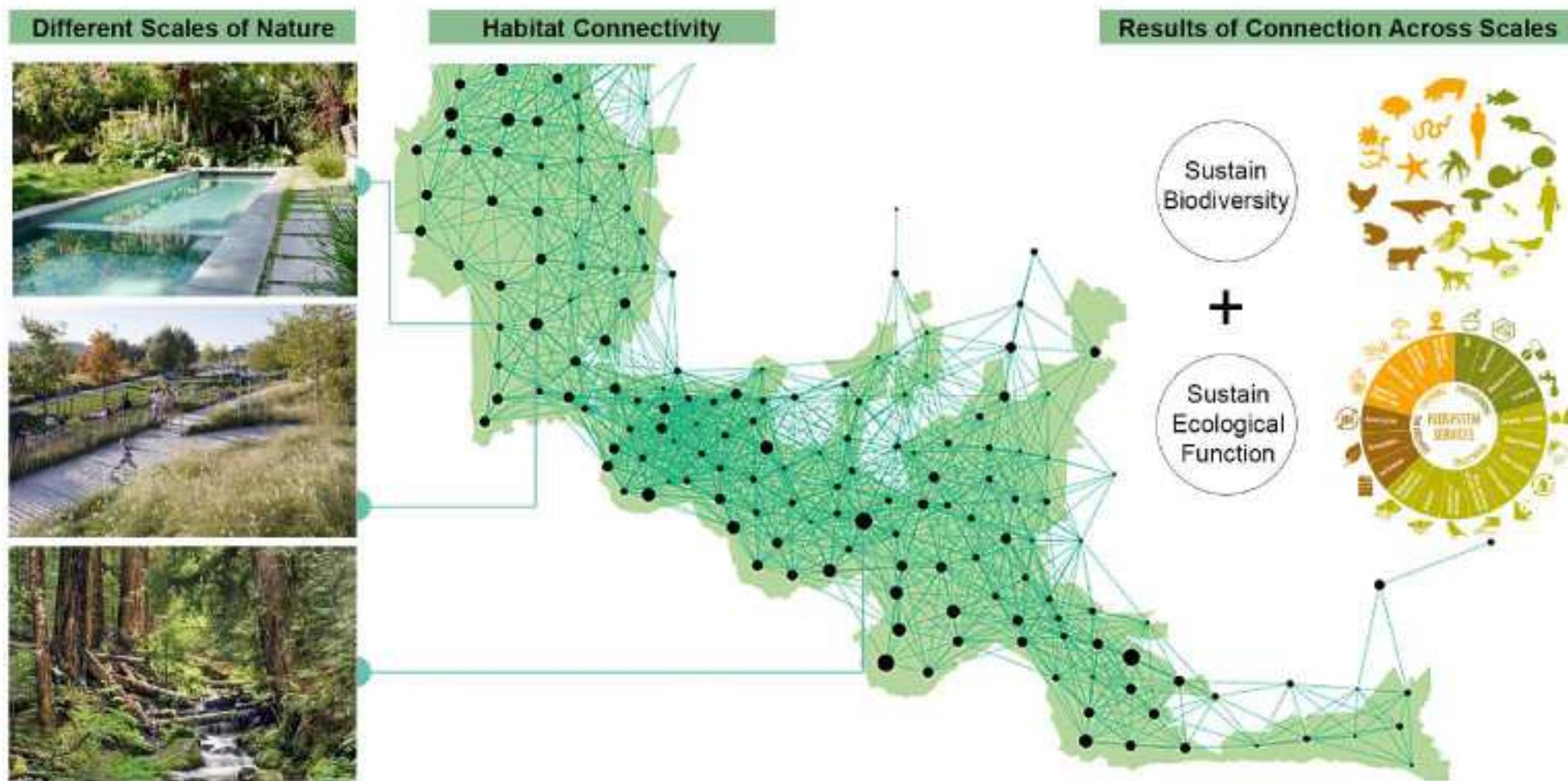
Information Management



III. B. Three Principles

1. A Shift in Geographic Scale

Decades of scientific research have built an emerging systems-level understanding of the natural world and have underscored the importance of habitat connectivity across scales. To sustain biodiversity and ecological function conservation must transcend arbitrary boundaries and move beyond a site-specific parcel by parcel approach. The Cypress Creek setting allows for this landscape concept to become a reality.



Source:

https://www.landscapingnetwork.com/pictures/modern-pool_74/92320-ca-landscaping-network-lap-pool-spa_4260/

<https://www.pinterest.com/pin/159174168053700618/?lp=true>

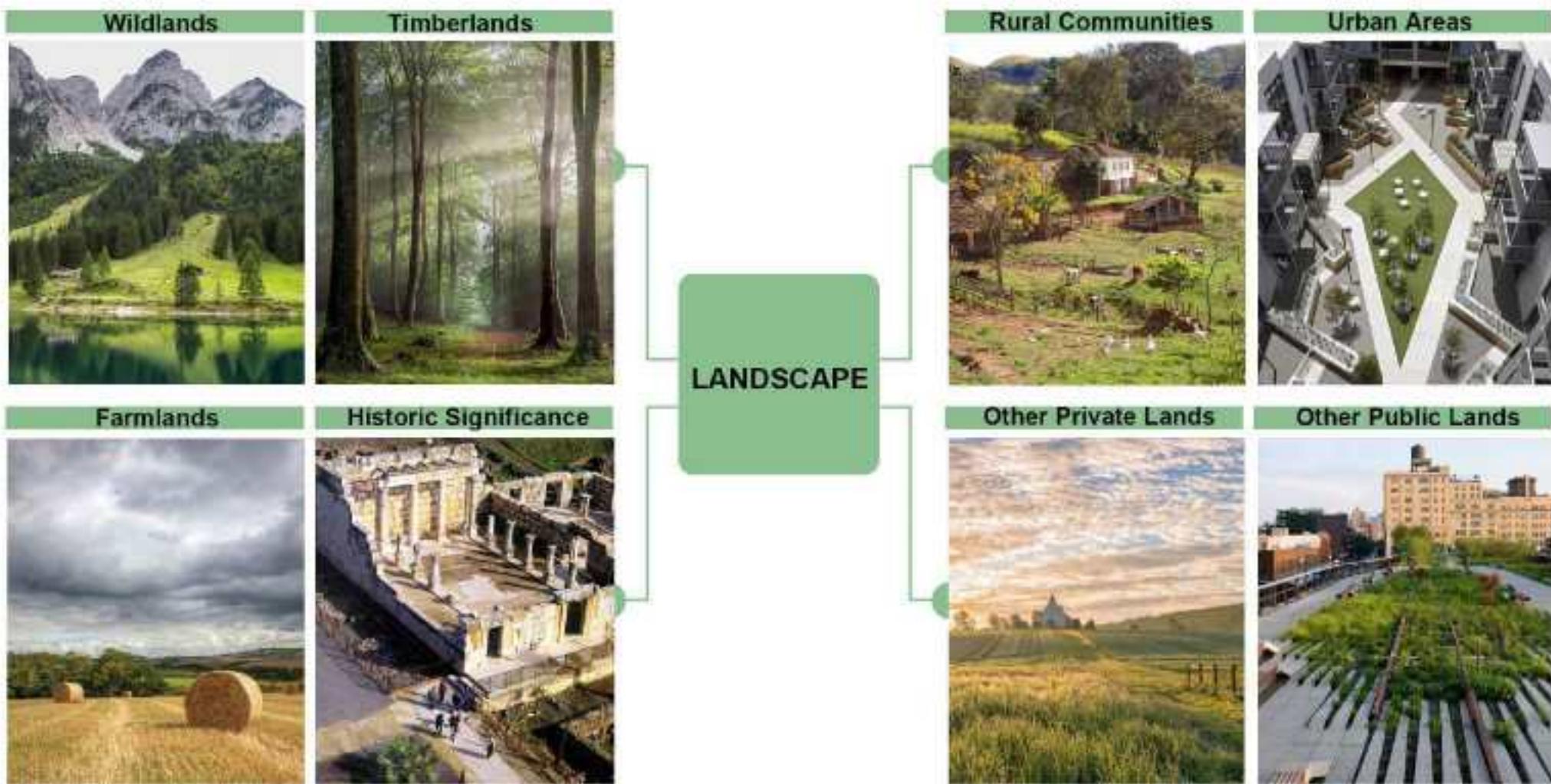
<https://www.pinterest.com/pin/141370675775823077/?lp=true>

<http://icf-india.org/projects/making-room-for-elephants> <http://themetapicture.com/how-men-see-the-food-chain-vs-how-it-really-is> <http://www.wf.org.ca/?uNewsID=324210>

III. C. Three Principles

2. A Shift in Perspective

Wildlands, farmlands, timberlands, tribal lands, places of cultural and historic significance, rural communities, urban areas, and other private and public lands are all part of a fully integrated whole landscape and do not exist independent of one another. The landscape conservation perspective is that the entire landscape, private to public, developed to wild, must be considered in a thoughtful and integrated manner.



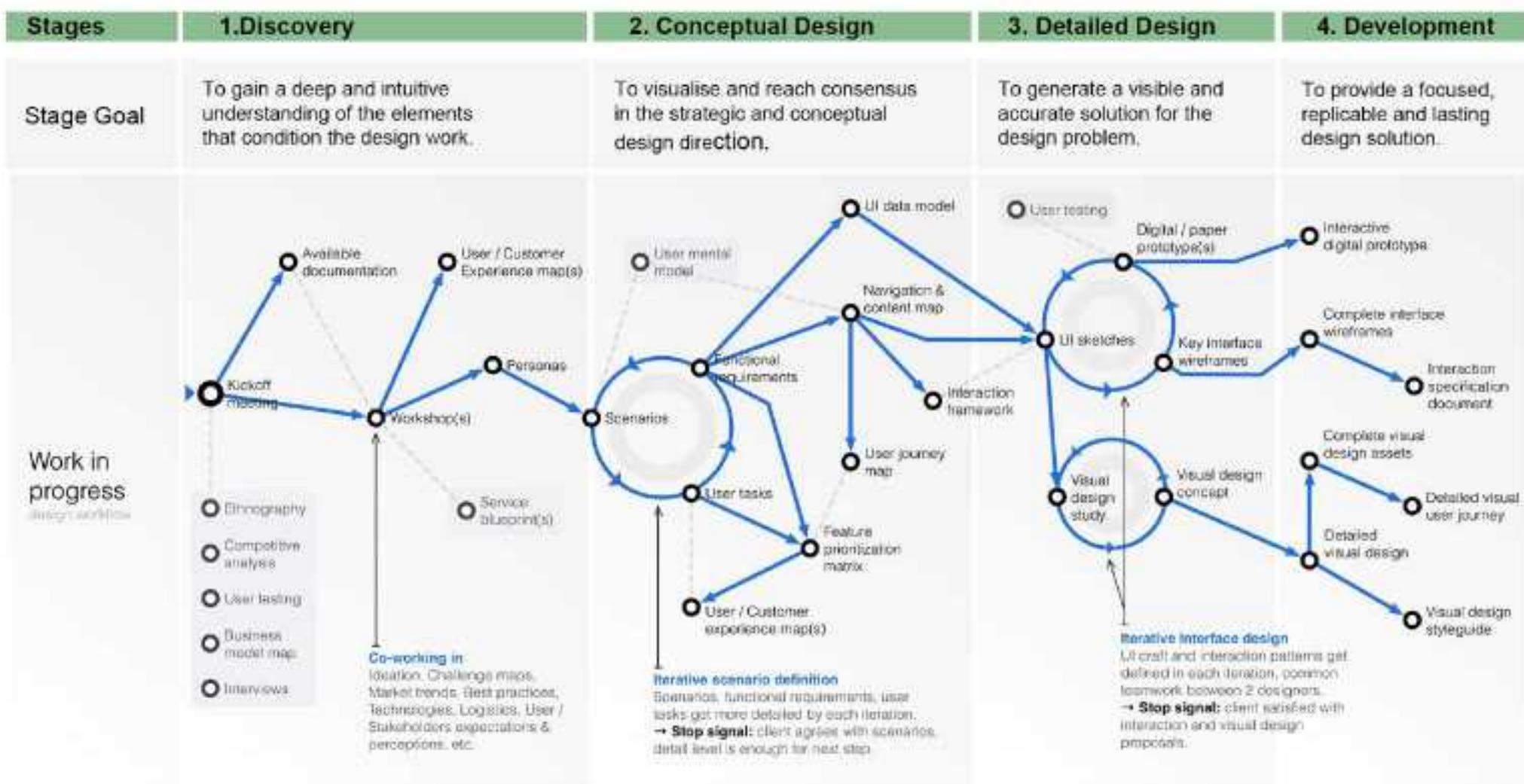
Source:

<https://www.pinterest.com/pin/55591376624421273/> <https://www.take-a-view.co.uk/2013-award-winners/>
<https://www.pinterest.com/pin/307381549525334804/> <https://www.archdaily.com/385196/the-nicholson-designing-51ce870cb3fc4be560000096-the-nicholson-designing-photo>
<http://pinimg.com/736x/3a/06/ca/3e06cadfc76639dc7d4c7851d621dec0.jpg> <https://www.pinterest.co.uk/pin/135459901278597950/>
<http://ohmybritain.tumblr.com/post/38990048895/deworth-hampshire-by-roger-voller-on-flickr> <https://www.pinterest.com/pin/1618549843516680/>

III. D. Three Principles

3. A Shift in Understanding of Process

Landscape scale conservation crosses jurisdictional and topical boundaries, transcending the traditional decision-making process and top-down hierarchy. Instead landscape conservation is generally characterized by a horizontal process and collaborative governance structure with long term participation by a broad and meaningful diversity of stakeholders.



Source:

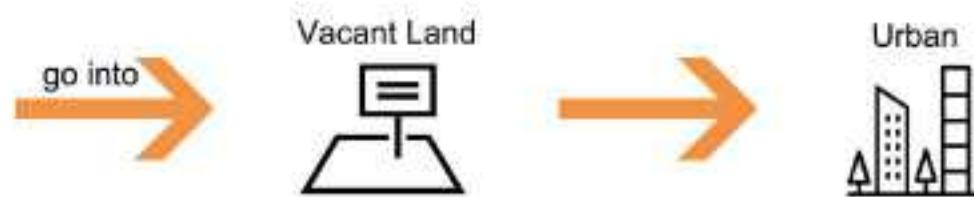
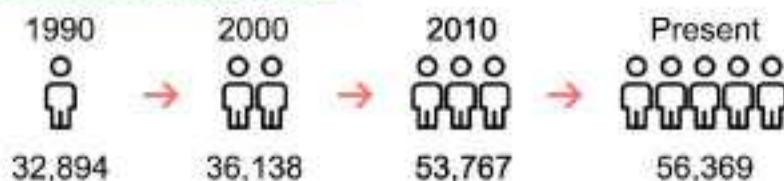
<https://www.pinterest.com/pin/21814379417621547/?lp=true>

IV. Impacts

Human Population Growth

The project itself was directed by the knowledge of the impacts of rapid urbanization. First the expansion is caused by an increase in human population growth and immigration into vacant spaces adjacent to the urban realm.

Population of Spring, TX



Impacts on the Environment

The loss of environments important to people is associated with increases of pollution, losses of air and water quality, soil losses, wildlife losses and ultimately habitat losses.

Increase of Pollution



Loss of Air Quality



Loss of Water Quality



Soil Losses



Wildlife Losses



Habitat Losses



Source:

<http://coastalcare.org/2016/06/boyan-slats-ocean-cleanup-project-launches-historic-first-prototype-at-sea/>

<https://wmswcd.org/preventing-soil-erosion/>

<https://www.getthinve.com/can-air-pollution-cause-brain-problems/>

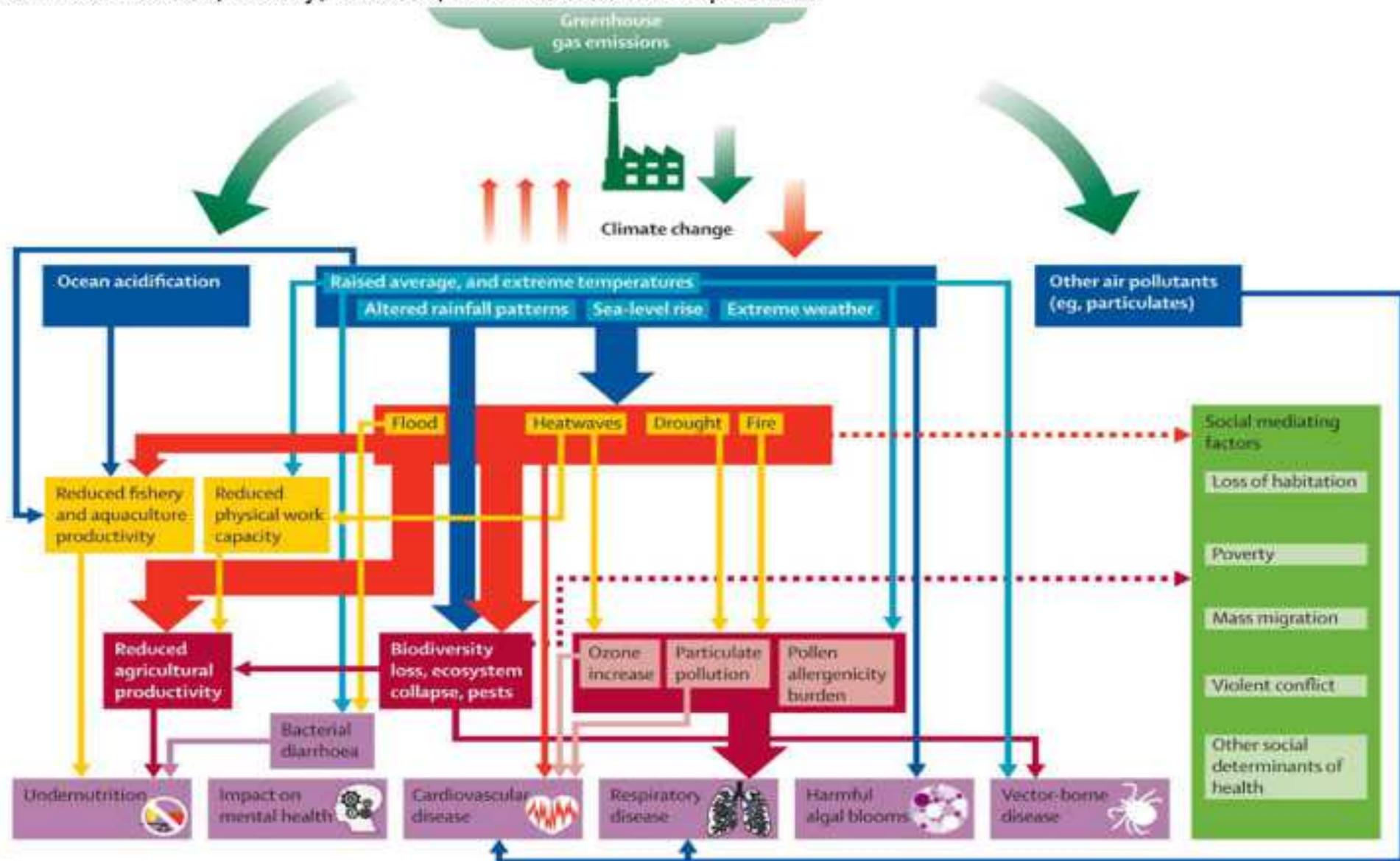
<https://www.cnn.com/2017/08/29/us/texas-harvey-latest/index.html>

<https://phys.org/news/2014-11-healthier-food-choices-decrease-environmental.html>

IV. Impacts

Human Health

These losses and changes have an effect on human health. Evidence offered by the Environmental Protection Agency and the Health and Environment Effects Research Laboratory suggests the U.S. population is experiencing increased illnesses from dispersed and synergistic causes. There is an increase in chronic ailments such as asthma, allergies, animal transmitted diseases, obesity, diabetes, heart disease and depression.



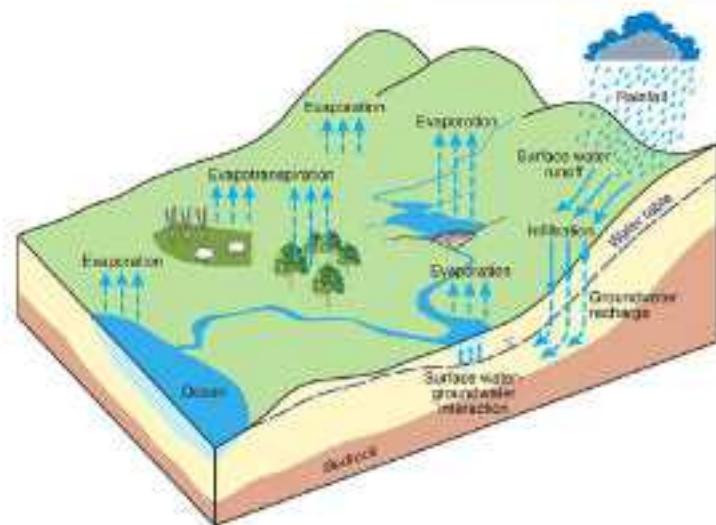
Source:

<https://klimaatverandering.wordpress.com/2015/06/30/commissie-van-the-lancet-brengt-rapport-uit-over-gezondheid-en-klimaatverandering/>

V. Goals

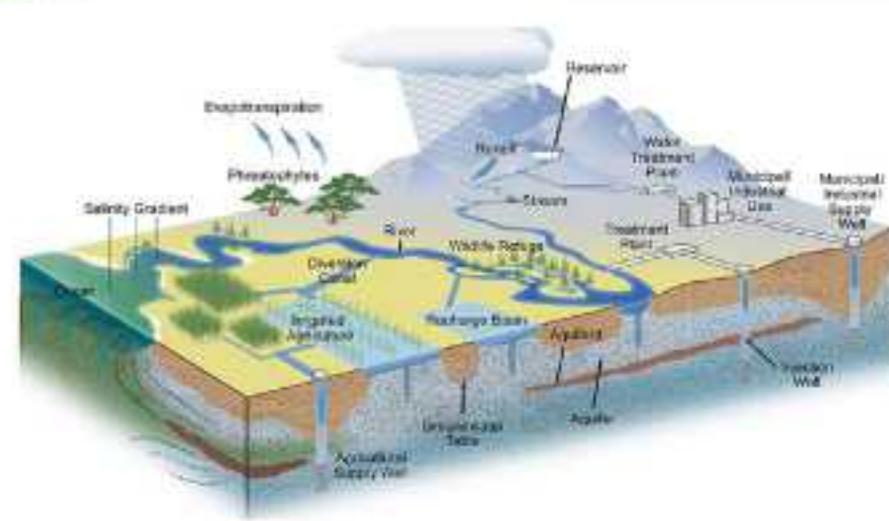
Goal
1

Capture value in resident ecosystems



Goal
2

Link land use and water



Goal
3

Provide urban natural resource leadership support to the TLUD



Source: <http://keywordsuggest.org/gallery/635605.html>

<https://mavensnotebook.com/2015/03/12/groundwater-problems-and-prospects-part-1-an-overview-of-groundwater/>

<http://www.newgeography.com/content/005483-the-evolving-urban-form-houston>

VI. Objectives

Objective 1

To compile information for the client to use in seeking financial support for the development of a Sustainable Wildlife Habitat Comprehensive Master Plan for the 327 acres study site.



327 acres Study Site

Objective 2

To define more specifically the 7 sub-sites planned for Wildlife Habitat treatments.



7 Sub-sites

VI. Objectives

Objective 3

To identify the wildlife life forms intended to be the subject of the habitat creation effort.



Migratory Birds



Deer

Objective 4

To create design treatment prototypes for habitat creation and enhancement.



Wetland Habitat



Wildlife Habitat

VII. A. 10 Acre + 1 Acre Site Location Map



Site 1

1 Site 1-1

2 Site 1-2

Site 2

3 Site 2-1

4 Site 2-2

5 Site 2-3

6 Site 2-4

Site 3

7 Site 3-1

8 Site 3-2

Site 4

9 Site 4-1

10 Site 4-2

Site 5

11 Site 5-1

12 Site 5-2

13 Site 5-3

Site 6

14 Site 6-1

15 Site 6-2

Site 7

16 Site 7-1

17 Site 7-2

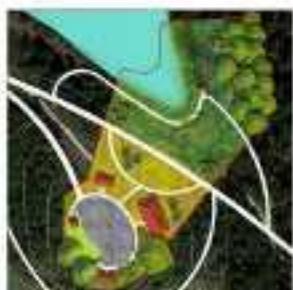
VII. B. Habitat Treatments

Wetland Edge



Site 2-1

Habitat Island



Site 2-2

Riparian Treatments



Site 1-2

Ecotone Treatments



Site 3-1

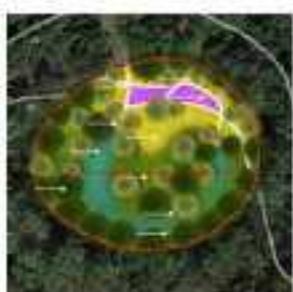
Wildflower Patches



Site 1-1



Site 2-3



Site 2-4



Site 5-2



Site 3-2



Site 4-1



Site 5-1



Site 6-1



Site 7-1



Site 4-2



Site 5-3



Site 7-2



Site 6-2

VII. C. Wildlife Life Forms

	Mammals	Birds	Herps	Pollinators
Site1-1		Song Bird Shore Bird		Butterfly Bee Hummingbird
Site1-2	Squirrel Deer Beaver	Song Bird Shore Bird	Turtle Lizard Frog Toad Snake	
Site2-1	Squirrel Deer Beaver	Song Bird Shore Bird	Turtle Toad Frog	
Site2-2	Squirrel Rat Raccoon Fox Deer	Song Bird		
Site2-3	Squirrel Deer Beaver	Song Bird Shore Bird	Turtle Toad Frog	
Site2-4	Squirrel Rat Raccoon Fox Deer	Song Bird	Frog Toad	
Site3-1	Squirrel Rat Deer	Song Bird		
Site3-2	Squirrel Rat Fox Deer	Song Bird		
Site4-1		Song Bird		Butterfly Bee Hummingbird

VII. C. Wildlife Life Forms

	Mammals		Birds	Herps		Pollinators
Site	Squirrel Fox	Rat Deer	Song Bird			
Site4-2	Squirrel Fox	Rat Deer	Song Bird			
Site5-1	Squirrel Deer	Rat	Song Bird Shore Bird	Turtle Frog	Toad	
Site5-2	Squirrel Deer	Rat	Song Bird Shore Bird	Turtle Frog	Lizard Toad	Snake
Site5-3			Song Bird			Butterfly Bee Hummingbird
Site6-1	Squirrel Raccoon	Rat Fox	Song Bird			
Site6-2			Song Bird			Butterfly Bee Hummingbird
Site7-1	Squirrel Deer	Rat	Song Bird Shore Bird	Turtle Frog	Lizard Toad	Snake
Site7-2	Squirrel Raccoon	Rat Fox	Song Bird			



Drainage Way between Site 2 and Site 3

Part 2. Studio Procedure

Sustainable Wildlife Habitat Comprehensive Master Plan
Spring, Texas

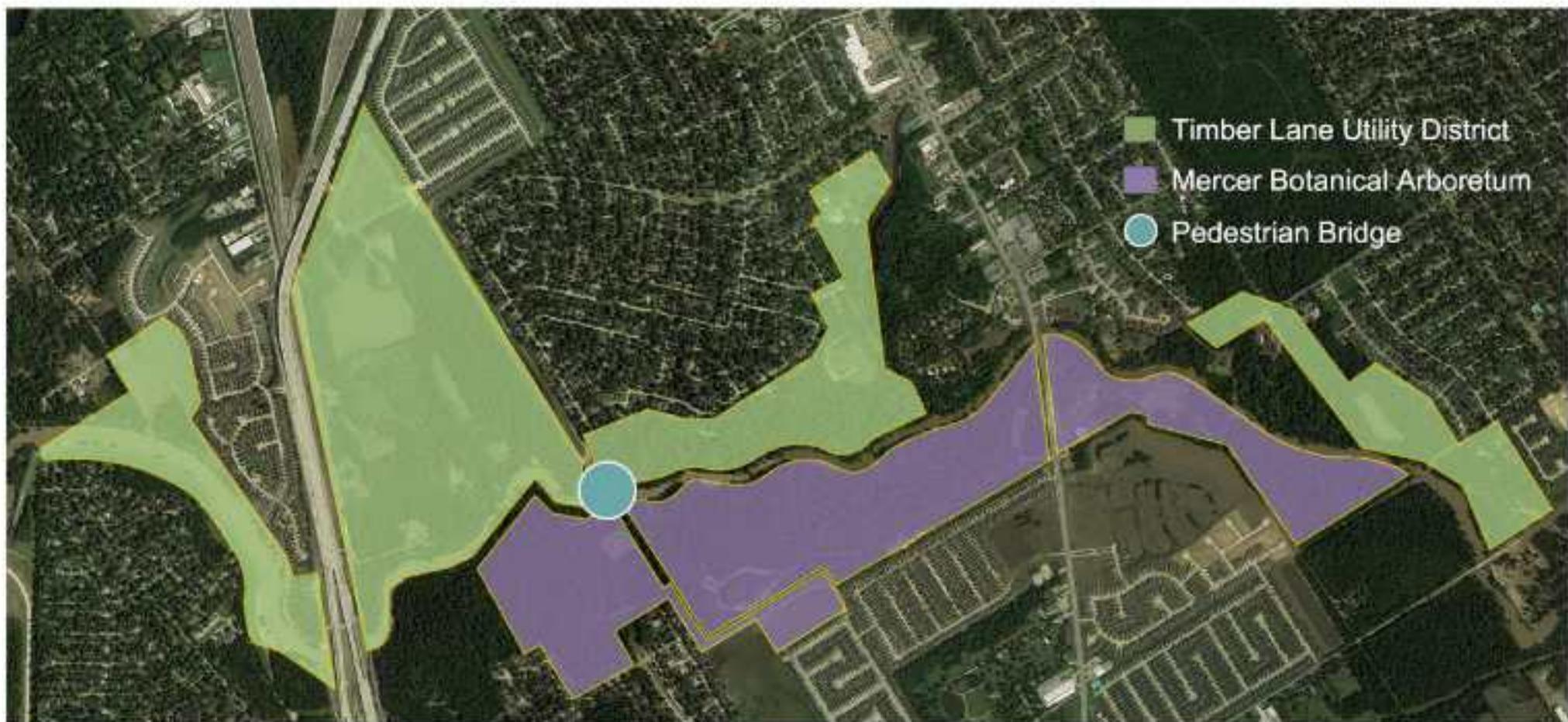
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I. The Study Area

Timber Lane Utility District & Mercer Botanical Arboretum

The study site located along the north and south side of Cypress Creek is composed of some 327 acres of land. The south parcels (3) are owned and operated as the Mercer Botanical Arboretum. The north side (4) parcels are owned and operated as an open space and recreational space by the Timber Lane Utility District. These two units of land are linked together by a pedestrian bridge that spans Cypress Creek in the approximate middle of the 327 acre E-W oriented study site.



Source:

Google earth

I. The Study Area

Habitats Found in Study Areas

The goal is to produce a Comprehensive Master Plan for sustaining wildlife habitat for the resident wildlife that exists within this property. This unique combination of properties provides the surrounding human population with a woodland and riparian sanctuary in the heart of northern Harris County. The north side recreation and open spaces provide much needed hike and bike trails and parks for the residents. The south side arboretum is a living natural history museum that is home to a wealth of animal life that depends on the plants and habitats found within its boundaries.



Source:
Google earth

I. The Study Area

Mercer Arboretum

Mercer is making advances in creating public awareness of its innovative research into conservation of plant genetic resources. Mercer's laboratory and herbarium information is being conveyed through educational programs targeted towards all age levels. Access by bridge now links the north side residences with this special museum and outdoor learning center.

Mercer Botanic Gardens



Story Time for Children



Volunteering



Botanic Bus Trips for Adults



Source:

<https://www.facebook.com/MercerBotanicGardens/photos/a.374443609243865.94816.115849375103291/14330387167677/?type=3&theater> <https://www.facebook.com/events/240217419873322/>

<https://www.facebook.com/MercerBotanicGardens/photos/a.228888080465986.65787.115849375103291/1772301239458080/?type=3&theater>

https://www.facebook.com/pg/MercerBotanicGardens/posts/?ref=page_internal <https://www.google.com/maps/>

I. The Study Area

The Timber Lane Utility District

The Timber Lane Utility District provides unique recreation and open space activities that can now include learning and science experiences at the museum. The creation of sustainable wildlife habitat will enhance the areas' environmental profile to be even more interesting and more importantly more accessible to a larger number of vehicle-independent recreationists in northern Harris County.

Open Space



Recreation for Adults



Recreation for Children



Community Center



Accessibility for Vehicle-independent Recreationists



Source:

<https://timberlanuid.com/major-projects/>

https://www.google.com/maps/place/Merger+Botanical+Gardens/@30.03902,-95.380811,3a,75y,90i/data=!3m8!1e2!3m6!1sAF1QipN2kYsXfqQBZdJqnCiiHD-NkGt_o_6UiArLe3sWl2e10/3e12!0shttps://N2P%2Fih5.googleusercontent.com%2Fp%2FAF1QipN2kYsXfqQBZdJqnCiiHD-NkGt_o_6UiArLe3sW%3D%203-l141-k-no!71543!81079!4m5!3m4!1s0x8640b54f754edc8d:0x28d46aeob8109ef:8!8m2!3d30.03825!4d-95.380787

II. A. 327 Acre Study Site

Site Selection



Subsite 6

II. B. Proposed Property Boundary

Final Study -Site Selection - Analysis Final



Aerial Photo

Area: 325 acres



Legend

Zone 7 Site Boundary

Habitat Map



Legend

1. Shaped Site + Roads
 - Site Boundary
 - 10 Acre Site Boundary
2. High/Low Point
 - ▲ Low Point
 - ▼ High Point

3. Existing Water

Water Stream

4. Proposed Features

- View Deck
- Picnic Area
- Primary Road
- Secondary Road
- Access Point

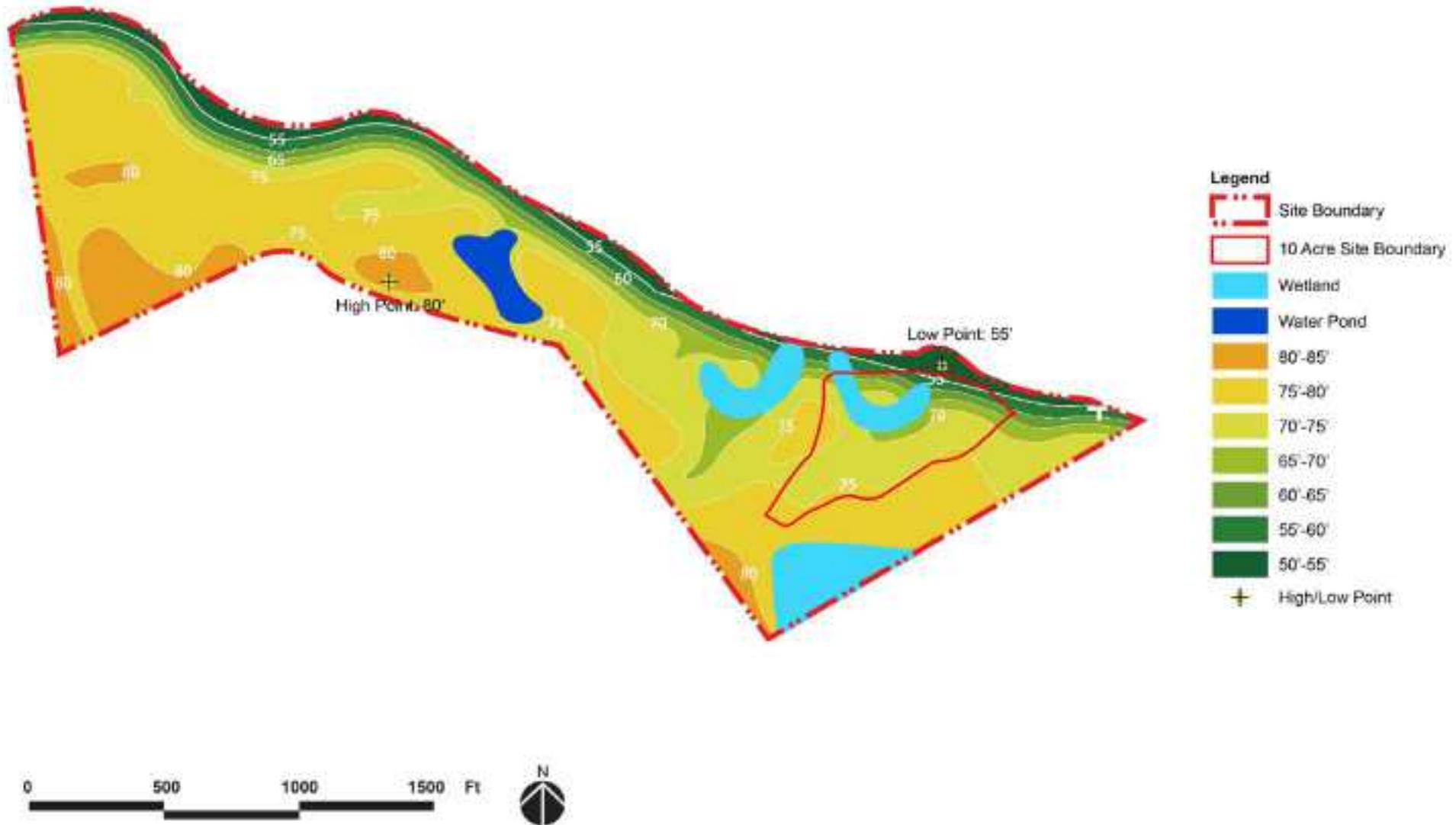
5. Habitat Types

- | | |
|---|------------------|
| 1 | Human Habitat |
| 2 | Wildlife Habitat |
| 3 | Wetland |
| 4 | Corridor |
| 5 | Meadow |
| 6 | Pond |
| 7 | Forest Habitat |
| 8 | Erosion Control |

Description

1. Vegetation: After careful aerial photo interpretation, I depict the land into 7 categories of landscape types. Overall, the site is consisted of the forest. These valuable resources should be preserved. Moreover, I creates space for people so that they can have opportunities to get close to the nature.
2. Water: There is one existing creek on the north side of the site. Moreover, an existing forest wetland in the site can be preserved.
3. Access: The main access is located in the south side of the site. There are also several trails that connect the 10 acre site with other parts.
4. Area: The site is 10.1 acres, and is located in the east part of site 6.

II. C. Elevation Zones Map



II. D. Land Use Strategic Plan, 10 Acres

Proposed Site Selection



0 200 400 1000 feet



Legend

- 1. Shaped Site + Road
- 3. High/Low Point
- 5. 10 Acre Site Boundary
- 6. Creek
- 7. Forest Wetland
- 8. Existing Contours
- 9. Contours (5 ft interval)
- 10. High Point
- 11. Low Point

Proposed Habitat Zoning



0 200 400 1000 feet

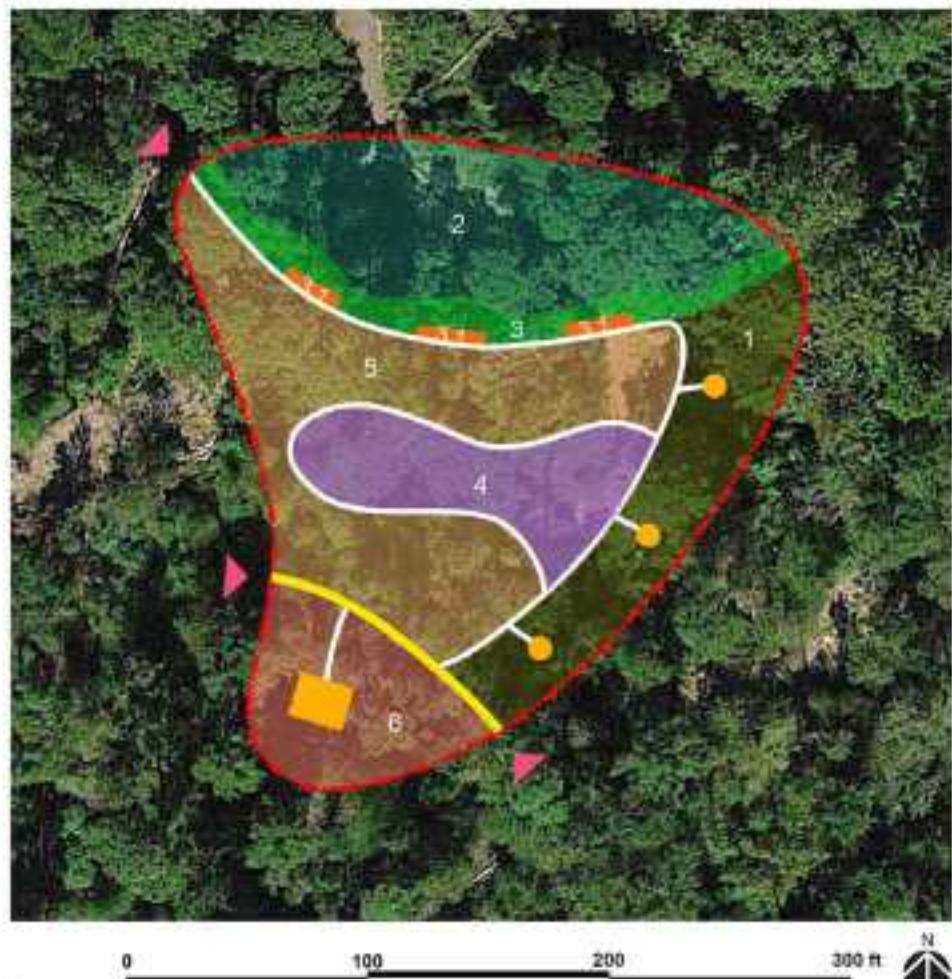


Legend

- 1. Shaped Site + Roads
- 3. Existing Water
- 5. Habitat Types
- 6. Water Stream
- 7. Human Habitat
- 8. 10 Acre Site Boundary
- 9. Proposed Features
- 10. Wildlife Habitat
- 11. View Deck
- 12. Picnic Area
- 13. Wetland
- 14. Primary Road
- 15. Corridor
- 16. Secondary Road
- 17. Meadow
- 18. Shrub
- 19. Forest Habitat
- 20. Access Point
- 21. Low Point
- 22. High Point

II. E. Land Use Zoning Plan, 1 Acre

Site 7 - 1 Acre



Legend

Recreation Zone		Protection Zone		Special Features	
Single Table Picnic		1- Forest Patch		4- Meadow	
Group Picnic		2- Wetland		5- Wildlife Habitat	
View Deck		3- Wetland Addition		6- Human Zone	
Primary Trail					
Secondary Trails					
Entry Point					

Habitat Zone	Treatment	Featured Wildlife	Plant Life Forms
Zone 1 Forest Patch	Trails Picnic	Buffer Drainage Control	Deer Raccoon Fox Woodpecker
Zone 2 Wetland	Existing Forest Wetland		Waterfowl Egret
Zone 3 Wetland Addition	3.1 View Deck		Frog Turtle
Zone 4 Meadow	Shrub Flowers	Seed Source	Bees Rabbit Butterflies
Zone 5 Wildlife Habitat	Bird Mammal Understory		Deer Rat Finches Squirrel
Zone 6 Human Space	Entrance Picnic	Trails Children Play	Pets

Index Map



10 Acre

N.T.S.

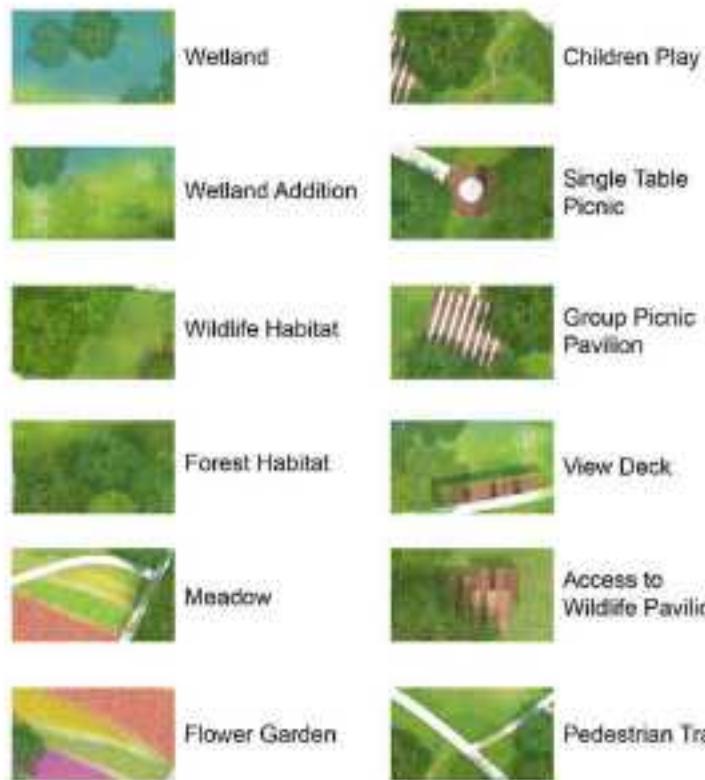


1 Acre

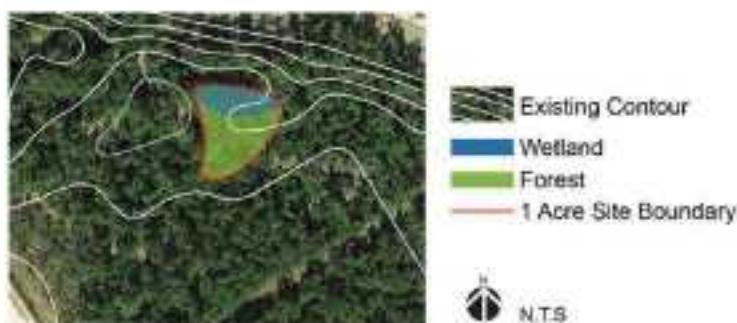
N.T.S.

II. F. Master Plan, 1 Acre

Legend



Existing Site 1 Acre



II. G. Plant List, 1 Acre

Forest Habitat

Tree	Fruit Season	
American Beech (<i>Fagus grandifolia</i>)	Fall to Winter	1
Eastern Black Walnut (<i>Juglans nigra</i>)	Late Summer to Fall	1
Pecan (<i>Carya illinoensis</i>)	Fall to Winter	1
Carolina Buckthorn (<i>Rhamnus caroliniana</i>)	Summer to Fall	1
American Holly (<i>Ilex opaca</i>)	Summer to Spring	2

Shrub	Fruit Season	
Desert Olive (<i>Forestiera neomexicana</i>)	Fall to Winter	1
Yaupon (<i>Ilex vomitoria</i>)	Fall to Winter	1
Parsley Hawthorn (<i>Crataegus marshallii</i>)	Spring	2
American Beautyberry (<i>Callicarpa americana</i>)	Fall	2
Desert Yaupon (<i>Schaefferia cuneifolia</i>)	Spring to Summer	1
Coralberry (<i>Symporicarpas orbiculatus</i>)	Fall to Spring	1
Viburnums (<i>viburnum</i> -app.)	Summer to Fall	1

Wildlife Habitat

Tree	Fruit Season	
Black Cherry (<i>Prunus serotina</i>)	Summer to Fall	2
Chokecherry (<i>Prunus virginiana</i>)	Late Summer	1
Parsley Hawthorn (<i>Crataegus marshallii</i>)	Fall to Spring	1
Lime Prickly-Ash (<i>Zanthoxylum fagara</i>)	Fall	1
Mayhaw (<i>Crataegus opaca</i>)	Summer	1

Shrub	Fruit Season	
Possumhaw (<i>Ilex decidua</i>)	Fall to Winter	1
Pyracantha (<i>Pyracantha coccinea</i>)	Fall to Winter	1
Natal Plum (<i>Carissa macrocarpa</i>)	Summer	1
Japanese Laurel (<i>Aucuba japonica</i>)	Fall	1

Wetland & Wetland Addition

Tree	
Shumard Oak (<i>Quercus shumardii</i>)	3
Water Oak (<i>Quercus nigra</i>)	3
Cottonwood (<i>Populus deltoides</i>)	3
Bald Cypress (<i>Taxodium distichum</i>)	3

Shrub	
Northern Spicebush (<i>Lindera benzoin</i>)	3
False Indigo Bush (<i>Amorpha fruticosa</i>)	3
Rattle Bush (<i>Sesbania drummondii</i>)	3
Hemp Sesbania (<i>Sesbania drummondii</i>)	3

Fern	
River Fern (<i>Thelypteris Kunthii</i>)	3
Water Clover (<i>Marsilea vestita</i>)	3
Carolina Fern (<i>Azolla caroliniana</i>)	3

Ferb	
Curly Dock (<i>Rumex Crispus</i>)	3
Halberd-leaf Rosemallow (<i>Hibiscus laevis</i>)	3
Mexican Seedbox (<i>Ludwigia octovalvis</i>)	3



Meadow & Wildflower Garden

Tree	
Cedar Elm (<i>Ulmus crassifolia</i>)	2
Texas Red Oak (<i>Quercus buckleyi</i>)	2
American Elm (<i>Ulmus Americana</i>)	1
Texas Persimmon (<i>Diospyros texana</i>)	2
Texas Ash (<i>Fraxinus albicans</i>)	2
Eastern Red Cedar (<i>Juniperus virginiana</i>)	1
Mexican Plum (<i>Prunus mexicana</i>)	2
Live Oak (<i>Quercus virginiana</i>)	2
Shumard Oak (<i>Quercus shumardii</i>)	2

Shrub	
Possumhaw (<i>Ilex decidua</i>)	2
Texas Persimmon (<i>Diospyros texana</i>)	2
Button Bush (<i>Cephaelanthus occidentalis</i>)	1
Begonia (<i>Begonia x semperflorens</i>)	2
Blackfoot Daisy (<i>Melampodium leucanthum</i>)	2
Res Sage (<i>Salvia greggii</i>)	1
Boatibrush (<i>Callistemon citrinus</i>)	2
Bulbine (<i>Bulbine frutescens</i>)	1
Cast Iron Plant (<i>Aspidistra elatior</i>)	1

Groundcover	
Sage (<i>Salvia roemeriana</i>)	2
Plateau Goldeneye (<i>Viguiera dentata</i>)	1
Gregg Salvia (<i>Salvia greggii</i>)	4
Asian Jasmine (<i>Trachelospermum asiaticum</i>)	5
Zoysia Species (<i>Zoysia</i>)	6

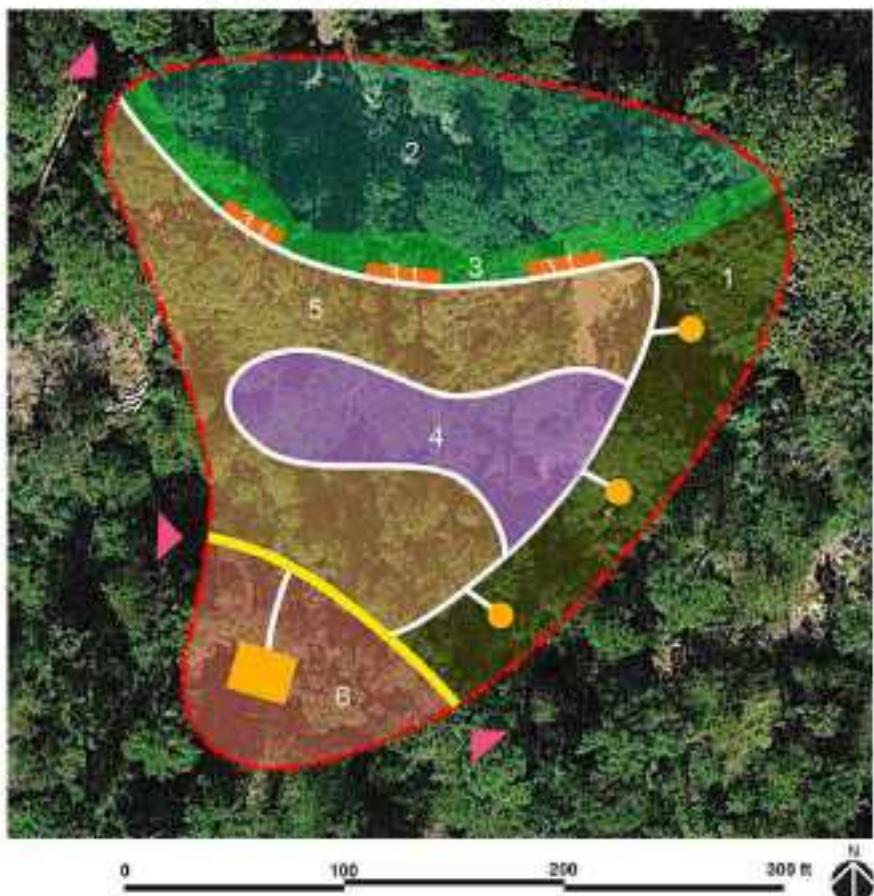
https://www.treeseedonline.com/article/p1059swamp_cypress_seeds_dixie_grown.html
<https://www.treepanday.com/product/four-leaf-water-clover-in-water-gardens-fish-gardens-hog-plants>

III. A. 1 Acre Habitat Master Plans

Habitat improvements here target the residential wildlife predicted to exist based on the existing vegetative communities, landform, water availability and suitable wildlife cover afforded the species present.

Example

1 Acre Land Use Zoning Plan



Legend

Recreation Zone:
Single Table Picnic
Group Picnic
View Deck
Primary Trail
Secondary Trails
Entry Point

Protection Zone
1- Forest Patch
2- Wetland
3- Wetland Addition

Special Features
4- Meadow
5- Wildlife Habitat
6- Human Zone

1 Acre Master Plan



Legend

Wetland	Children Play	Forest Habitat	View Deck
Wetland Addition	Single Table-Picnic	Access to Wildlife	Wildlife Habitat
Wildlife Habitat	Meadow	Flower Garden	Group Picnic Pavilion
Human Zone	Pedestrian Trail		

III. B. 10 Acre Proposed Habitat Zoning

Habitat treatments will target the wildlife life forms that occupy these specific habitat conditions for larger numbers of wildlife species over a longer time frame period. Management of these sites may require larger habitat treatment coverage and maintenance activities over greater areas of landscape. Not every sub-site is suited for this type of treatment investment. The investment decisions will be guided by the analysis of the successes and failures realized on the upgraded 10 acre experiments put in place.

Example

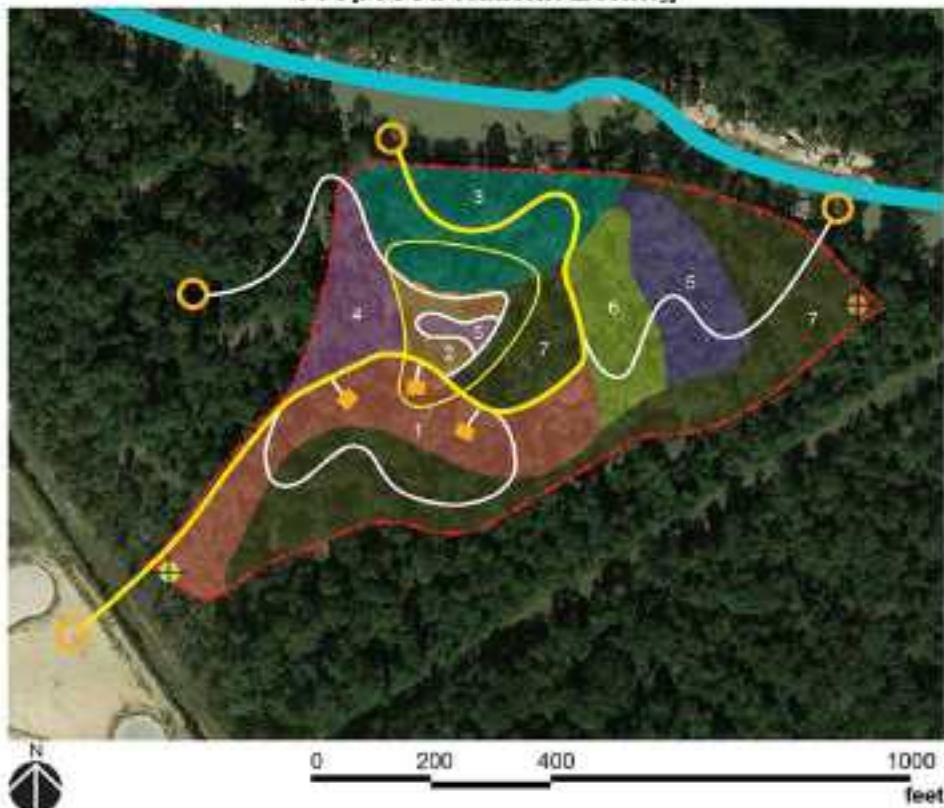
Proposed Site Selection



Legend

- 1. Shaped Site + Road
- 2. High/Low Point
- 3. High/Low Point
- 4. Existing Contours
- 10 Acre Site Boundary
- Creek
- Forest Wetland
- Contours (5 ft interval)
- Low Point
- High Point

Proposed Habitat Zoning



Legend

- 1. Shaped Site + Roads
- 2. High/Low Point
- 3. Existing Water
- 4. Proposed Features
- 5. Habitat Types
- 10 Acre Site Boundary
- 1 Acre Site Boundary
- Water Stream
- View Deck
- 1 Human Habitat
- Low Point
- Picnic Area
- Primary Road
- 2 Wildlife Habitat
- High Point
- Secondary Road
- 3 Wetland
- Access Point
- 4 Corridor
- 5 Meadow
- 6 Shrub
- 7 Forest Habitat

III. C. Targeted Wildlife Species

The Sustainable Wildlife Habitat Comprehensive Master Plan is directed to provide ongoing habitat management for targeted wildlife species identified as long term residents of the area in need of on going management activities.

Birds



Mourning Dove
Zenaida macroura



Eurasian Collared-Dove
Streptopelia decaocto



Rock Pigeon
Columba livia

Reptile



Chicken Turtle
Deirochelys reticularia



Eastern Fence Lizard
Sceloporus undulatus



Brown Anole
Anolis sagrei

Mammals



River Otter
Lutra canadensis



Hispid Pocket Mouse
Chaetodipus hispidus



Bobcat
Lynx rufus

Amphibians



Northern Cricket Frog
Acris crepitans



Bullfrog
Rana catesbeiana



Eastern Narrow-mouth Toad
Gastrophryne carolinensis

Butterflies



Orange-barred Sulphur
Phoebis philea



Cloudless Sulphur
Phoebis sennae



Ceraunus Blue
Hemiacraus ceraunus

Dragonflies



Red-tailed Pennant
Brachymesia furcata



Blue-faced Ring Tail
Erpetogomphus eutainia



Eastern Pondhawk
Erythemis simplicicollis

Source: <http://www.abbottnature.com/>

<https://www.butterfliesandmoths.org/>

<https://gis1.usgs.gov/casigap/viewer/species/Map.aspx>

https://tpwd.texas.gov/publications/nonpwdpubs/young_naturalist/animals/mammal_scrabble/

III. D. Treatment Strategy

Three levels of habitat planning are created. The concept is to start small (1 acre sites) with habitat upgrades and improvements dispersed throughout the 7 sub-site areas. As more is learned about successes for wildlife/habitat relationships the plan then encourages expansion of those sites to 10 acre experiments. Successes and failures at this level will eventually inform the managers to expand to even larger habitat improvements at the sub-site level or reduce and modify habitat improvements to more realistic ones in both size, wildlife life form targets and human contact opportunities.

Protect Rich Habitat

1. Preserve Core Areas



2. Mediate Edge Conditions



3. Establish Buffer Zones



Example

1 acre site



10 acre site



Sub-site #5



III. E. Treatment Strategy

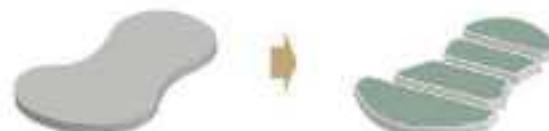
The plan begins with small 1 acre level treatments dispersed across the entire 327 acres. Over time 10 acre areas could be planned that are guided by the successes realized at the 1 acre level. Eventually the entire 327 acre site could then be planned, designed and financed as a unit. Its direction, size and phasing would be guided by the hard won knowledge documented from the successes and failures realized over time in place on the experimental 1 acre sites. In wildlife habitat management projects observation over time is the best guide for determining the pace, direction and amount of investment to make for the wildlife population in question.

Repair Damaged Habitat

1. Increase Canopy Coverage



2. Reclaim Lost Habitat



3. Develop Organic Edge Boundaries





Beaver Pond on-site

Part 3. Inventory Studies

Sustainable Wildlife Habitat Comprehensive Master Plan
Spring, Texas

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III. Landscape and Land Use Planning

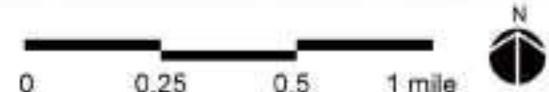
- Site #5	85-91
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I. Study Site Inventory A. 327 Acres



Legend

- Site Boundary
- 327-acre Site

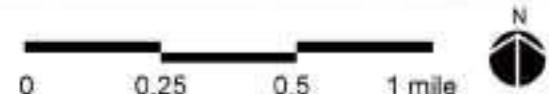


I. B. Topography Map



Legend

- Site Boundary
- Contour Line

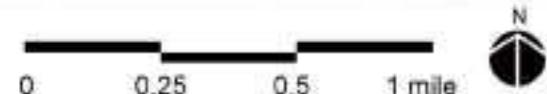


I. C. Tributary Map



Legend

- Site Boundary
- Waterline



I. D. Wetland Map



Legend

- Site Boundary
- Floodway
- 100 Year Floodplain
- 500 Year Floodplain

Source: <https://lens.org/data-download/#l/motewide>

I. E. Wetland Map



Wetland Type	Classification	Location (DMS)	Acres
STUDY SITE 1			
1 Freshwater Forested/Shrub Wetland	PFO1A	95°24'49.847"W 30°2'21.595"N	1.87
2 Freshwater Forested/Shrub Wetland	PFO1C	95°24'49.627"W 30°2'18.781"N	0.89
3 Freshwater Pond	PUBFx	95°24'44.521"W 30°2'10.489"N	1.22
4 Freshwater Pond	PUBFx	95°24'37.276"W 30°2'14.917"N	0.91
5 Freshwater Pond	PUSCx	95°24'33.889"W 30°1'57.368"N	0.1
TOTAL			6.85 / 8%
STUDY SITE 2			
1 Freshwater Forested/Shrub Wetland	PFO1A	95°24'18.683"W 30°2'46.224"N	2.22
2 Freshwater Pond	PUBHx	95°24'18.716"W 30°2'47.887"N	17.84

Wetland Type	Classification	Location (DMS)	Acres
STUDY SITE 2			
3 Freshwater Pond	PUBHx	95°24'8.895"W 30°2'20.421"N	2.14
4 Freshwater Pond	PUBHx	95°24'18.487"W 30°2'14.953"N	2.45
5 Freshwater Forested/Shrub Wetland	PSS1Cx	95°24'7.308"W 30°2'10.345"N	2.82
6 Freshwater Emergent Wetland	PEM1Cx	95°24'1.669"W 30°2'12.373"N	0.68
7 Freshwater Pond	PUBHx	95°23'57.792"W 30°2'12.11"N	0.95
TOTAL			24.1 / 13%

Source: <https://lrsis.org/data-download/#/wetlands>

I. F. Wetland Map



Wetland Type	Classification	Location (DMS)	Acres
STUDY SITE 1			
1 Freshwater Forested/Shrub Wetland	PFO1A	95°23'42.053"W 30°2'214.655"N	2.51
2 Freshwater Emergent Wetland	PEM1Cx	95°23'16.982"W 30°2'227.697"N	0.39
3 Freshwater Forested/Shrub Wetland	PFO1C	95°23'34.498"W 30°2'221.604"N	0.18
TOTAL			3.08 / 3%
STUDY SITE 5			
1 Freshwater Forested/Shrub Wetland	PFO1A	95°23'10.783"W 30°2'311.636"N	0.33
2 Freshwater Emergent Wetland	PEM1C	95°23'12.961"W 30°2'27.582"N	1.08
3 Freshwater Forested/Shrub Wetland	PFO1C	95°23'8.297"W 30°2'28.107"N	0.42
TOTAL			1.83 / 1%

0	0.25	0.5	1 mile
STUDY SITE 6			
1 Freshwater Pond			
2 Freshwater Forested/Shrub Wetland	PFO1A	95°22'25.227"W 30°2'12.137"N	0.21
3 Freshwater Forested/Shrub Wetland	PFO1A	95°22'19.446"W 30°2'10.915"N	0.23
4 Freshwater Forested/Shrub Wetland	PFO1A	95°22'19.506"W 30°2'25.477"N	2.89
TOTAL			3.54 / 6%
STUDY SITE 7			
1 Freshwater Forested/Shrub Wetland	PFO1A	95°22'33.654"W 30°2'24.552"N	1.38
2 Freshwater Pond	PUBHx	95°22'34.964"W 30°2'16.447"N	3.05
TOTAL			4.43 / 8%

Source: <https://lrsis.org/data-download/> #1/utawide

I. G. Wetland Map

CODE	MEANING
P	System PALUSTRINE The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 ppt. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres) (2) active wave-formed or bedrock shoreline features lacking (3) water depth in the deepest part of basin less than 2.5 m at low water (4) salinity due to ocean-derived salts less than 0.5 ppt.
EM	Class EMERGENT Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
FO	Class FORESTED Characterized by woody vegetation that is 6 m tall or taller.
SS	Class SCRUB-SHRUB Includes areas dominated by woody vegetation less than 6 m tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions.
UB	Class UNCONSOLIDATED BOTTOM Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%.
US	Class UNCONSOLIDATED SHORE Includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders or bedrock and; (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class.

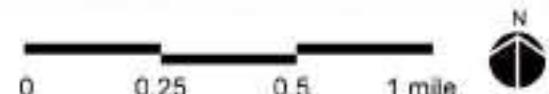
CODE	MEANING
1	Subclass Broad-Leaved Deciduous Woody angiosperms (trees or shrubs) with relatively wide, flat leaves that are shed during the cold or dry season; e.g., <i>Fraxinus nigra</i> .
A	Water Regime Temporary Flooded Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for the most of the season.
C	Water Regime Seasonally Flooded Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
F	Water Regime Semipermanently Flooded Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.
H	Water Regime Permanently Flooded Water covers the substrate throughout the year in all years.
X	SPECIAL MODIFIER Excavated This Modifier is used to identify wetland basins or channels that were excavated by humans.

I. H. Flood Boundaries



Legend

- Site Boundary
- Floodway
- 100 Year Floodplain
- 500 Year Floodplain



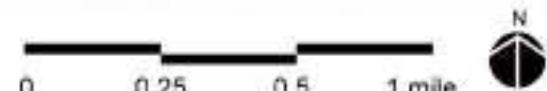
I. I. Ecosystem Map



Legend

—	Site Boundary	—	Pondshore Prairies	—	Post Oak Motte	—	High Density Urban
■	Pine Plantation	■	Coastal Prairies	■	Live Oak Motte	■	Low Density Urban
■	Red Cedar Motte	■	Riparian Forest/shrubs	■	Riparian Wet Prairie	■	Barren Land
■	Deciduous Forests						

Source: <http://rowtthms.gov/gisteam/>

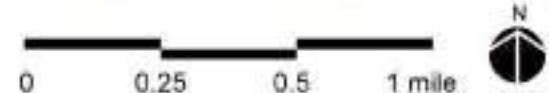


I. J. Riparian Tree, Shrub and Vine Map

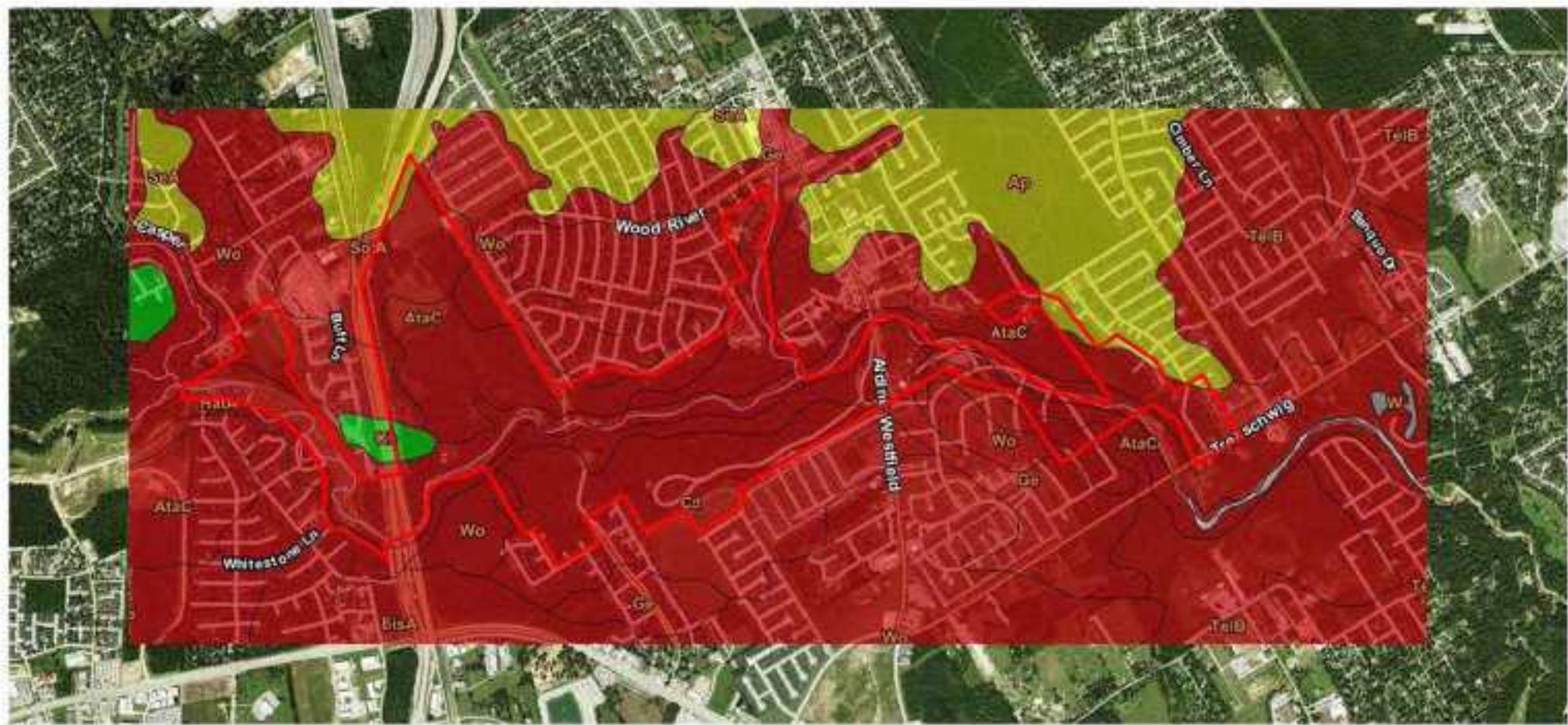


Legend

- The legend consists of four colored squares with corresponding labels: a red square for 'Site Boundary', a green square for 'Highly Suitable', a yellow-green square for 'Limited', and a dark red square for 'Not Suitable'.

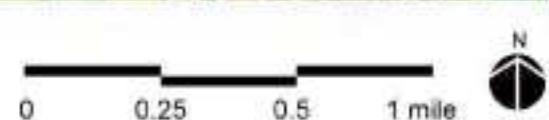


I. K. Burrowing Mammals and Reptiles Map



Legend

- Site Boundary
- Highly Suitable
- Limited
- Not Suitable



I. L. Pond and Reservoir Suitability



Legend

- Site Boundary
Highly Suitable
Limited
Not Suitable

<https://www.surveymonkey.com/r/AspWm63h>



I. M. Paths and Trails Suitability



Legend

- Site Boundary
- Highly Suitable
- Limited
- Not Suitable

II. Species Inventory 1. Shrubs

Shrubs of Spring, Texas



Japanese Barberry
Berberis thunbergii



Grayleaf Cotoneaster
Cotoneaster glaucophyllus



Tea Rose
Rosa odorata



Green Pittosporum
Pittosporum tobira



Pomegranate
Punica granatum



Oleander
Nerium oleander



Cherry Laurel
Prunus caroliniana



Possumhaw
Ilex decidua



American Beautyberry
Callicarpa americana



Yaupon Holly
Ilex vomitoria



Red Tip Photinia
Photinia x Fraseri



Texas Mountain Laurel
Sophora secundiflora



Texas Sage
Leucophyllum frutescens



Waxleaf Ligustrum
Ligustrum japonicum



Littleleaf Boxwood
Buxus microphylla



Crimson Bottlebrush
Callistemon citrinus



Chinese Juniper
Juniperus chinensis



Bigleaf Hydrangea
Hydrangea macrophylla



Suspensum Viburnum
Viburnum suspensum



Common Buttonbush
Cephaelanthus occidentalis



Dwarf Palmetto
Sabal minor



Wax Myrtle
Myrica cerifera



Virginia Sweetspire
Itea virginica



Boxleaf Euonymus
Euonymus japonicus

II. Species Inventory 2. Shrubs

Shrubs of Spring, Texas



Burning Bush
Euonymus alatus



Chinese Privet
Ligustrum sinense



Cast Iron Plant
Aspidistra elatior



Dwarf Chinese Holly
Ilex cornuta



Dwarf Crepe myrtle
Lagerstroemia indica



Camellia
Camellia sasanqua



Gardenia
Gardenia jasminoides



Firecracker
Jatropha integerrima



Forsythia
Forsythia intermedia



Red yucca
Hesperaloe parviflora



Rose of Sharon
Hibiscus syriacus



Spirea
Spiraea japonica



Sweet Olive
Osmanthus fragrans



Natal Plum
Carissa macrocarpa



Nandina
Nandina domestica



Pampass Grass
Cortaderia selloana



Pyracantha
Pyracantha coccinea



Chinese Fringe Flower
Loropetalum chinense



Blue Italian Cypress
Cupressus sempervirens



Japanese Laurel
Aucuba japonica



Abelia
Abelia x grandiflora



Banana
Musa



Thorny Eleagnus
Elaeagnus pungens



Texas sage
Leucophyllum frutescens

II. Species Inventory 3. Shrubs

Shrubs of Spring, Texas

Sr. no	Scientific Name	Common Name
1	<i>Berberis thunbergii</i>	Japanese Barberry
2	<i>Cotoneaster glaucophyllus</i>	Grayleaf Cotoneaster
3	<i>Rosa odorata</i>	Tea Rose
4	<i>Pittosporum tobira</i>	Green Pittosporum
5	<i>Punica granatum</i>	Pomegranate
6	<i>Nerium oleander</i>	Oleander
7	<i>Prunus caroliniana</i>	Cherry Laurel
8	<i>Ilex decidua</i>	Possumhaw
9	<i>Callicarpa americana</i>	American Beautyberry
10	<i>Ilex vomitoria</i>	Yaupon Holly
11	<i>Photinia x fraseri</i>	Red Tip Photinia
12	<i>Sophora secundiflora</i>	Texas Mountain Laurel
13	<i>Leucophyllum frutescens</i>	Texas Sage
14	<i>Ligustrum japonicum</i>	Waxleaf Ligustrum
15	<i>Buxus microphylla</i>	Littleleaf Boxwood
16	<i>Callistemon citrinus</i>	Crimson Bottlebrush
17	<i>Juniperus chinensis</i>	Chinese Juniper
18	<i>Hydrangea macrophylla</i>	Bigleaf Hydrangea
19	<i>Viburnum suspensum</i>	Suspensum Viburnum
20	<i>Cephalanthus occidentalis</i>	Common Buttonbush
21	<i>Sabal minor</i>	Dwarf Palmetto
22	<i>Myrica cerifera</i>	Wax Myrtle
23	<i>Itea virginica</i>	Virginia Sweetspire
24	<i>Euonymus japonicus</i>	Boxleaf Euonymus
25	<i>Aucuba japonica</i>	Japanese laurel
26	<i>Abelia x grandiflora</i>	Abelia
27	<i>Musa</i>	Banana
28	<i>Cupressus sempervirens 'Glauca'</i>	Blue Italian Cypress
29	<i>Euonymus alatus</i>	Burning Bush
30	<i>Ligustrum sinense</i>	Chinese Privet

Sr. no	Scientific Name	Common Name
31	<i>Aspidistra elatior</i>	Cast Iron Plant
32	<i>Ilex cornuta</i>	Dwarf Chinese Holly
33	<i>Lagerstroemia indica</i>	Dwarf Crepe myrtle
34	<i>Gardenia jasminoides</i>	Gardenia
35	<i>Jatropha integerrima</i>	Firecracker
36	<i>Forsythia intermedia</i>	Forsythia
37	<i>Hesperaloe parviflora</i>	Red yucca
38	<i>Hibiscus syriacus</i>	Rose of Sharon
39	<i>Spiraea japonica</i>	Spirea
40	<i>Osmanthus fragrans</i>	Sweet Olive
41	<i>Carissa macrocarpa</i>	Natal Plum
42	<i>Nandina domestica</i>	Nandina
43	<i>Cortaderia selloana</i>	Pampass Grass
44	<i>Pyracantha coccinea</i>	Pyracantha
45	<i>Loropetalum chinense</i>	Chinese Fringe Flower
46	<i>Camellia sasanqua</i>	Camellia
47	<i>Elaeagnus pungens</i>	Thorny Elaeagnus
48	<i>Leucophyllum frutescens</i>	Texas Sage

II. Species Inventory 4. Grasses

Grasses of Spring, Texas



Adagio Maiden Grass
Miscanthus sinensis 'Adagio'



Blonde Ambition Blue Grama Grass
Bouteloua gracilis



Blue Dart Juncus
Juncus tenuis



Big Bluestem
Andropogon gerardii



Bracken Fern
Pteridium esculentum



Buddha's Belly Bamboo
Bambusa ventricosa



Combererry
Symporicarpus orbiculatus



Elijah Blue Fescue
Festuca glauca 'Elijah Blue'



Evergold Variegated Japanese Sedge
Carex oshimensis 'Evergold'



Fern Acacia
Acacia farnesiana



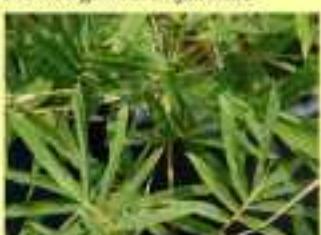
Fiber-optic Grass
Isolepis cernua



Fireworks Fountain Grass
Pennisetum setaceum 'Fireworks'



Frogfruit
Phyla nodiflora



Golden Goddess Bamboo
Bambusa multiplex 'Golden Goddess'



Golden Variegated Hakone Grass
Hakonechloa macra 'Aureola'



Grassy-Leaved Sweetflag
Acorus gramineus 'Minimus Aureus'



Gulf Muhly
Muhlenbergia capillaris



Hameln Dwarf Fountain Grass
Pennisetum alopecuroides 'Hameln'



Horseherb
Calycocarpus vialis



Indian Blankets
Gaillardia pulchella



Ivory Feathers Pampas Grass
Cortaderia selloana 'Pumila'



Knotroot Bristlegrass
Setaria parviflora (Poir.)



Karley Rose Oriental Fountain Grass King Tut Egyptian Papyrus
Pennisetum orientale 'Karley Rose' *Cyperus papyrus 'King Tut'*

II. Species Inventory 5. Grasses

Grasses of Spring, Texas



Little Bluestem
Schizachyrium scoparium



Maiden Grass
Miscanthus sinensis 'Gracillimus'



Maidenhair Fern
Adiantum pedatum



Mexican Feather Grass
Nassella tenuissima



Missouri Violet
Viola sororia



Pampas Grass
Erianthus ravennae



Partridge Berry
Mitchella repens L.



Pigeonberry
Rivina humilis



Pink Muhly Grass
Muhlenbergia capillaris 'Lenea'



Prairie Verbena
Glandularia bipinnatifida



Purple Fountain Grass
Pennisetum setaceum 'Rubrum'



Purple Groundcherry
Quincula lobata



Scarlet Sage
Salvia coccinea



Spiderwort
Tradescantia



Spiralis Corkscrew Rush
Juncus effusus f. spiralis



Sweet William
Dianthus barbatus



Widow's Tears
Commeconia erecta



Winecups
Culicaria spp.

II. Species Inventory 6. Grasses

Grasses of Spring, Texas

Scientific Name	Common Name	Erosion Control	Wildlife Index
<i>Miscanthus sinensis 'Adagio'</i>	Adagio Maiden Grass	GOOD	GOOD
<i>Bouteloua gracilis</i>	Blonde Ambition Blue Grama Grass	GOOD	GOOD
<i>Juncus tenuis</i>	Blue Dart Juncus	EXCELLENT	GOOD
<i>Andropogon gerardii</i>	Big Bluestem	EXCELLENT	GOOD
<i>Pteridium aquilinum</i>	Bracken Fern	EXCELLENT	GOOD
<i>Bambusa ventricosa</i>	Buddha's Belly Bamboo	EXCELLENT	GOOD
<i>Symporicarpus orbiculatus</i>	Coralberry	EXCELLENT	GOOD
<i>Festuca glauca 'Elijah Blue'</i>	Elijah Blue Fescue	EXCELLENT	GOOD
<i>Carex oshimensis 'Evergold'</i>	Evergold Variegated Japanese Sedge	GOOD	EXCELLENT
<i>Acaciella angustissima</i>	Fern Acacia	FAIR	GOOD
<i>Isolepis cernua</i>	Fiber-optic Grass	GOOD	GOOD
<i>Pennisetum setaceum 'Fireworks'</i>	Fireworks Fountain Grass	GOOD	GOOD
<i>Phylo incisa</i>	Frogfruit	EXCELLENT	GOOD
<i>Bambusa multiplex 'Golden Goddess'</i>	Golden Goddess Bamboo	FAIR	FAIR
<i>Hakonechloa macro 'Aureola'</i>	Golden Variegated Hakone Grass	EXCELLENT	FAIR
<i>Acorus gramineus 'Minimus Aureus'</i>	Grassy-Leaved Sweetflag	GOOD	FAIR
<i>Muhlenbergia capillaris</i>	Gulf Muhly	GOOD	GOOD
<i>Pennisetum alopecuroides 'Hameln'</i>	Hameln Dwarf Fountain Grass	GOOD	GOOD
<i>Calystegia soldanella</i>	Horseherb	GOOD	GOOD
<i>Gaillardia pulchella</i>	Indian Blanket	EXCELLENT	EXCELLENT
<i>Cortaderia selloana 'Pumila'</i>	Ivory Feathers Pampas Grass	GOOD	GOOD
<i>Setaria parviflora (Poir.)</i>	Knotroot Bristlegrass	GOOD	FAIR
<i>Pennisetum orientale 'Karley Rose'</i>	Karley Rose Oriental Fountain Grass	GOOD	GOOD
<i>Cyperus papyrus 'King Tut'</i>	King Tut Egyptian Papyrus	FAIR	GOOD

Scientific Name	Common Name	Erosion Control	Wildlife Index
<i>Schizachyrium scoparium</i>	Little Bluestem	EXCELLENT	GOOD
<i>Miscanthus sinensis 'Gracillimus'</i>	Maiden Grass	GOOD	GOOD
<i>Adiantum pedatum</i>	Maidenhair Fern	FAIR	FAIR
<i>Nassella tenuissima</i>	Mexican Feather Grass	GOOD	GOOD
<i>Viola sororia</i>	Missouri Violet	GOOD	EXCELLENT
<i>Erianthus ravennae</i>	Pampas Grass	FAIR	GOOD
<i>Mitchella repens L.</i>	Partridge Berry	GOOD	EXCELLENT
<i>Rivina humilis</i>	Pigeonberry	GOOD	GOOD
<i>Muhlenbergia capillaris 'Lenca'</i>	Pink Muhly Grass	GOOD	GOOD
<i>Glandularia bipinnatifida</i>	Prairie Verbena	EXCELLENT	EXCELLENT
<i>Pennisetum setaceum 'Rubrum'</i>	Purple Fountain Grass	GOOD	GOOD
<i>Quincula lobata</i>	Purple Groundcherry	FAIR	GOOD
<i>Salvia coccinea</i>	Scarlet Sage	FAIR	GOOD
<i>Tradescantia</i>	Spiderwort	GOOD	GOOD
<i>Juncus effusus f. Spiralis</i>	Spiralis Corkscrew Rush	GOOD	GOOD
<i>Dianthus barbatus</i>	Sweet William	EXCELLENT	GOOD
<i>Commelinia erecta</i>	Widow's Tears	FAIR	EXCELLENT
<i>Callirhoe spp.</i>	Wildflowers	GOOD	GOOD

II. Species Inventory 7. Vines

Vines of Spring, Texas

Vines Image



Bougainvillea
Bougainvillea sp.



Cape Honeysuckle
Tecoma capensis



Confederate Jasmine
Trachelospermum jasminoides



Orange Jubilee
Tecoma x hybrid



Carolina Jessamine
Gelsemium sempervirens



Trumpet Creeper
Campsis radicans



Wisteria
Wisteria sinensis



Cat's Claw Vine
Mastigodryas acanthophorus



Solanum 'Potato Vine'
Solanum jasminoides



Creeping Fig
Ficus pumila



Wire Vine
Muehlenbeckia axillaris



Algerian Ivy
Hedera algeriensis

Vines List

Scientific Name	Common Name	Erosion Control	Wildlife Index
<i>Bougainvillea sp.</i>	Bougainvillea	Good	Good
<i>Tecoma capensis</i>	Cape Honeysuckle	Good	Excellent
<i>Trachelospermum jasminoides</i>	Confederate Jasmine	Good	Fair
<i>Tecoma x hybrid</i>	Orange Jubilee	Good	Excellent
<i>Gesnerium sempervirens</i>	Carolina Jessamine	Fair	Good
<i>Campsis radicans</i>	Trumpet Creeper	Good	Good
<i>Wisteria sinensis</i>	Wisteria	Fair	Good
<i>Mastigodryas acanthophorus</i>	Cat's Claw Vine	Fair	Excellent
<i>Solanum jasminoides</i>	Solanum 'Potato Vine'	Good	Good
<i>Ficus pumila</i>	Creeping Fig	Excellent	Fair
<i>Muehlenbeckia axillaris</i>	Wire Vine	Excellent	Fair
<i>Hedera algeriensis</i>	Algerian Ivy	Excellent	Fair
<i>Ampelopsis arborea</i>	Pepper Vine	Excellent	Excellent
<i>Vitis rupestris</i>	Riverbank Grape	Excellent	Excellent
<i>Rubus spp.</i>	Blackberries	Excellent	Excellent

Legend

- Full Sun
- Low Water Requirement
- ✿ Flowers
- ◇ Attract Bees
- ▼ Attract Hummingbirds
- Part Shade/Shade
- ✗ Low Maintenance
- ▲ Evergreen
- ◆ Attract Butterflies
- ◆ Deer Resistant



Blackberries
Rubus spp.



Riverbank Grape
Vitis rupestris



Blackberries
Rubus spp.

II. Species Inventory 8. Forbs

Forbs of Spring, Texas

Plant Image



Creeping Spot Flower
Acemelia oppositifolia var.
repens



Blue Star Flower
Amsonia tabernaemontana



Butterflyweed
Asclepias tuberosa



Prostrate lawnflower
Calypso carpus vialis



Eastern Purple Coneflower
Echinacea purpurea



Indian Blanket
Gaillardia pulchella



White Avens
Geum canadense



Prairie Verbena
Glandularia bipinnatifida



Rose Vervain
Glandularia canadensis



Scarlet Rose-mallow
Hibiscus coccineus



Texas Spider lily
Hymenocallis littoralis



Standing Cypress
Iponmea rubra



Hairy Tubetongue
Justicia pilosella



Cardinal flower
Lobelia cardinalis



Partridgeberry
Mitchella repens



Spotted Beebalm
Monarda punctata



Crow's Poison
Nothoscordum bivalve



Obedient Plant
Physostegia virginiana



Pigeonberry
Rivina humilis



Wild Petunia
Ruellia humilis



Softseed Ruellia
Ruellia malacosperma



Scarlet Sage
Salvia coccinea



Coralberry
Symporicarpus orbiculatus



Walter's Violet
Viola walteri

II. Species Inventory 9. Forbs

Forbs of Spring, Texas

Plant List

Scientific Name	Common Name	Erosion Control	Wildlife Index	Light Requirements	Water Requirements	Height
<i>Acmenia oppositifolia</i> var. <i>repens</i>	Creeping Spur Flower	Excellent	Good	Full Sun	Medium	0-1 ft.
<i>Amsonia tabernaemontana</i>	Blue Star Flower	Excellent	Excellent	Full sun to part shade	Wet	1-3 ft.
<i>Asclepias tuberosa</i>	Butterflyweed	Excellent	Excellent	Full sun	Low	1-2 ft.
<i>Calyptocarpus vialis</i>	Prostrate Love-lies-bleeding	Excellent	Excellent	Full sun/ part shade/ shade	Low to medium	0-1 ft.
<i>Echinacea purpurea</i>	Eastern Purple Coneflower	Excellent	Excellent	Full sun to part shade	Medium	1-3 ft.
<i>Gaillardia pulchella</i>	Indian Blanket	Excellent	Excellent	Full sun to part shade	Medium	1-3 ft.
<i>Geum canadense</i>	White Avens	Excellent	Excellent	Full sun to part shade	Medium	1-3 ft.
<i>Glandularia bipinnatifida</i>	Prairie Verbena	Excellent	Excellent	Part shade	Low to medium	0-1 ft.
<i>Glandularia canadensis</i>	Rose Vervain	Excellent	Excellent	Part shade	Medium	0-1 ft.
<i>Hibiscus coccineus</i>	Scarlet Rose-mallow	Excellent	Excellent	Full sun	Wet	3-6 ft.
<i>Hymenocallis liriosme</i>	Texas Spider Lily	Excellent	Good	Part shade	Medium	1-3 ft.
<i>Ipomopsis rubra</i>	Standing Cypress	Excellent	Excellent	Full sun to part shade	Medium	3-6 ft.
<i>Justicia pilosella</i>	Hairy Tuberous-rooted Plant	Excellent	Good	Part shade	Low	0-1 ft.
<i>Lobelia cardinalis</i>	Cardinal flower	Excellent	Excellent	Full sun/ part shade/ shade	Low	3-6 ft.
<i>Mitchella repens</i>	Partridgeberry	Excellent	Good	Part shade to shade	Low to medium	0-1 ft.
<i>Monarda punctata</i>	Spotted Beebalm	Excellent	Excellent	Full sun	Low	1-3 ft.
<i>Nothoscordum bivalve</i>	Crow's Poison	Excellent	Good	Full sun	Medium	0-1 ft.
<i>Physostegia virginiana</i>	Obedient Plant	Excellent	Excellent	Full sun/ part shade/ shade	Medium	3-6 ft.
<i>Rivina humilis</i>	Pigeonberry	Excellent	Excellent	Part shade	Medium	1-3 ft.
<i>Ruellia humilis</i>	Wild Petunia	Excellent	Good	Part shade	Low	1-3 ft.
<i>Ruellia malacosperma</i>	Softseed Ruellia	Excellent	Good	Full sun	Low to medium	3-4 ft.
<i>Salvia coccinea</i>	Scarlet Sage	Excellent	Excellent	Full sun/ part shade/ shade	Medium	1-3 ft.
<i>Symporicarpos orbiculatus</i>	Coralberry	Excellent	Good	Part shade to shade	Low to medium	1-6 ft.
<i>Viola walteri</i>	Walter's Violet	Excellent	Good	Part shade to shade	Medium	0-1 ft.

Source: <http://npsot.org/wp/houston/files/2015/02/NPSOT-Houston-Information-Pages-2015.pdf>, <http://npsot.org/wp/houston/files/2015/02/NPSOT-Houston-Information-Pages-2015.pdf>, <https://garden.org.org>

II. Species Inventory 10. Wetland

Wetland Plants for Spring, Texas

Plant Image



Two-headed water-starwort
Callitrichia heterophylla



Guadalupe water-lymph
Najas guadalupensis



Water hyacinth
Eichhornia crassipes



Banana water-lily
Nymphaea mexicana



Red milkweed
Asclepias rubra



Pinewoods rose-gentian
Sabatia gentianoides



Seaside goldenrod
Solidago sempervirens



Great coneflower
Rudbeckia maxima



Plains coreopsis
Coreopsis tinctoria



Frog fruit
Phyla nodiflora



Iris
Iris spp.



Southern cattail
Typha domingensis



Horsetail
Equisetum hyemale



Sand spikerush
Eleocharis montevidensis



Green sprangletop
Lepidochloa dubia



Spikerush
Eleocharis equisetoides



Bushy bluestem
Andropogon glomeratus



Thin-fruit sedge
Carex flaccosperma



Switchgrass
Panicum virgatum



Giant plume grass
Saccharum giganteum



Buttonbush
Cephaelanthus occidentalis



Dwarf palmetto
Sabal minor



Virginia sweetspire
Itea virginica



Leucothoe
Leucothoe racemosa

II. Species Inventory 11. Wetland

Wetland Plants for Spring, Texas

Plant List

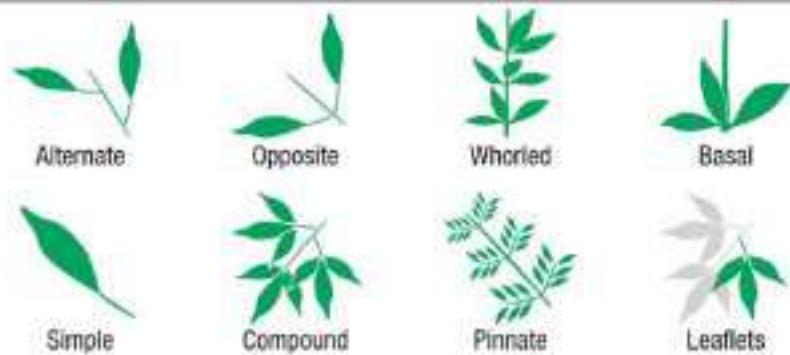
Scientific Name	Common Name	Plant Type	Landscape Index	Light Requirements	Soil Requirements	Height
<i>Callitrichia heterophylla</i>	Twoheaded water-starwort	Forbs	Submergent Zone	Full Sun	Moderately drained	8 in.
<i>Najas guadalupensis</i>	Guadalupe watermymph	Forbs	Submergent Zone	Full Sun	Poorly drained	2.5 ft.
<i>Eichhornia crassipes</i>	Water hyacinth	Forbs	Emergent Zone	Full Sun	Poorly drained	1 ft.
<i>Nymphaea mexicana</i>	Banana water-lily	Forbs	Emergent Zone	Full Sun	Poorly drained	1 ft.
<i>Asclepias rubra</i>	Red milkweed	Forbs	Toe Slope	Sun to Part Shade	Moderately drained	2.5 ft.
<i>Sabatia gentianoides</i>	Pinewoods rose-gentian	Forbs	Toe Slope	Full Sun	Poorly drained	2 ft.
<i>Solidago sempervirens</i>	Seaside goldenrod	Forbs	Middle Slope	Sun to Part Shade	Moderately drained	2-6 ft.
<i>Rudbeckia maxima</i>	Great coneflower	Forbs	Middle Slope	Sun to Part Shade	Well drained	3-6 ft.
<i>Coreopsis tinctoria</i>	Prairie coreopsis	Forbs	Upper Slope	Sun to Part Shade	Moderately drained	2 ft.
<i>Phyla nodiflora</i>	Frog fruit	Forbs	Upper Slope	Sun to Part Shade	Moderately drained	1 ft.
<i>Iris spp.</i>	Iris	Forbs	Submergent Zone	Sun to Part Shade to Shade	Poorly drained	1 ft.
<i>Typha domingensis</i>	Southern cattail	Grasses	Submergent Zone	Full Sun	Poorly drained	8 ft.
<i>Equisetum hyemale</i>	Horsetail	Grasses	Emergent Zone	Sun to Part Shade to Shade	Poorly drained	2-4 ft.
<i>Eleocharis montevidensis</i>	Sand spikerush	Grasses	Emergent Zone	Full Sun	Poorly drained	1 ft.
<i>Leptochloa dubia</i>	Green sprangletop	Grasses	Toe Slope	Full Sun	Poorly drained	3 ft.
<i>Eleocharis equisetoides</i>	Spikerush	Grasses	Toe Slope	Sun to Part Shade	Moderately drained	3 ft.
<i>Andropogon glomeratus</i>	Bushy bluestem	Grasses	Upper/Middle Slope	Full Sun	Poorly drained	6 ft.
<i>Carex flacca</i>	Thin-fruit sedge	Grasses	Upper/Middle Slope	Sun to Part Shade	Moderately drained	6-10 in.
<i>Panicum virgatum</i>	Switchgrass	Grasses	Upper/Middle Slope	Sun to Part Shade	Moderately drained	6 ft.
<i>Saccharum giganteum</i>	Giant plume grass	Grasses	Upper/Middle Slope	Full Sun	Moderately drained	3.5-10 ft.
<i>Cephaelanthus occidentalis</i>	Buttonbush	Shrubs	Toe Slope	Sun to Part Shade	Poorly drained	3-12 ft.
<i>Sabal minor</i>	Dwarf palmetto	Shrubs	Middle Slope	Sun to Part Shade	Poorly drained	5 ft.
<i>Itea virginica</i>	Virginia sweetspire	Shrubs	Middle Slope	Sun to Part Shade	Poorly drained	9 ft.
<i>Leucothoe racemosa</i>	Leucothoe	Shrubs	Middle Slope	Full Sun	Poorly drained	12 ft.

Source: Field Guide for Plant Identification Volume Two: Wetlands | Vegetation common to Harris County wetland areas

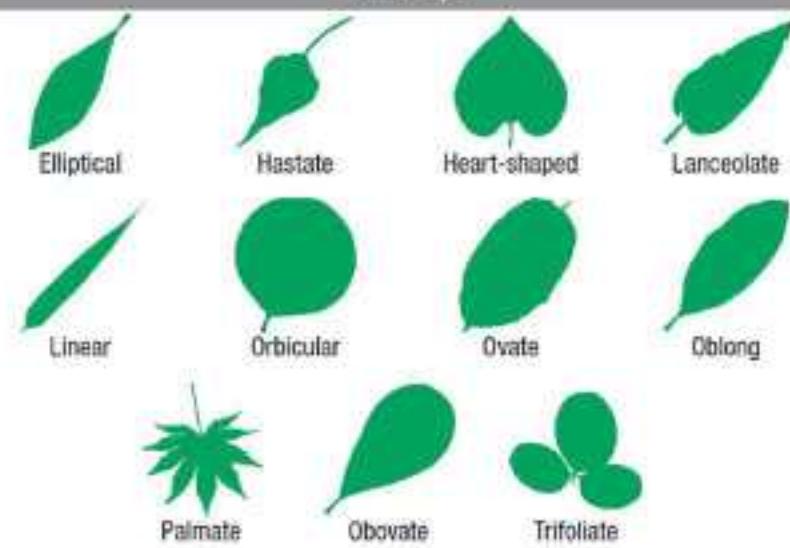
II. Species Inventory 12. Leaf Guide

Leaf Guide

Leaf Arrangement



Leaf Shape



Leaf Margin



Associates Guide

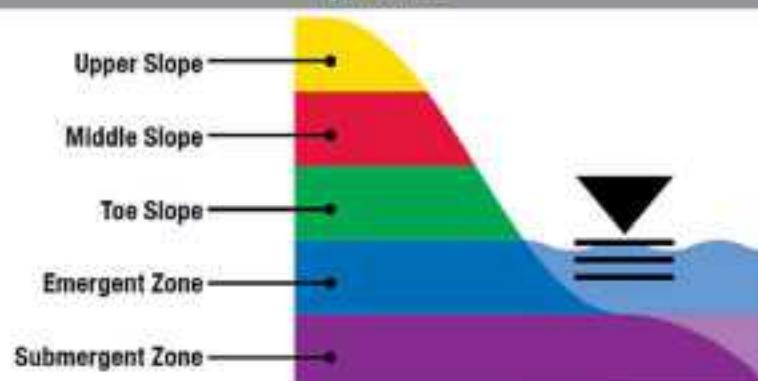
Harris County Ecoregions



Sunlight Requirements



Hydric Zones



Source: Field Guide for Plant Identification Volume Two: Wetlands | Vegetation common to Harris County wetland areas

II. Species Inventory 13. Leaf Guide

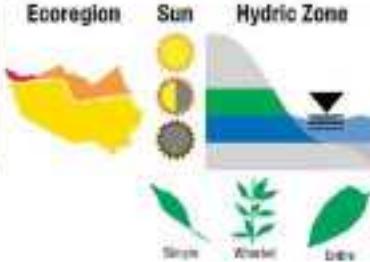
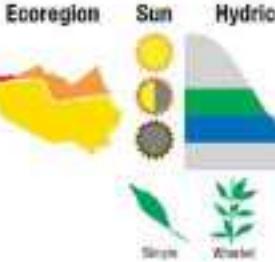
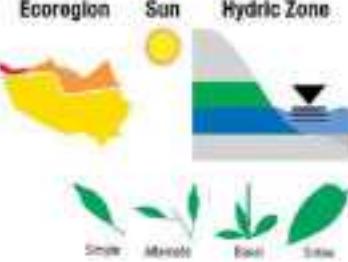
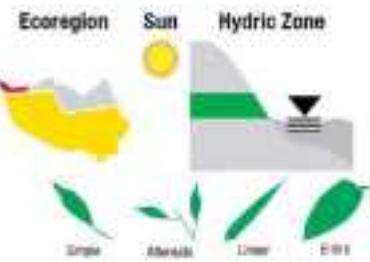
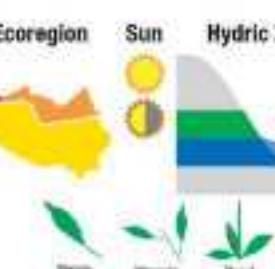
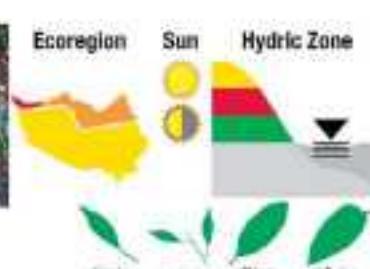
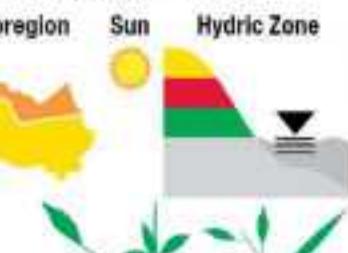
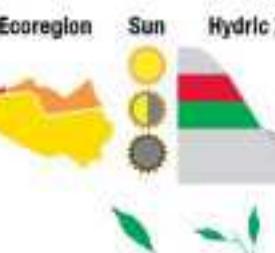
Leaf Guide

<p>Water hyacinth (<i>Eichhornia crassipes</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Compound, Simple, Alternate, Linear</p>	<p>Guadalupe waternymph (<i>Najas guadalupensis</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Alternate, Simple, Linear</p>	<p>Water hyacinth (<i>Eichhornia crassipes</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Linear, Trifoliate</p>
<p>Banana water-lily (<i>Nymphaea mexicana</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Alternate, Sympodial, Serrate</p>	<p>Red milkweed (<i>Asclepias rubra</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Opposite, Entire, Lanceolate</p>	<p>Pinewoods rose-gentian (<i>Sabatia gentianoides</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Opposite, Linear, Lanceolate, Linear</p>
<p>Seaside goldenrod (<i>Solidago sempervirens</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Basal, Alternate, Ovate</p>	<p>Great coneflower (<i>Rudbeckia maxima</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Alternate, Basal, Ovate, Opposite, Serrate</p>	<p>Plains coreopsis (<i>Coreopsis tinctoria</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Compound, Alternate, Linear, Lanceolate, Ovate, Linear</p>
<p>Frog fruit (<i>Phyla nodiflora</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Opposite, Elliptical, Ovate, Linear, Serrate</p>	<p>Iris (<i>Iris spp.</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Alternate, Basal, Linear, Linear</p>	<p>Southern cattail (<i>Typha domingensis</i>)</p>  <p>Ecoregion</p>  <p>Sun</p>  <p>Hydric Zone</p>  <p>Leaf Types: Simple, Linear, Linear, Linear, Linear</p>

Source: Field Guide for Plant Identification Volume Two: Wetlands | Vegetation common to Harris County wetland areas

II. Species Inventory 14. Leaf Guide

Leaf Guide

<p>Horsetail (<i>Equisetum hyemale</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   	<p>Sand spikerush (<i>Eleocharis montevidensis</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   	<p>Green sprangletop (<i>Leptochloa dubia</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   
<p>Spikerush (<i>Eleocharis enuisetoides</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   	<p>Bushy bluestem (<i>Andropogon glomeratus</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   	<p>Bushy bluestem (<i>Andropogon glomeratus</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   
<p>Switchgrass (<i>Panicum virgatum</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   	<p>Giant plume grass (<i>Saccharum giganteum</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   	<p>Buttonbush (<i>Cephalanthus occidentalis</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   
<p>Dwarf palmetto (<i>Sabal minor</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   	<p>Virginia sweetspire (<i>Itea virginica</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   	<p>Leucothoe (<i>Leucothoe racemosa</i>)</p>  <p>Ecoregion Sun Hydric Zone</p>   

Source: Field Guide for Plant Identification Volume Two; Wetlands | Vegetation common to Harris County wetland areas

II. Species Inventory 15. Mammals

Mammals of Harris County Area, Spring, Texas

Small Mammals



Swamp Rabbit
Sylvilagus aquaticus



Black-tailed Jackrabbit
Lepus californicus



Eastern Cottontail
Sylvilagus floridanus



Nutria
Myocaster coypus



Southern Flying Squirrel
Glaucomys volans



Common Raccoon
Procyon lotor



Striped Skunk
Mephitis mephitis



Ringtail
Bassariscus astutus



Eastern Mole
Scalopus aquaticus



American Badger
Taxidea taxus



Nine-banded Armadillo
Dasypus novemcinctus



Virginia Opossum
Didelphis virginiana

Large Mammals



Bobcat
Lynx rufus



Common Gray Fox
Urocyon cinereoargenteus



Coyote
Canis latrans



Red Fox
Vulpes vulpes



White-tailed Deer
Odocoileus virginianus



Louisiana black bear
Ursus americanus luteolus



Feral Pig
Sus scrofa



River Otter
Lontra canadensis

II. Species Inventory 16. Mammals

Mammals of Harris County Area, Spring, Texas

Rodents



Hispid Pocket Mouse
Chaetodipus hispidus



Deer Mouse
Peromyscus maniculatus



Eastern Harvest Mouse
Rheithrodontomys humulis



White-footed Mouse
Peromyscus leucopus



Fulvous Harvest Mouse
Rheithrodontomys fulvescens



Hispid Cotton Rat
Sigmodon hispidus



Norway Rat
Rattus norvegicus



Muskrat
Ondatra zibethicus



American Beaver
Castor Canadensis



Least Shrew
Cryptotis parva



Baird's Pocket Gopher
Geomys brevicauda



Eastern Gray Squirrel
Sciurus carolinensis

Bats



Big Brown Bat
Eptesicus fuscus



Brazilian Free-tailed Bat
Tadarida brasiliensis cynocephala



Eastern Pipistrelle
Pipistrellus subflavus



Eastern Red Bat
Lasiurus borealis



Seminole Bat
Lasiurus seminolus



Hoary Bat
Lasiurus cinereus



Northern Yellow Bat
Lasiurus intermedius



Rafinesque's Big-eared Bat
Corynorhinus rafinesquii



Silver-haired Bat
Lasionycteris noctivagans



Southeastern Myotis
Myotis austroriparius



Evening Bat
Nycticeius humeralis



Mexican long-nosed bat
Leptonycteris nivalis

II. Species Inventory 16. Mammals

Mammals of Harris County Area, Spring, Texas

Target Species



American Beaver
Castor canadensis



Deer Mouse
Peromyscus maniculatus



Southern Flying Squirrel
Glaucostylops volans



Virginia Opossum
Didelphis virginiana



Eastern Cottontail
Sylvilagus floridanus



Nine-banded Armadillo
Dasyurus novemcinctus

Habitat: Essentially aquatic and require water in the form of a pond, stream, lake, or river for their well-being, because of their skills in regulating water level and stream flow with dams, beavers are able to convert an otherwise unfavorable area into one that is habitable.

Food: Mainly the inner bark of willows and cottonwood in absence of above in winter they feed on trees as button willow, juniper, and pecan and rely heavily on Bermuda grass, beard grass, ragweed, and yellow water lily in summer.

Predators: Mountain lions, wolves, northern river otters, fishers, lynx and bobcats.

Habitat: Occupy a variety of habitats, ranging from mixed forests to grasslands to open, sparsely vegetated deserts. In Texas, they usually inhabit grasslands or areas of open brush, especially where weeds and grasses offer concealment and a source of food. Weed-choked fence rows and washes offer almost ideal habitat.

Food: Seeds, fruits, bark, roots, and herbage.

Predators: Small carnivores, owls, and snakes.

Habitat: Inhabit forested areas where suitable trees are present to afford den sites.

Food: They mostly eat nuts and acorns. They also eat insect larvae, beetles, young and eggs of birds, persimmon, and cultivated corn.

Predators: Owls, Marten, Fisher, raccoon, Coyote, House Cat, Bobcat, Lynx, Weasel, Arboreal snakes, Rattlesnakes.

Habitat: Primarily inhabitants of deciduous woodlands. Also found in prairies, marshes, and farmlands. Hollow trees and logs are preferred sites, but will den in woodpiles, rock piles, crevices in cliffs, under buildings, in attics, and in underground burrows.

Food: It feeds on a variety of foods, including rats, mice, young rabbits, birds, insects, crustaceans, frogs, fruits, and vegetables.

Predators: Owls, hawks, foxes, and humans.

Habitat: Optimal eastern cottontail habitat includes open, grassy areas, clearings, and old fields supporting abundant green grasses and herbs, with shrubs in the area or edges for cover. The essential components of eastern cottontail habitat are an abundance of well-distributed escape cover interspersed with more open foraging areas such as grasslands and pastures.

Food: Bark, twigs, leaves, fruit buds, flowers, grass seeds, sedge fruits, and rush seeds.

Predator: Domestic cats and dogs, foxes, coyote, bobcat, weasels, raccoon, mink, great horned owl, barred owl, hawks, corvids, and snakes.

Habitat: The nine-banded armadillo evolved in a warm, rainy environment, and is still most commonly found in regions resembling its ancestral home. As a very adaptable animal, it can also be found in scrublands, open prairies, and tropical rainforests.

Food: Grubs, beetles, ants, termites, worms.

Predators: Cougars, wolves, coyotes, black bears, red wolves, jaguars, alligators, bobcats, and large raptors.

II. Species Inventory 18. Mammals

Mammals of Harris County Area, Spring, Texas

Target Species

					
River Otter <i>Lutra canadensis</i>	White-tailed Deer <i>Odocoileus virginianus</i>	Coyote <i>Canis latrans</i>	Red Fox <i>Vulpes vulpes</i>	Bobcat <i>Lynx rufus</i>	Eastern Red Bat <i>Lasiurus borealis</i>
Habitat: aquatic habitats like freshwater and coastal marine, including lakes, rivers, inland wetlands, coastal shorelines, marshes, and estuaries. Food: fish, crustaceans, mollusks, insects, birds, oysters, shellfish, crabs, crayfish, frogs, rodents, turtles and aquatic invertebrates Predators: Alligators, bobcats, and birds of prey	Habitat: different types of places from forest, plains, desert, tropical rainforests, scrub lands, mountains and they even live in the city. In Texas, they like to live in hardwood areas where the main vegetation is a mixture of pines and hardwoods or nearly pure stands of pines. Food: Nuts are the most preferred foods, 67% of their total feeding time was grazing on grasses, 26% eating fruits and mast, and only 7% in browsing. Predators: Wolves, mountain lions, bears, jaguars, and coyotes. But most of the deers are killed by hunters or cars	Habitat: Areas of good cover such as woodlands and shrublands. They can be found in woodlands, prairies, deserts and the forests. Food: Rabbits, small rodents, ground birds, fish, frogs, snakes, lizards, invertebrates, carrion, fruits and nuts Predators: Eagles, mountain lions, owls, but 90% of the coyote deaths are attributed to people through hunting with guns, poison, traps or killed accidentally with vehicles or farm equipment.	Habitat: Not a native species. They can be found in mixed woodland areas. Food: Rabbits, small rodents, insects and wild fruits and berries. Predators: Great horned owls, domestic dogs or hunted by humans	Habitat: South Texas brush country. They can live in a wide variety of habitats, including swamps, deserts, and mountain ranges. Food: mice, rabbits and poultry, domestic animals and deer. Most of them hunt at night. Predators: Eagles, owls, coyotes, foxes, mountain lions, wolves or hunted by humans	Habitat: Mostly over land, along the edges of pastures, crop lands, or other openings dotted with large deciduous trees. They also have been found in cypress stands, and near pecan trees along rivers. They prefer forested environments. Food: insectivorous, preying heavily on moths and scarab beetles. Predators: Bluejay, opossums, hawks and owls

II. Species Inventory 19. Birds

Birds of Spring, Texas

Woodpeckers



Downy Woodpecker
Picoides pubescens



Pileated Woodpecker
Dryocopus pileatus



Red-bellied Woodpecker
Melanerpes carolinus



Red-headed Woodpecker
Melanerpes erythrocephalus



Yellow-bellied Sapsucker
Sphyrapicus varius



Hairy Woodpecker
Leuconotopicus villosus

Shrikes, Vireos, Crow and Jays, Swallows



Loggerhead Shrike
Lanius ludovicianus



White-eyed Vireo
Vireo griseus



American Crow
Corvus brachyrhynchos



Blue Jay
Cyanocitta cristata



Purple Martin
Progne subis



Barn Swallow
Hirundo rustica

Pigeons, Doves, Swifts and Hummingbirds



Mourning Dove
Zenaidura macroura



Eurasian Collared-Dove
Streptopelia decaocto



Rock Pigeon
Columba livia



Chimney Swift
Chaetura pelasgica



Ruby-throated Hummingbird
Archilochus colubris



Rufous Hummingbird
Selasphorus rufus

Owls



Barred Owl
Strix varia



Eastern Screech-Owl
Megascops asio



Great Horned Owl
Bubo virginianus



Carolina Chickadee
Poecile carolinensis



Tufted Titmouse
Baeolophus bicolor



Sandhill Crane
Antigone canadensis

Titmice and Chickadees

Crane

II. Species Inventory 20. Birds

Birds of Spring, Texas

Egrets and Herons



Cattle Egret
Bubulcus ibis



Great Egret
Ardea alba



Snowy Egret
Egretta thula



Great Blue Heron
Ardea herodias



Yellow-crowned Night-Heron
Nyctanassa violacea



Green Heron
Butorides virescens

Hawks and Allies, Eagles, Falcons and Osprey



Bald Eagle
Haliaeetus leucocephalus



Cooper's Hawk
Accipiter cooperii



Red-shouldered Hawk
Buteo lineatus



Red-tailed Hawk
Buteo jamaicensis



Sharp-shinned Hawk
Accipiter striatus



Broad-winged Hawk
Buteo platypterus

Vultures



American Kestrel
Falco sparverius



Osprey
Pandion haliaetus



Swallow-tailed Kite
Elanoides forficatus



Mississippi Kite (seasonal)
Ictinia mississippiensis



Black Vulture
Coragyps atratus



Turkey Vulture
Cathartes aura

Gulls and Terns



Laughing Gull
Larus atricilla



Ring-billed Gull
Larus delawarensis



Caspian Tern
Hydroprogne caspia



Forster's Tern
Sterna forsteri

II. Species Inventory 21. Birds

Birds of Spring, Texas

Waterfowl



Snow Goose (seasonal)
Chen caerulescens



Canada Goose
Branta canadensis



Wood Duck
Aix sponsa



Blue Winged Teal
Anas discors



American Coot
Fulica americana



Double-crested Cormorant
Phalacrocorax auritus

Wrens, Kinglets, Gnatcatcher, Thrushes and Mockingbirds



Carolina Wren
Thryothorus ludovicianus



House Wren
Troglodytes aedon



Ruby-crowned Kinglet
Regulus calendula



Blue-gray Gnatcatcher
Poliolais caerulea



American Robin
Turdus migratorius



Northern Mockingbird
Mimus polyglottos

Starlings, Waxwing, Wood Warblers



European Starling
Sturnus vulgaris



Cedar Waxwing
Bombycilla cedrorum



Pine Warbler
Dendroica pinus



Yellow-throated Warbler
Dendroica dominica



Orange-crowned Warbler
Oreothlypis celata



Ovenbird
Seiurus aurocapillus

Blackbirds, Finches, Cardinals



Brown-headed Cowbird
Molothrus ater



Great-tailed Grackle
Quiscalus mexicanus



Common Grackle
Quiscalus quiscula



Red-winged Blackbird
Agelaius phoeniceus



American Goldfinch
Carduelis tristis



Northern Cardinal
Cardinalis cardinalis

II. Species Inventory 22. Herps

Herps of Spring, Texas

Reptiles



Alligator Snapping Turtle
Macrochelys temminckii



Chicken Turtle
Deirochelys reticularia



Eastern Mud Turtle
Kinosternon subrubrum



Eastern Musk Turtle
Stemotherus odoratus



Ornate Box Turtle
Terrapene ornata ornata



Yellow Mud Turtle
Kinosternon flavescens



Broad-headed Skink
Plestiodon laticeps



Common Five-lined Skink
Plestiodon inexpectatus



Texas Spiny Lizard
Sceloporus olivaceus



Eastern Fence Lizard
Sceloporus undulatus



Brown Anole
Anolis sagrei



Texas Horned Lizard
Phrynosoma cornutum

Amphibians



Northern Cricket Frog
Acris crepitans



Bullfrog
Rana catesbeiana



Eastern Narrow-mouth Toad
Gastrophryne carolinensis



Green Tree Frog
Hyla cinerea



Spring Peeper
Pseudacris crucifer



Gulf Coast Toad
Incilius valliceps



Bronze Frog
Rana clamitans



Southern Leopard Frog
Rana sphenocephalus



Spotted Chorus Frog
Pseudacris clarkii



Eastern Tiger Salamander
Ambystoma tigrinum



Southern Dusky Salamander
Desmognathus acaudatus



Lesser Siren
Siren intermedia

II. Species Inventory 23. Herps

Herps of Spring, Texas

Venomous Snakes



Texas Coral Snake
Micruurus tener



Copperhead Snake
Agiistrodon constrictor



Cottonmouth Snake
Agiistrodon piscivorus



Timber Rattlesnake
Crotalus horridus



Texas diamond-back
Crotalus atrox



Western Pygmy Rattlesnake
Sistrurus miliarius streckeri

Nonvenomous Snakes



Red-bellied Mudsnake
Farancia abacura



Ring-necked Snake
Diadophis punctatus



Rough Earth Snake
Virginia striatula



Rough Green Snake
Opheodrys aestivus



Slowinski's Corn Snake
Pantherophis slowinskii



Texas rat snake
Elaphe obsoleta lindheimeri



Common Kingsnake
Lampropeltis getula



Dekay's Brownsnake
Storeria dekayi



Flat-headed Snake
Tantilla gracilis



Lined Snake
Tropidoclonion lineatum



Milk snake
Lampropeltis triangulum



Mississippi Green Watersnake
Nerodia cyclopion



Southern Watersnake
Nerodia fasciata



Western Ribbon Snake
Thamnophis proximus



Western Wormsnae
Carpophis vermis



Yellow-bellied Kingsnake
Lampropeltis calligaster



Dusty Hognose Snake
Heterodon gloydi



Western Ground Snake
Sonora semiannulata

II. Species Inventory 24. Butterflies

Butterflies of Spring, Texas

Hesperiidae Skippers



Clouded Skipper
Lerema accius



Ocola Skipper
Panoquina ocola



Fiery Skipper
Hylephila phyleus



Brazilian Skipper
Caenides ethlius



Southern Skipperling
Copeades minima



Horace's Duskywing
Erynnis horatius



Long-tailed Skipper
Urbanus proteus



Funereal Duskywing
Erynnis funeralis



White-striped Longtail
Chorodes albofasciatus



Twin-spot Skipper
Oligoria maculata



Southern Broken-Dash
Wallengrenia otho



Sachem
Atalopedes campestris

Nymphalidae Brush-footed Butterflies



Tawny Emperor
Asterocampa clyton



Common Buckeye
Junonia coenia



Painted Lady
Vanessa cardui



Monarch
Danaus plexippus



Bordered Patch
Chlosyne lacinia

Pieridae Whites and Sulphurs



Orange-barred Sulphur
Phoebis philea



Cloudless Sulphur
Phoebis sennae



Ceraunus Blue
Hemiargus ceraunus



Red-banded Hairstreak
Calycopis cecrops



Giant Swallowtail
Papilio cresphontes



Spicebush Swallowtail
Papilio troilus

Lycaenidae Gossamer-wing Butterflies

Papilionidae Parnassians and Swallowtails

II. Species Inventory 25. Butterflies

Butterflies of Spring, Texas

Targeted Species

Adult Stage						
Texan Crescent <i>Anthanassa texana</i>						
Caterpillar Stage	Texan Crescent <i>Anthanassa texana</i>	American Snout <i>Libytheana carinenta</i>	Silvery Checkerspot <i>Chlosyne nycteis</i>	Pipevine Swallowtail <i>Chlosyne nycteis</i>	Gulf Fritillary <i>Agraulis vanillae</i>	Little Yellow <i>Pyrisitia lisa</i>
Host Plants	1. <i>Dicliptera brachiata</i> (False Mint) 2. <i>Ruellia carolinensis</i> (Small Flower Ruellia)	1. <i>Celtis occidentalis</i> (Common hackberry) 2. <i>Celtis ehrenbergiana</i> (Desert hackberry)	1. <i>Helianthus argophyllum</i> (Silverleaf Sunflower) 2. <i>Rudbeckia hirta</i> var. <i>pulcherrima</i> (Blackeyed Susan)	1. <i>Aristolochia erecta</i> (Swanflower) 2. <i>Aristolochia tomentosa</i> (Woolly Dutchman's pipe) 3. <i>Aristolochia coryi</i> (Cory's Dutchman's-pipe) 4. <i>Aristolochia serpentaria</i> (Virginia Snakeroot)	1. <i>Passiflora affinis</i> (Bracted Passionflower) 2. <i>Passiflora foetida</i> (Corona de Cristo) 3. <i>Liatris pycnostachya</i> (Prairie blazing star) 4. <i>Passiflora tenuiloba</i> (Bird Wing Passionflower)	1. <i>Chamaecrista fascicularis</i> (Partridge pea) 2. <i>Chamaecrista nictitans</i> (Sensitive partridge pea)

II. Species Inventory 26. Trees

Trees of Spring, Texas

Large Trees



American Beech
Fagus grandifolia



Green Ash
Fraxinus pennsylvanica



White Ash
Fraxinus americana



Bald Cypress
Taxodium distichum



Blackgum
Nyssa sylvatica



Winged Elm
Ulmus alata



Cottonwood
Populus deltoides



Big-tooth Maple
Acer grandidentatum



Eastern Black Walnut
Juglans nigra



American Elm
Ulmus americana



Cedar Elm
Ulmus crassifolia



Black Willow
Salix nigra



Lindens
Tilia spp.



Shumard Oak
Quercus shumardii



Texas Red Oak
Quercus buckleyi



Water Oak
Quercus nigra



Willow Oak
Quercus phellos



Bur Oak
Quercus macrocarpa



White Oak
Quercus alba



Live Oak
Quercus virginiana



Pecan
Carya illinoensis



Post Oak
Quercus stellata



Loblolly Pine
Pinus taeda



Ashe Juniper
Juniperus ashei

II. Species Inventory 27. Trees

Trees of Spring, Texas



Eastern Red Cedar
Juniperus virginiana



Sweetgum
Liquidambar styraciflua



American Sycamore
Platanus occidentalis



Southern Red Oak
Quercus falcata



Red Maple
Acer rubrum



Southern Magnolia
Magnolia grandiflora

Medium & Small Trees



Black Cherry
Prunus serotina



Anaqua
Ebrieta anacua



Carolina Buckthorn
Rhamnus caroliniana



American Holly
Ilex opaca



Desert Willow
Chilopsis linearis



Common Chokecherry
Prunus virginiana



Anacacho Orchid Tree
Bauhinia congesta



Huisache
Acacia farnesiana



Berlandier's Acacia
Acacia berlandieri



Yaupon
Ilex vomitoria



Western Soapberry
Sapindus drummondii



Sassafras
Sassafras albidum



River Birch
Betula nigra



Red Bay
Persia borbonia



Pawpaw
Asimina triloba



Mesquite
Prosopis juliflora



Flameleaf Sumac
Rhus copallina



Lime Prickly-Ash
Zanthoxylum fagara

II. Species Inventory 28. Trees

Trees of Spring, Texas

Flowering Trees



Texas Persimmon
Diospyros texana



Southern Waxmyrtle (Bayberry)
Myrica cerifera



Southern Magnolia
Magnolia grandiflora



Rusty Blackhaw
Viburnum rufidulum



Redbud
Cercis canadensis



Necklace Tree:
Sophora affinis



Texas Mountain Laurel
Sophora secundiflora



Mexican Plum
Prunus mexicana



Mexican Olive
Cordia boissieri



Jerusalem Thorn
Parkinsonia aculeata



Parsley Hawthorn
Crataegus marshallii



Mayhaw
Crataegus opaca



Golden Rain Tree
Koelreuteria bipinnata



Fringe Tree
Chionanthus virginicus



Faulkberry
Vaccinium arboreum



Dogwood
Cornus florida



Common Crape Myrtle
Lagerstroemia indica



Japanese Crape Myrtle
Lagerstroemia fauriei



Chaste Tree
Vitex agnus-castus



Callery Pear
Pyrus calleryana



Red Buckeye
Aesculus pavia



Texas Buckeye
Aesculus glabra



Mexican Buckeye
Lingnania speciosa



Banana Shrub
Mitchella repens

II. Species Inventory 29. Trees

Trees of Spring, Texas

Plant List

Scientific Name	Common Name	Erosion Index	Wildlife Index
<i>Fagus grandifolia</i>	American Beech	Good	Good
<i>Fraxinus pennsylvanica</i>	Green Ash	Fair	Fair
<i>Fraxinus americana</i>	White Ash	Good	Good
<i>Taxodium distichum</i>	Bald Cypress	Good	Good
<i>Nyssa sylvatica</i>	Blackgum	Good	Excellent
<i>Ulmus alata</i>	Winged Elm	Excellent	Good
<i>Populus deltoides</i>	Cottonwood	Excellent	Good
<i>Acer grandidentatum</i>	Big-tooth Maple	Good	Fair
<i>Juglans nigra</i>	Eastern Black Walnut	Excellent	Good
<i>Ulmus americana</i>	American Elm	Good	Good
<i>Ulmus crassifolia</i>	Cedar Elm	Good	Fair
<i>Salix nigra</i>	Black Willow	Excellent	Fair
<i>Tilia spp.</i>	Lindens	Good	Fair
<i>Quercus shumardii</i>	Shumard Oak	Good	Excellent
<i>Quercus buckleyi</i>	Texas Red Oak	Fair	Good
<i>Quercus nigra</i>	Water Oak	Excellent	Excellent
<i>Quercus phellos</i>	Willow Oak	Good	Excellent
<i>Quercus macrocarpa</i>	Bur Oak	Good	Excellent
<i>Quercus alba</i>	White Oak	Excellent	Excellent
<i>Quercus virginiana</i>	Live Oak	Good	Good
<i>Carya illinoensis</i>	Pecan	Excellent	Excellent
<i>Quercus stellata</i>	Post Oak	Good	Good
<i>Pinus taeda</i>	Loblolly Pine	Excellent	Good
<i>Juniperus ashei</i>	Ashe Juniper	Excellent	Good
<i>Juniperus virginiana</i>	Eastern Red Cedar	Excellent	Good
<i>Liquidambar styraciflua</i>	Sweetgum	Good	Good
<i>Platanus occidentalis</i>	American Sycamore	Good	Fair
<i>Quercus falcata</i>	Southern Red Oak	Good	Excellent
<i>Ilex opaca</i>	American Holly	Excellent	Excellent
<i>Eburtia canescens</i>	Anise	Excellent	Excellent
<i>Prunus serotina</i>	Black Cherry	Excellent	Good
<i>Magnolia grandiflora</i>	Southern Magnolia	Good	Good
<i>Rhamnus caroliniana</i>	Carolina Buckthorn	Good	Good
<i>Acer rubrum</i>	Red Maple	Good	Good
<i>Chiropetalum tigrinum</i>	Desert Willow	Excellent	Fair
<i>Prunus virginiana</i>	Common Chokecherry	Excellent	Excellent

Scientific Name	Common Name	Erosion Index	Wildlife Index
<i>Diospyros texana</i>	Texas Persimmon	Excellent	Good
<i>Myrce ciliifera</i>	Southern Waxmyrtle (Bayberry)	Excellent	Excellent
<i>Magnolia grandiflora</i>	Southern Magnolia	Good	Good
<i>Viburnum rufidulum</i>	Rusty Blackhaw	Excellent	Excellent
<i>Cercis canadensis</i>	Redbud	Fair	Fair
<i>Sophora affinis</i>	Necklace Tree	Fair	Fair
<i>Sophora secundiflora</i>	Texas Mountain Laurel	Low	Low
<i>Prunus mexicana</i>	Mexican Plum	Good	Good
<i>Cordia boissieri</i>	Mexican Olive	Fair	Fair
<i>Pithecellobium aculeata</i>	Jerusalem Thorn	Low	Low
<i>Crataegus marshallii</i>	Parsley Hawthorn	Good	Good
<i>Crataegus opaca</i>	Mayhaw	Good	Fair
<i>Koelreuteria bipinnata</i>	Golden Rain Tree	Fair	Fair
<i>Chionanthus virginicus</i>	Fringe Tree	Good	Good
<i>Vaccinium arboreum</i>	Fairleberry	Excellent	Good
<i>Cornus florida</i>	Dogwood	Good	Excellent
<i>Lagerstroemia indica</i>	Common Crape Myrtle	Good	Good
<i>Lagerstroemia fauriei</i>	Japanese Crape Myrtle	Good	Good
<i>Vitex agnus-castus</i>	Chaste Tree	Good	Fair
<i>Pyrus calleryana</i>	Callery Pear	Good	Excellent
<i>Aesculus pavia</i>	Red Buckeye	Good	Good
<i>Aesculus glabra</i>	Texas Buckeye	Good	Good
<i>Uncaria speciosa</i>	Mexican Buckeye	Low	Low
<i>Michelia figo</i>	Banana Shrub	Good	Low
<i>Bauhinia congesta</i>	Anacacho Orchid Tree	Low	Low
<i>Acacia farnesiana</i>	Huisache	Good	Excellent
<i>Acacia berlandieri</i>	Berlandier's Acacia	Good	Good
<i>Ilex vomitoria</i>	Yaupon	Excellent	Excellent
<i>Sapindus drummondii</i>	Western Soapberry	Fair	Low
<i>Sassafras albidum</i>	Sassafras	Excellent	Good
<i>Betula nigra</i>	River Birch	Good	Fair
<i>Persea borbonia</i>	Red Bay	Fair	Fair
<i>Asimina triloba</i>	Pawpaw	Excellent	Good
<i>Prosopis juliflora</i>	Mesquite	Good	Good
<i>Rhus copallina</i>	Flameleaf Sumac	Good	Good
<i>Zanthoxylum fagara</i>	Lime Prickly-Ash	Low	Low

II. Species Inventory 30. Fish

Fish of Spring, Texas

Game Species



Red Shiner,
Cyprinella lutrensis

Spotted Gar,
Lepisosteus oculatus

Warmouth
Lepomis gulosus

Carp,
Cyprinus sp.

Alligator Gar,
Atractosteus spatula

Freshwater drum,
Aplodinotus grunniens

II. Species Inventory 31. Fish

Fish of Spring, Texas

Non Game Species of Spring, TX



American eel,
Anguilla rostrata



Creek chubsucker,
Emyzon oblongus



Smalltooth sawfish,
Pristis pectinata

Non Game Species of General TX



Comanche Springs Pupfish,
Cyprinodon elegans

Comanche Springs pupfish habitat requires flowing water from desert springs. Now they are found only in the springs near Balmorhea. These pupfish are endangered because many of the large springs in west Texas are drying up. A desert oasis has been built near Balmorhea to provide habitat for the fish.



Pecos Pupfish,
Cyprinodon pecosensis

Pecos Pupfish originally Pecos River basin, presently restricted to upper basin only; shallow margins of clear, vegetated spring waters high in calcium carbonate, as well as in sinkhole habitats.



Conchos Pupfish,
Cyprinodon eximus

Conchos Pupfish habitat in place like Rio Grande and Devils River basins; sloughs, backwaters, and margins of larger streams, channels of creeks, and mouths.



Proserpine Shiner,
Cyprinella proserpina

Rio Grande and Pecos River basins; rocky runs and pools of creeks and small rivers.



Sharpnose Shiner,
Notropis oxyrhynchus

endemic to Brazos River drainage; also, apparently introduced into adjacent Colorado River drainage; large turbid river, with bottom a combination of sand, gravel, and clay-mud.



Smalleye Shiner,
Notropis buccula

endemic to upper Brazos River system and its tributaries (Clear Fork and Bosque); apparently introduced into adjacent Colorado River drainage; medium to large prairie streams with sandy substrate and turbid to clear warm water; presumably eats small aquatic invertebrates.



Devils River Minnow,
Dionda diabolii

rocky runs and flowing pools originally of Devils River and nearby San Felipe, Sycamore, Pinto and Las Moras creeks; spawns in late spring and summer

II. Species Inventory 32. Dragonflies

Dragonflies of Spring, Texas

Skimmers



Red-tailed Pennant
Brachymesia furcata



Blue-faced Ring Tail
Erpetogomphus eutainia



Eastern Pondhawk
Erythemis simplicicollis



Yellow-sided Skimmer
Libellula flavida



Western Meadowhawk
Sympetrum semicinctum



Eastern Pondhawk
Erythemis simplicicollis



Halloween Pennant
Celithemis eponina



Bleached Skimmer
Libellula composita



Skimming Bluet
Enallagma geminatum



Blue Dasher
Pachydiplos longipennis

Pond Damselfs



Desert firetail
Telebasis salva



Springwater Dancer
Argia plana



Fiery-eyed Dancer
Argia oenea



Burgundy Bluet
Enallagma geminatum

II. Species Inventory 33. Dragonflies

Dragonflies of Spring, Texas

Darners, Spreadwing, Baskettail, Dragonlet, Emerald, Threadtail, Dragonhunter.



Common Green Darner
Anax junius



Argia ornaticeps



Great Spreadwing
Archilestes grandis



Elegant spreadwing
Leistes inaequalis



Dragonhunter
Hagenius brevistylus



Coral-fronted Threadtail
Neoneura aaroni



Common Baskettail
Epitheca cynosura



Red-faced Dragonlet
Erythrodiplax fusca



Texas Emerald
Somatochlora margarita

III. Landscape and Land Use Planning - Site #5

The Road and Property Map of Site 5

Site Location Map



Site 5

Map N.T.S. N

Site Context Map

Site Area: 130.36 ac

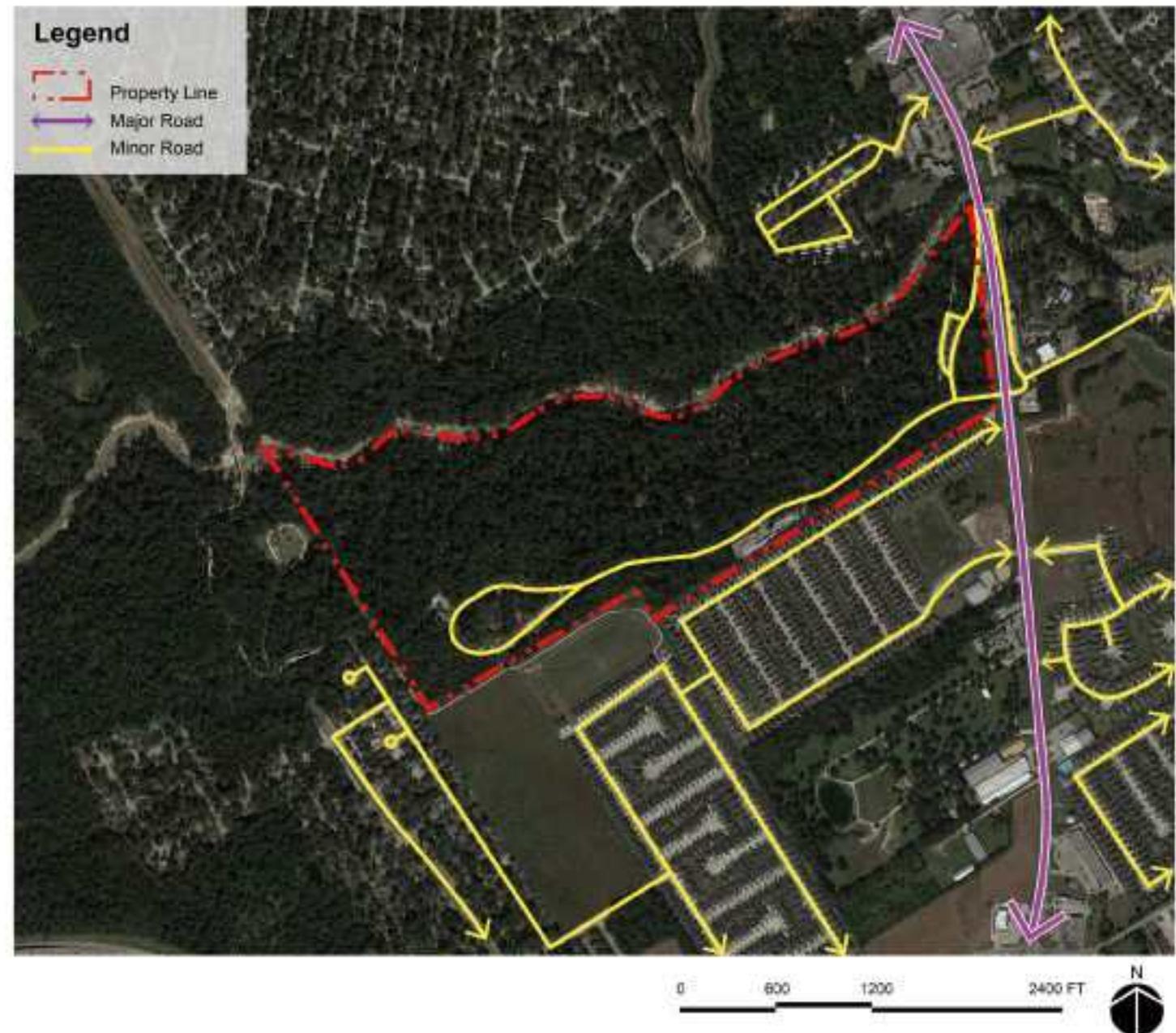


Map N.T.S. N

The Road and Property Map

Legend

- Property Line
- Major Road
- Minor Road



III. Landscape and Land Use Planning - Site #5

Adjacent Land Use Map of Site 5

Site #5



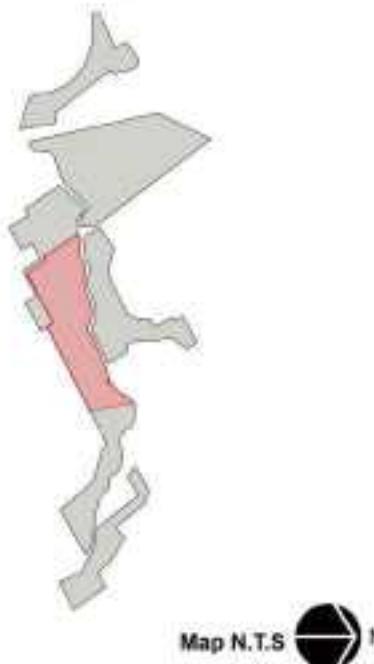
Legend

- Property Line
- Residential
- Water
- Agriculture
- Vacant
- Commercial

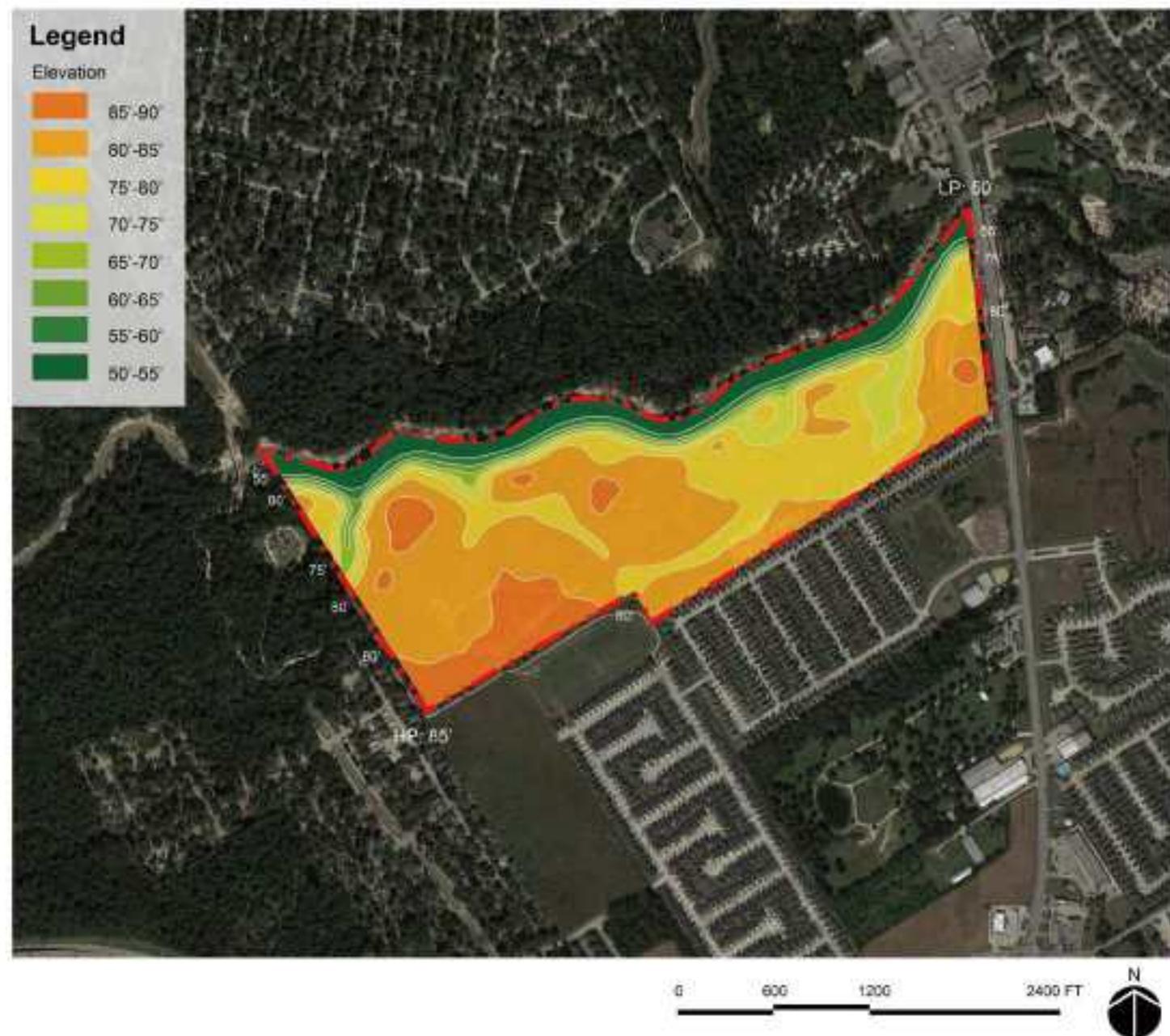
III. Landscape and Land Use Planning - Site #5

The Elevation Map of Site 5

Site Location Map



The Elevation Zones Map



Site Context Map

Site Area: 130.36 ac

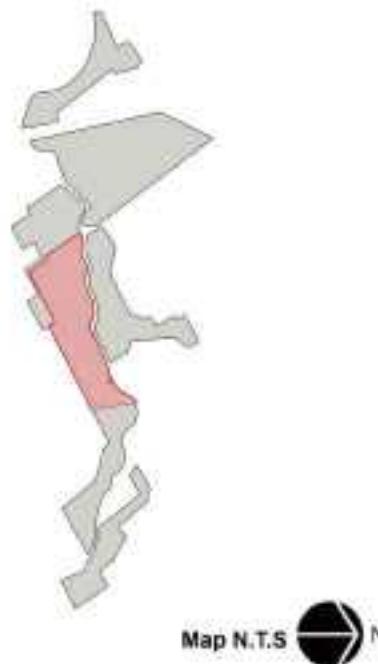


Source: Google Earth Pro

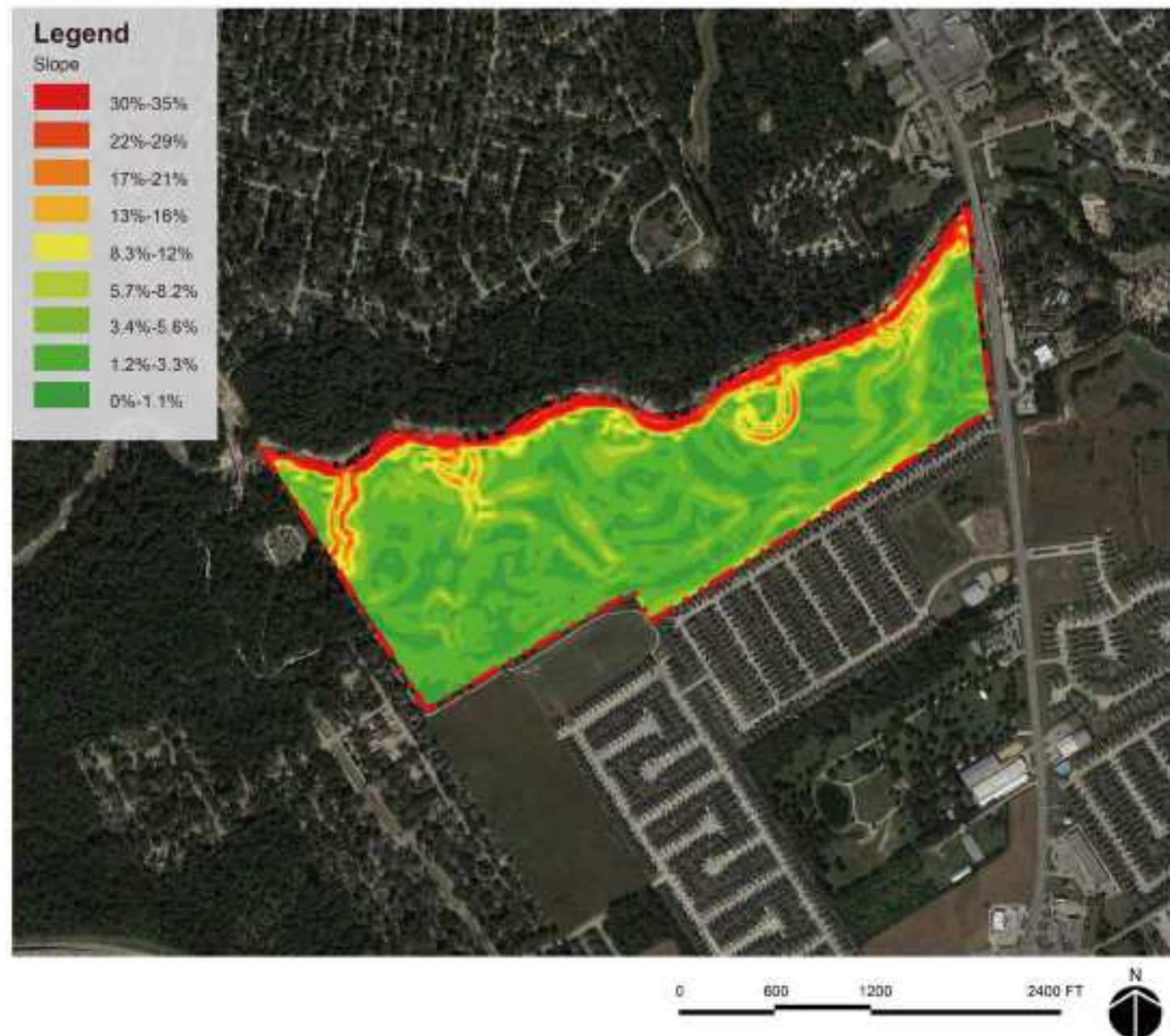
III. Landscape and Land Use Planning - Site #5

The Slope Analysis Map of Site 5

Site Location Map



The Slope Analysis Map



Site Context Map

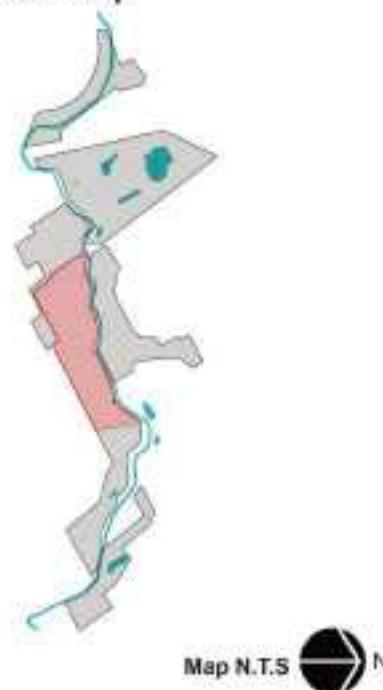
Site Area: 130.36 ac



III. Landscape and Land Use Planning - Site #5

The Drainage Map of Site 5

Site Location Map



The Drainage Map



Site Context Map

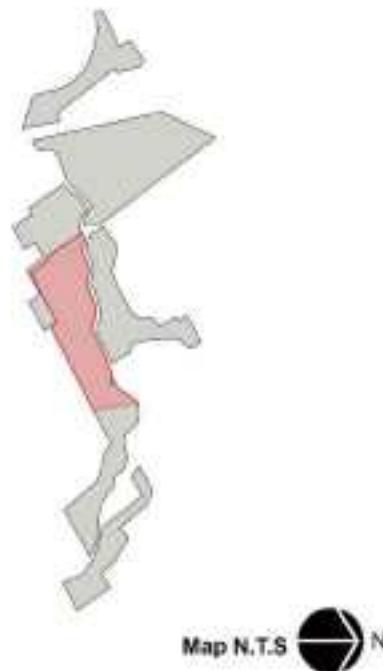
Site Area: 130.36 ac



III. Landscape and Land Use Planning - Site #5

Canopy Coverage Map of Site 5

Site Location Map



The Canopy Coverage Map



III. Landscape and Land Use Planning - Site #5

NRCS Soil Data Map of Site 5

Soil Taxonomy Classification

Map unit symbol

HatA

Map unit name

Hatliff-Pluck-Kian complex, 0 to 1 percent slopes

Rating

Flood plains, frequently flooded; somewhat soil erosion; poorly drained but high infiltration rate; high potential for compaction

Map unit symbol

Ge

Map unit name

Gessner fine sandy loam, 0 to 1 percent slopes

Rating

Depressions landform, occasionally ponded; somewhat soil erosion; poorly drained and slow infiltration rate; medium potential for compaction

Map unit symbol

Cd

Map unit name

Clodine fine sandy loam, 0 to 1 percent slopes

Rating

Flat landform; somewhat soil erosion; somewhat poorly drained and slow infiltration rate; medium potential for compaction

NRCS Site Soil Map





Big Lake on-site

Part 4. Outcomes & Conclusions

Sustainable Wildlife Habitat Comprehensive Master Plan
Spring, Texas

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I. Habitat Prototype Designs

Song Bird



Nectar/ Pollinator Sites



Deer Habitat



Small Mammal



I. Song Bird

Introduction

Song Bird Habitat

Song Bird habitats refer to areas that will provide food, water if possible, cover, shelter for avoiding predators throughout the year and for rearing young during the breeding season, and appropriate nest sites.

Habitat Requirements

Cover: The majority of songbirds nest in shrubtype vegetation. Others nest in tree cavities, in steep banks and cliffs, abandoned woodpecker holes, and on bare ground.



Food Source: Most fruits, seeds, and insects, along with small animal life, are consumed by songbirds.



Water: Open water provides a highly diverse habitat for a wide variety of birds. A bathing area should be no more than 2 to 3 inches deep with a relatively hard bottom.



Forest Patches

Food Source

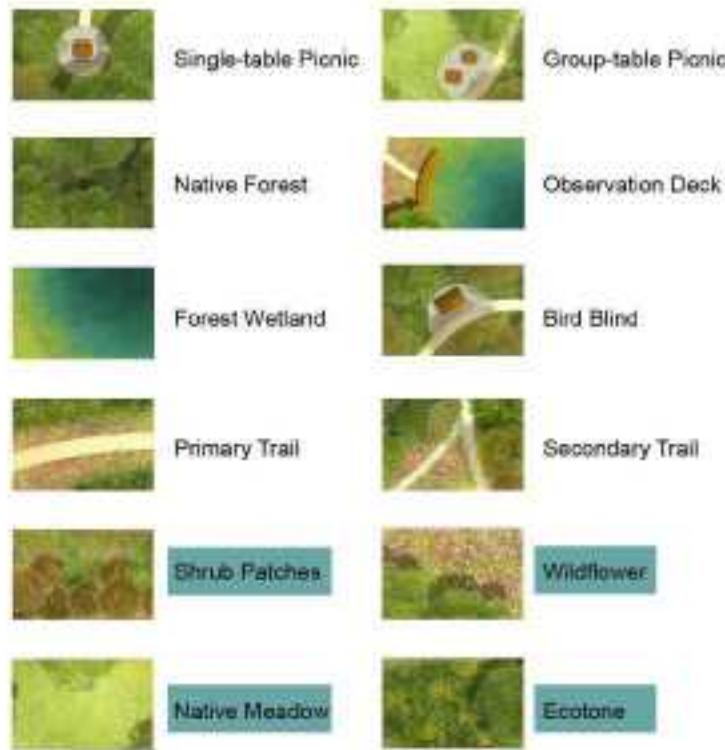
Open Water

I. Song Bird

Site Selection Sub-site #5-1

Master Plan, Zoom in, 1 Acre

Legend



Existing Site



Index Map



I. Song Bird

Special Features



Red Maple
Acer rubrum



Bald Cypress
Taxodium distichum



American Beautyberry
Callicarpa americana



Live Oak
Quercus virginiana



Yaupon Holly
Ilex vomitoria

I. Song Bird

Plant List

Forest Patches

Tree	Fruit Season	
Bald Cypress (<i>Taxodium distichum</i>)	Fall	2
Red Maple (<i>Acer rubrum</i>)	Late Fall	5
Eastern Redbud (<i>Cercis canadensis</i>)	Late Summer	1
Southern Wax-Myrtle (<i>Myrica cerifera</i>)	Summer to Winter	1
Longleaf Pine (<i>Pinus palustris</i>)	Summer to Winter	5
Sweet Bay Magnolia (<i>Magnolia virginiana</i>)	Fall	1
Mexican Buckeye (<i>Liquidambar styraciflua</i>)	Fall	4
Live Oak (<i>Quercus virginiana</i>)	Summer to Fall	3
Texas Red Oak (<i>Quercus rubra</i>)	Summer to Fall	3
American Beech (<i>Fagus grandifolia</i>)	Fall	3

Shrub	Fruit Season	
American Beautyberry (<i>Callicarpa americana</i>)	Fall to Winter	1
Yaupon Holly (<i>Ilex vomitoria</i>)	Fall	1
Sweetspire (<i>Iva virginica</i>)	Fall	1
Coral Bean (<i>Erythrina herbacea</i>)	Fall to Winter	1
Indian Pink (<i>Spigelia marilandica</i>)	Late Summer	1
Texas Mountain Laurel (<i>Sophora secundiflora</i>)	Late Spring	5
Oakleaf Hydrangea (<i>Hydrangea quercifolia</i>)	Summer to Fall	6
Common Viburnum (<i>Viburnum dentatum</i>)	Fall to Spring	3

Ferb	Fruit Season	
Cardinal Flower (<i>Lobelia cardinalis</i>)	Fall	4
Standing Cypress (<i>Ipomoea rubra</i>)	Spring to Summer	4



Wetland

Tree	
River Birch (<i>Betula nigra</i>)	7
Water Oak (<i>Quercus nigra</i>)	3
Shumard Oak (<i>Quercus shumardii</i>)	1
Black Willow (<i>Salix nigra</i>)	7
White Poplar (<i>Populus alba</i>)	7
Bald Cypress (<i>Taxodium distichum</i>)	3

Shrub	
Swamp Cyrilla (<i>Cyrilla racemiflora</i>)	1
Swamp Azalea (<i>Rhododendron viscosum</i>)	1
Prairie Iris (<i>Iris pseudacorus</i>)	1

Fern	
Water Horsetail (<i>Equisetum fluviatile</i>)	9
Maidenhair Fern (<i>Adiantum pedatum</i>)	4

Forb	
Eastern Purple Coneflower (<i>Echinacea purpurea</i>)	8
White Avens (<i>Geum canadense</i>)	8
Spotted Beebalm (<i>Monarda punctata</i>)	8



Native Meadow & Wildflower

Tree	
Southern Magnolia (<i>Magnolia grandiflora</i>)	1
Texas Redbud (<i>Cercis canadensis</i> var. <i>texensis</i>)	3
Japanese Maple (<i>Acer palmatum</i>)	1
Texas Ebony (<i>Ebenopsis ebano</i>)	1
Sassafras (<i>Sassafras albidum</i>)	4
Green Ash (<i>Fraxinus pennsylvanica</i>)	4
American Sweetgum (<i>Liquidambar styraciflua</i>)	1
Shortleaf Pine (<i>Pinus echinata</i>)	6
Cherry-laurel (<i>Prunus caroliniana</i>)	3
Bur Oak (<i>Quercus macrocarpa</i>)	3
White Fringetree (<i>Chionanthus virginicus</i>)	6

Shrub	
Texas Azalea (<i>Rhododendron texanum</i>)	2
Fragrant Sumac (<i>Rhus aromatica</i>)	6
Coralberry (<i>Symplocarpus orbiculatus</i>)	6
Texas Sage (<i>Leucophyllum frutescens</i>)	4
Possumhaw (<i>Ilex decidua</i>)	1
American Beautyberry (<i>Callicarpa americana</i>)	1
Parsley Hawthorn (<i>Crataegus macrosperma</i>)	1
Calliandra (<i>Calliandra calothyrsus</i>)	2
Carnellia (<i>Cornelia japonica</i>)	1
Wild Crapemyrtle (<i>Maclura glabra</i>)	4
Texas Bluebonnet (<i>Lupinus subcarnosus</i>)	1

Groundcover	
Texas Windmill Grass (<i>Chloris texensis</i>)	5
Bushy Bluestem (<i>Andropogon glomeratus</i>)	2
Switchgrass (<i>Panicum virgatum</i>)	2
Broomsedge (<i>Andropogon virginicus</i>)	2

I. Nectar/ Pollinator Sites

Introduction

Nectar Patches

A mix of flowering native plants which produce nectar as a mean of attracting potential pollinators such as insects and birds.



Plant Selection Criteria

**A standard nectar garden includes a mix of annuals, perennials, herbs, shrubs and trees.
Different pollinators have specific tendencies for flowering plants**

Butterflies: Prefer red, orange, pink and yellow trumpet-shaped flowers.



Honeybees: Prefer yellow, white, blue and purple daisy-like flowers



Hummingbirds: Prefer red, orange, yellow, and purple trumpet-shaped flowers.

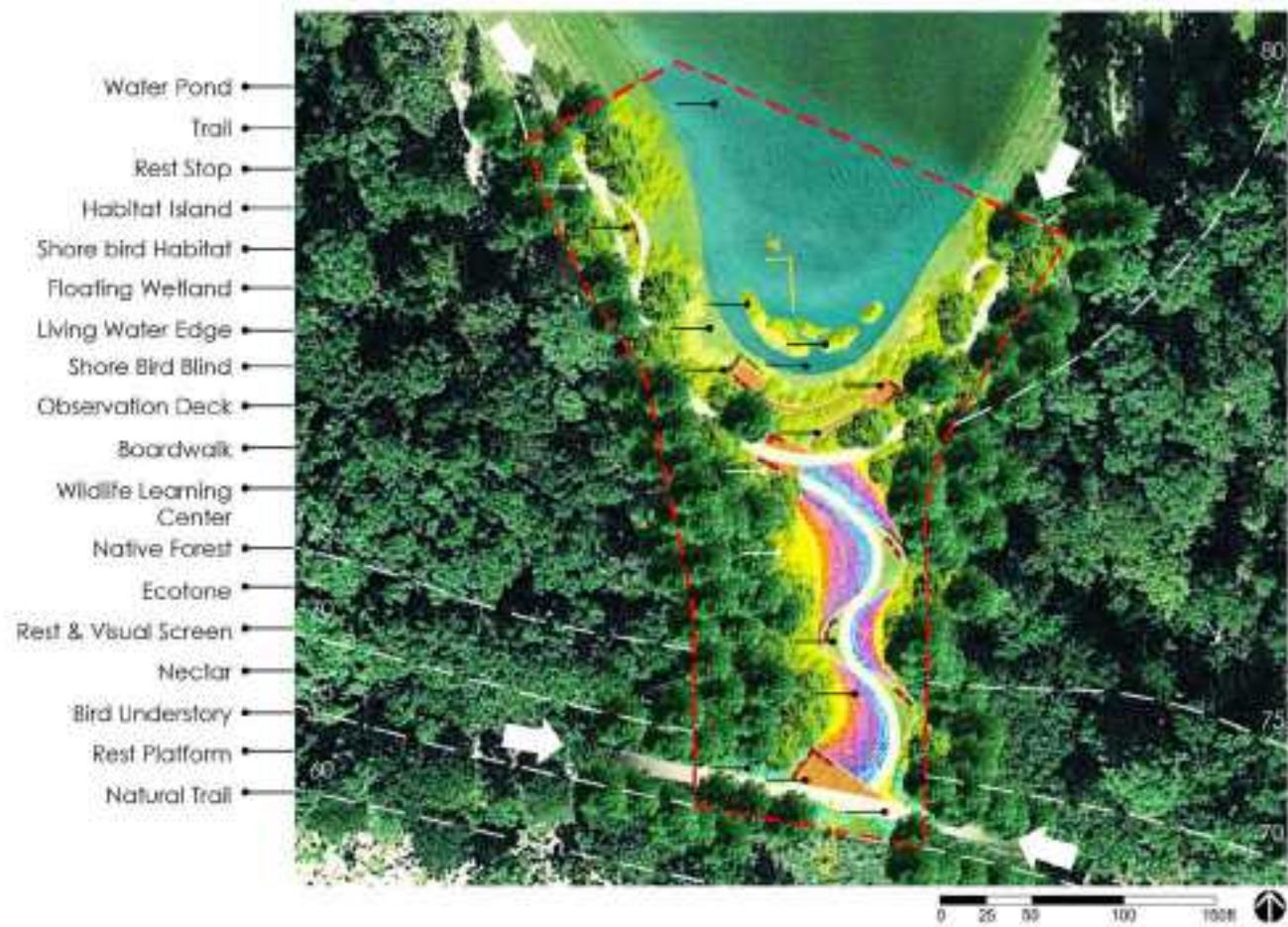
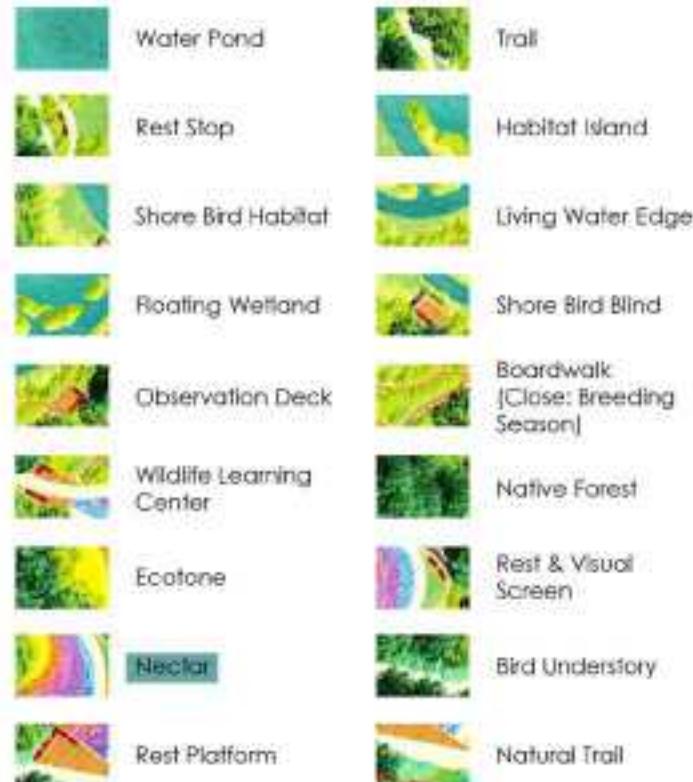


I. Nectar/ Pollinator Sites

Site Selection Sub-site #1-1

Master Plan, Zoom in, 1 Acre

Legend



Existing Site



10 Acre Site

NTS

Index Map



10 Acre Site

NTS



1 Acre Site

NTS

I. Nectar/ Pollinator Sites

Special Features



Legend

1&7. Natural Trail
2&5. Rest Platform
3. Bird Understory

4&6&8. Nectar
9. Trail
10. Shore Bird Habitat

11. Shore Bird Blind
12. Habitat Island
13. Floating Wetland

14. Water Pond

N.T.S



Bluebonnet
Lupinus texensis



Mist flower
Ageratum houstonianum



Phlox
Phlox spp.



Mexican milkweed
Asclepias curassavica



Coneflower
Echinacea purpurea

I. Nectar/ Pollinator Sites

Plant List

Shore Bird Habitat

Forbs	Hydric Zone	Value
Pimroses/ <i>Ludwigia</i> spp.	Emergent	Food/ brood
Pondweed/ <i>Potamogeton</i> spp.	Emergent/ Submerging	Food/ seed
Inswamp milkweed/ <i>Asclepias incarnata</i>	Toe slope	Cover
Smartweed/ <i>Polygonum</i> spp.	Toe slope/ emergent	Food (invertebrate)
Grasses	Hydric Zone	Value
Spikerush/ <i>Eleocharis</i> spp.	Toe slope/ Emergent	Food/ seed
Sedge/ <i>Carex</i> spp.	Upper/ Middle/ Toe	Cover/ food
Shrubs	Hydric Zone	Value
Buttonbush/ <i>Cephalanthus occidentalis</i>	Toe slope/ Emergent	Cover/ food
Trees	Hydric Zone	Value
Black willow/ <i>Salix nigra</i>	Toe slope/ Emergent	Food/ screen
Sugberry/ <i>Celtis laevigata</i>	Upper/ Middle/ Toe	Food (fruit)

Visual Screen

Vines	Color	Wildlife
Cat's claw vine/ <i>Mastostachys unguis-cati</i>	Yellow	🦋 🦋
Orange jubilee/ <i>Fecoma</i> x hybrid	Orange	🦋 🦋
Cypress vine/ <i>Ipomoea quamoclit</i>	Red	🦋
Passionflower/ <i>Passiflora incarnata</i>	White, purple	🦋

Nectar Habitat

Nectar Plants	Color	Season	Wildlife
Bluebonnet/ <i>Lupinus texensis</i>	Blue	Spring	🦋 🦋
Mist flower/ <i>Ageratum houstonianum</i>	Blue	Summer/ fall	🦋
Heliotrope/ <i>Heliotropium arborescens</i>	Blue	Summer/ fall/ winter	🦋
Phlox/ <i>Phlox</i> spp.	Purple	Spring	🦋
Verbena/ <i>Verbena</i> spp.	Purple	Summer	🦋
Aster/ <i>Aster</i> spp.	Purple	Summer/ fall	🦋
Bee balm/ <i>Monarda</i> spp.	Red/ pink	Summer	🦋 🦋
Redbane/ <i>Eryngium</i> spp.	Pink/ yellow	Spring/ summer	🦋
Coneflower/ <i>Echinacea purpurea</i>	Pink	Summer	🦋 🦋
Pink candle celosia/ <i>Celosia argentea</i>	Pink	Summer/ fall	🦋
Mexican milkweed/ <i>Asclepias curassavica</i>	Orange	Summer/ fall	🦋 🦋
Cosmos/ <i>Cosmos bipinnatus</i>	Orange/ yellow	Summer/ fall	🦋
Coreopsis/ <i>Coreopsis</i> spp.	Yellow	Spring/ fall/ summer	🦋
Yarrow/ <i>Achillea millefolium</i>	Yellow	Spring/ summer	🦋
Goldenrod/ <i>Solidago</i> spp.	Yellow	Summer/ fall	🦋
Lantana/ <i>Lantana camara</i>	Yellow/ orange	Summer	🦋
Dahlberg daisy/ <i>Thymophyllum tenuiloba</i>	Yellow	Summer/ fall	🦋

Song Bird Habitat & Ecotone

Trees	Value	Wildlife
White ash/ <i>Fraxinus americana</i>	Seed	🦋
Bur oak/ <i>Quercus alba</i>	Seed	🦋
Cedar elm/ <i>Ulmus crassifolia</i>	Seed	🦋
Pecan/ <i>Carya illinoiensis</i>	Nut/ seed	🐦 🐦
Shumard oak/ <i>Quercus shumardii</i>	Nut/ seed	🐦 🐦
Shrubs	Value	Wildlife
American beautyberry/ <i>Callicarpa americana</i>	Fruit	🐦 🐦
Cherry laurel/ <i>Prunus caroliniana</i>	Fruit	🐦 🐦
Dwarf chinese holly/ <i>Ilex cornuta</i>	Fruit	🐦 🐦
Possumhaw/ <i>Ilex decidua</i>	Fruit	🐦 🐦
Yaupon holly/ <i>Ilex vomitoria</i>	Fruit	🐦 🐦
Grasses	Value	Wildlife
Indiangrass/ <i>Sorghastrum nutans</i>	Seed	🐦
Switchgrass/ <i>Panicum virgatum</i>	Seed	🐦
Little bluestem/ <i>Schizachyrium scoparium</i>	Seed	🐦
Vines	Value	Wildlife
Pepper vine/ <i>Ampelopsis arborea</i>	Fruit	🐦 🐦
Blackberries/ <i>Rubus</i> spp.	Fruit	🐦 🐦

I. Deer Habitat

Introduction

Population Characteristics

White-tailed deer are primarily browsers, feeding on browse (tips of leaves, twigs, and woody vines), forbs (weeds and wildflowers), and to a lesser extent on mushrooms, lichens, sedges, and native grasses. More variety of vegetation available for deer normally results in a healthier population. Fawn production and survival of fawns is heavily dependent on does having a high nutrition diet (16%+ protein) to provide a plentiful supply of rich milk for nursing fawns. A healthy deer population should average at least a 70% fawn crop (7 surviving fawns per 10 does - in October).



Deer Population

Generally the Post Oak Savannah Bottomland habitat will support over the entire year about one deer per 10 acres, and upland habitat about one deer per 25 acres.



Food Plot Design and Establishment

Food plots specifically for deer should be planted at typical forage-production rates in large blocks. Just like any agricultural crop, seedbed preparation and correct fertilization is essential for the successful establishment of any food plot for deer.

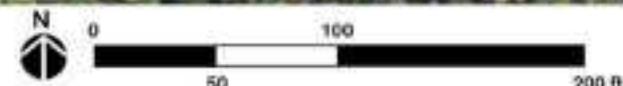
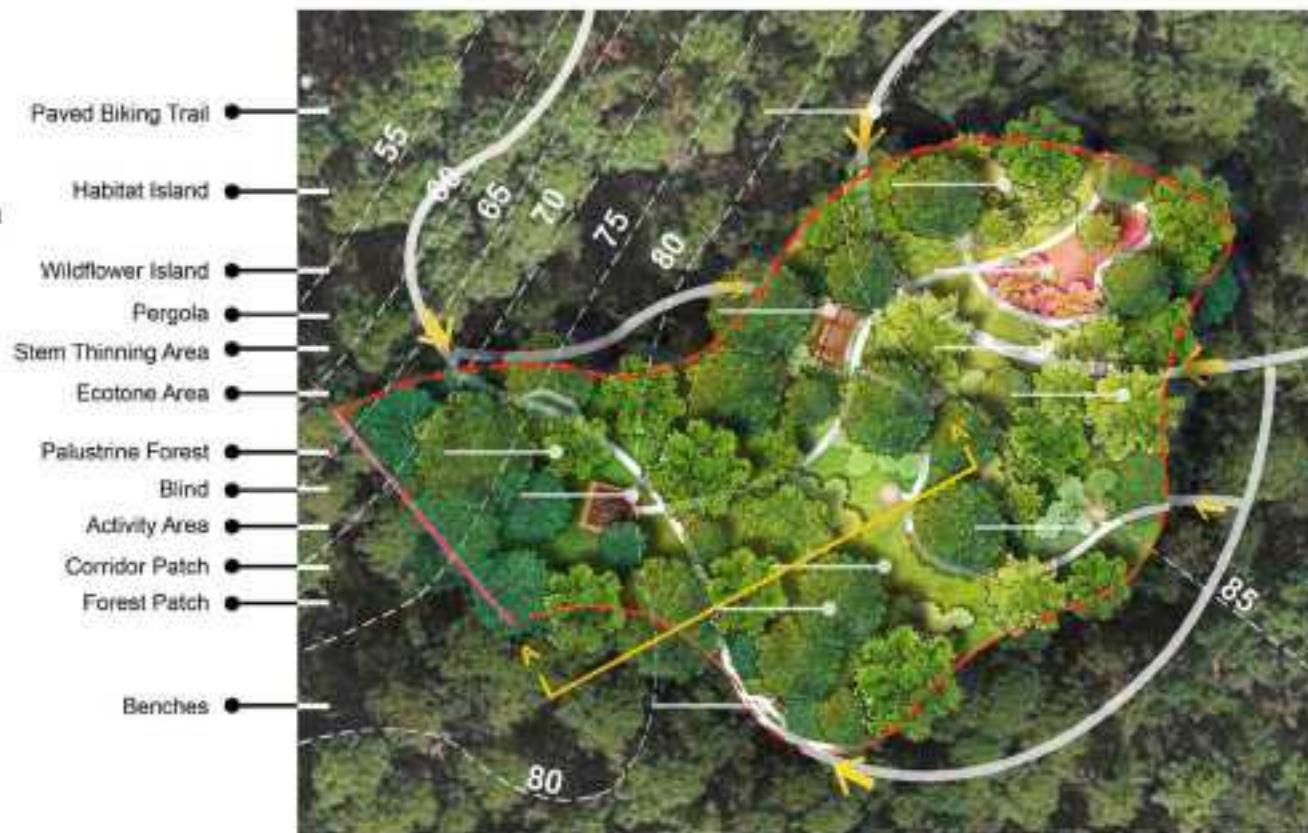


I. Deer Habitat

Site Selection Sub-site #4-2

Master Plan, Zoom in, 1 Acre

Legend



Existing Site



- Existing Contour
- Existing Forest
- 1 Acre Site Boundary



Index Map



Site location - 10 acre Site

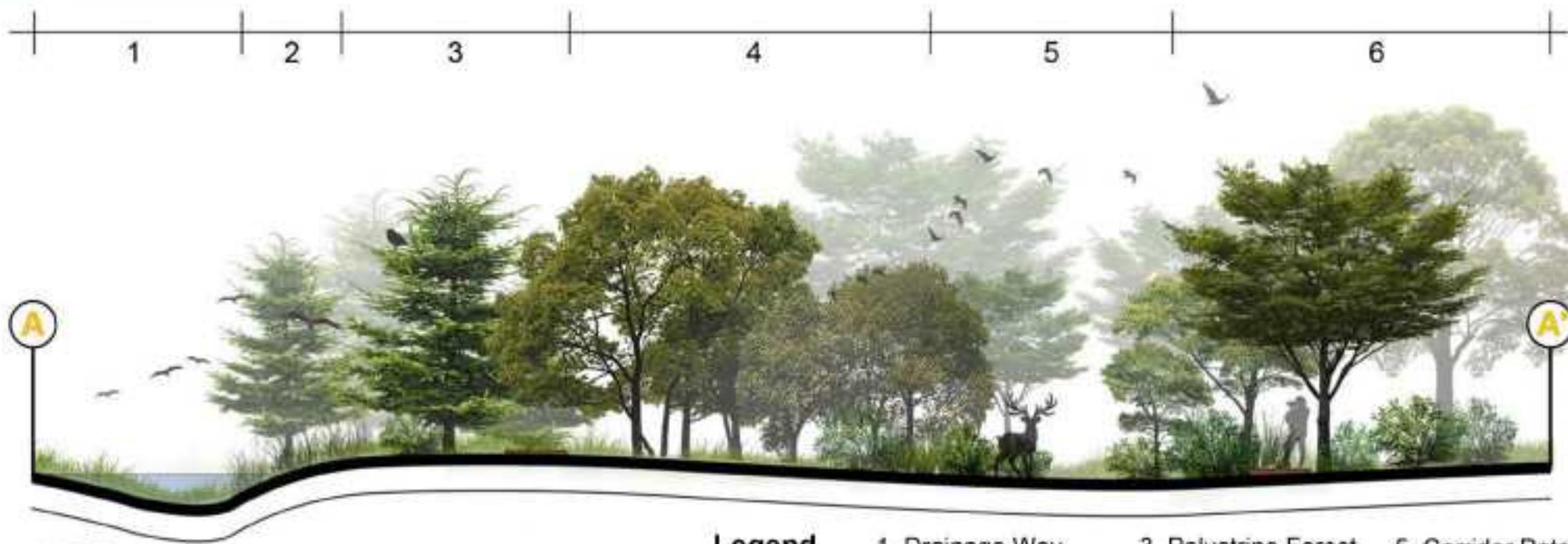


Site location - 1 acre site



I. Deer Habitat

Special Features



N.T.S

Legend

- 1. Drainage Way
- 2. Bank Stabilization
- 3. Palustrine Forest
- 4. Forest Patch
- 5. Corridor Patch
- 6. Ecotone



Beauty Berry
Callicarpa americana



Sugar Hackberry
Celtis laevigata



Granjeno
Celtis pallida



Cedar Elm
Ulmus crassifolia



Huisache
Acacia farnesiana

I. Deer Habitat

Plant List, Zoom In, 1 Acre

Habitat Island

Tree	Fruit Season	
American Beech (<i>Fagus grandifolia</i>)	Fall to Winter	1
Callery Pear (<i>Pyrus calleryana</i>)	Summer to Fall	3
Huisache (<i>Acacia farnesiana</i>)	Late Winter to Early Spring	2
Yaupon (<i>Ilex vomitoria</i>)	Spring	1
Shumard Oak (<i>Quercus shumardii</i>)	Fall to Winter	1
Ashe Juniper (<i>Juniperus ashei</i>)	Fall	4
Blackgum (<i>Nyssa sylvatica</i>)	Summer	3
American Elm (<i>Ulmus americana</i>)	Summer	3

Shrub	Fruit Season	
Rose of Sharon (<i>Hibiscus syriacus</i>)	Fall to Winter	4
Nandina (<i>Nandina domestica</i>)	Late Autumn to Winter	3
Waxleaf Ligustrum (<i>Ligustrum japonicum</i>)	Early Winter	3
Forsythia (<i>Forsythia intermedia</i>)	Early Summer to Fall	5
Camellia (<i>Camellia sasanqua</i>)	Summer to early Spring	3
Thorny Elaeagnus (<i>Elaeagnus pungens</i>)	Spring	5
Texas Sage (<i>Leucophyllum frutescens</i>)	Summer and Fall	1
Possumhaw (<i>Ilex decidua</i>)	Fall to Spring	1

Vine	Fruit Season	
Blackberries (<i>Rubus spp.</i>)	Various Seasons	4
Creeping Fig (<i>Ficus pumila</i>)	Spring to Late Summer	6



Palustrine Forest

Tree		
Cottonwood (<i>Populus deltoides</i>)	7	
Water Oak (<i>Quercus nigra</i>)	7	
Loblolly Pine (<i>Pinus taeda</i>)	7	
Texas Persimmon (<i>Diospyros texana</i>)	7	
Southern Waxmyrtle (<i>Myrica cerifera</i>)	3	

Shrub		
American Beautyberry (<i>Celtis occidentalis</i>)	3	
Common Buttonbush (<i>Cephaelanthus occidentalis</i>)	7	
Tea Rose (<i>Rosa odorata</i>)	7	
Green Pittosporum (<i>Pittosporum tobira</i>)	8	

Wetland Plants		
Virginia sweetspire (<i>Itea virginica</i>)	1	
Thin-fruit sedge (<i>Carex flaccosperma</i>)	3	
Horsetail (<i>Equisetum hyemale</i>)	3	

Ferb		
Spotted Beebalm (<i>Monarda punctata</i>)	7	
Walter's Violet (<i>Viola walteri</i>)	7	
White Avens (<i>Geum canadense</i>)	7	
Cardinal flower (<i>Lobelia cardinalis</i>)	3	



Ecotone Area & Wildflower Garden

Tree		
Fringe Tree (<i>Chionanthus virginicus</i>)	3	
Common Crape Myrtle (<i>Lagerstroemia indica</i>)	8	
Texas Buckeye (<i>Aesculus pavia</i>)	1	
Yaupon (<i>Ilex vomitoria</i>)	1	
Flameleaf Sumac (<i>Rhus copallina</i>)	7	
American Holly (<i>Ilex opaca</i>)	3	
White Oak (<i>Quercus alba</i>)	3	
Eastern Red Cedar (<i>Juniperus virginiana</i>)	3	
Chaste Tree (<i>Vitex agnus-castus</i>)	3	

Shrub		
Cherry Laurel (<i>Prunus caroliniana</i>)	1	
Cleander (<i>Nerium oleander</i>)	3	
Pomegranate (<i>Punica granatum</i>)	3	
Littleleaf Boxwood (<i>Buxus microphylla</i>)	4	
Chinese Juniper (<i>Juniperus chinensis</i>)	4	
Firecracker (<i>Jatropha integerrima</i>)	4	
Spiraea (<i>Spiraea japonica</i>)	3	
Chinese Fringe Flower (<i>Loropetalum chinense</i>)	3	
Texas Sage (<i>Leucophyllum frutescens</i>)	1	

Groundcover		
Big Bluestem (<i>Andropogon gerardii</i>)	7	
Coralberry (<i>Symporicarps orbiculatus</i>)	3	
Frogfruit (<i>Phyla incisa</i>)	7	
Sweet William (<i>Dianthus barbatus</i>)	3	
Indian Blanket (<i>Gaillardia pulchella</i>)	7	

https://commons.wikimedia.org/wiki/File:Callery_pear_3.jpg
<http://www.turn-it-tropical.co.uk/product/nandina-domestica-for-sale.html>
<http://fieldbioticlife.blogspot.com/2014/03/carex-sedges-part-1-big-and-showy.html>

I. Small Mammal

Introduction

Purpose of Mammal Designed Habitats

The purpose of this design is to faithfully replicate the natural environment of the species in order for it to thrive and be included in a balanced and diverse ecosystem within the Timber Lane Utility District.



Designing habitats for mammals within the Timber Lane Utility District requires considerations for the animal species and visitors. The design must allow patrons to experience the wildlife in their natural habitat in an undisturbed state.

Red Fox



Squirrel



Bobcat

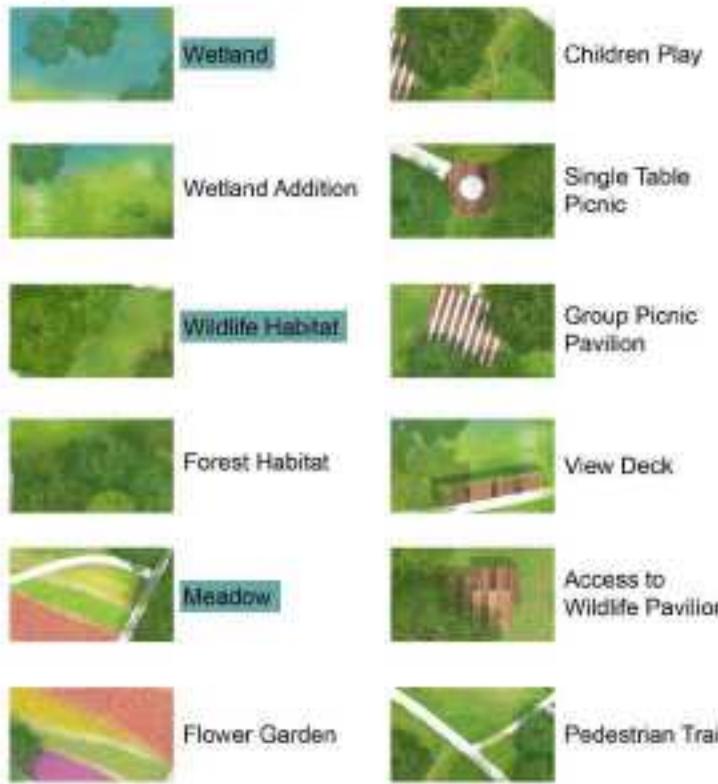


I. Small Mammal

Site Selection Sub-site #6-1

Master Plan, Zoom in, 1 Acre

Legend



Existing Site 1 Acre



Index Map



I. Small Mammal

Special Features

1

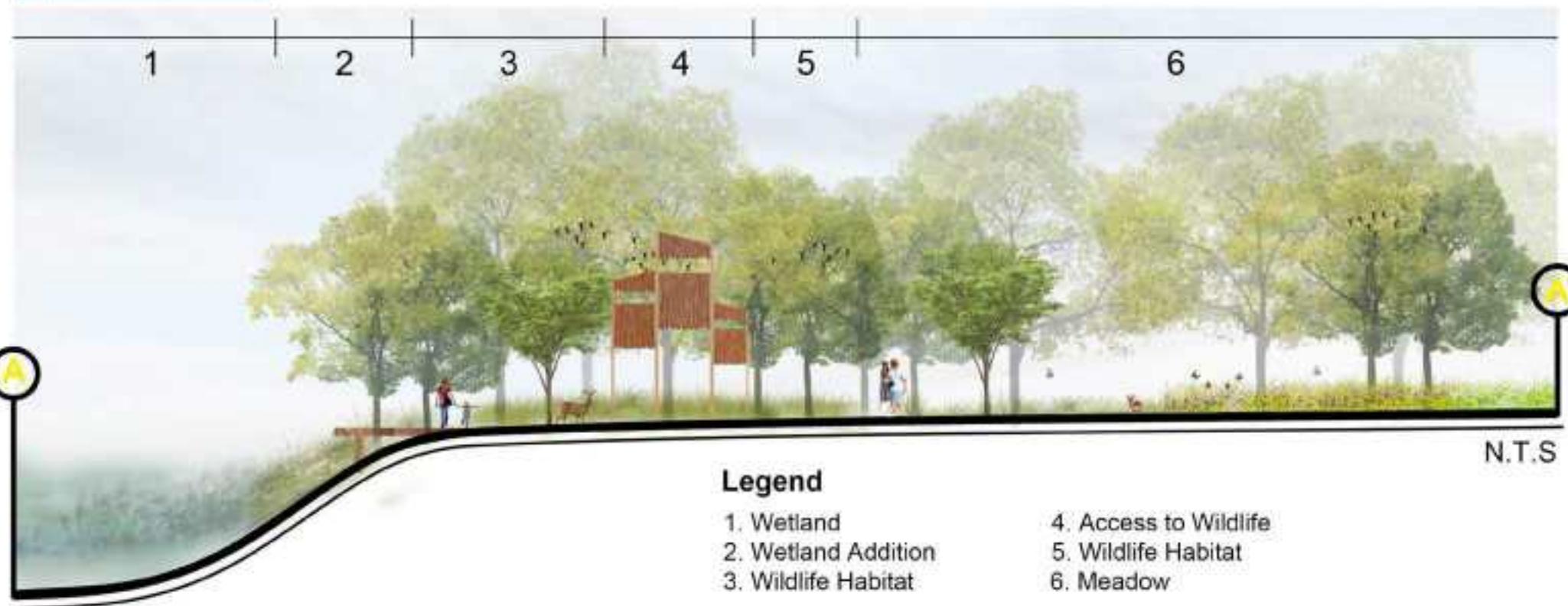
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3

4

5

6



Legend

- 1. Wetland
- 2. Wetland Addition
- 3. Wildlife Habitat
- 4. Access to Wildlife
- 5. Wildlife Habitat
- 6. Meadow



Eastern Black Walnut
Juglans nigra



Chokecherry
Prunus virginiana



Possumhaw
Ilex decidua



Lime Prickly-Ash
Zanthoxylum fagara



Pyracantha
Pyracantha coccinea

I. Small Mammal

Plant List

Forest Habitat

Tree	Fruit Season	
American Beech (<i>Fagus grandifolia</i>)	Fall to Winter	1
Eastern Black Walnut (<i>Juglans nigra</i>)	Late Summer to Fall	1
Pecan (<i>Carya illinoiensis</i>)	Fall to Winter	1
Carolina Buckthorn (<i>Rhamnus caroliniana</i>)	Summer to Fall	1
American Holly (<i>Ilex opaca</i>)	Summer to Spring	2

Shrub	Fruit Season	
Desert Olive (<i>Forestiera neomexicana</i>)	Fall to Winter	1
Yaupon (<i>Ilex vomitoria</i>)	Fall to Winter	1
Parsley Hawthorn (<i>Crataegus marshallii</i>)	Spring	2
American Beautyberry (<i>Callicarpa americana</i>)	Fall	2
Desert Yaupon (<i>Schaeferia cuneifolia</i>)	Spring to Summer	1
Coralberry (<i>Symporicarpos orbiculatus</i>)	Fall to Spring	1
Viburnums (<i>Viburnum spp.</i>)	Summer to Fall	1

Wildlife Habitat

Tree	Fruit Season	
Black Cherry (<i>Prunus serotina</i>)	Summer to Fall	2
Chokecherry (<i>Prunus virginiana</i>)	Late Summer	1
Parsley Hawthorn (<i>Crataegus marshallii</i>)	Fall to Spring	1
Lime Prickly-Ash (<i>Zanthoxylum fagara</i>)	Fall	1
Mayhaw (<i>Crataegus opaca</i>)	Summer	1

Shrub	Fruit Season	
Possumhaw (<i>Ilex decidua</i>)	Fall to Winter	1
Pyracantha (<i>Pyracantha coccinea</i>)	Fall to Winter	1
Natal Plum (<i>Carissa macrocarpa</i>)	Summer	1
Japanese Laurel (<i>Aucuba japonica</i>)	Fall	1

Wetland & Wetland Addition

Tree	
Shumard Oak (<i>Quercus shumardii</i>)	3
Water Oak (<i>Quercus nigra</i>)	3
Cottonwood (<i>Populus deltoides</i>)	3
Bald Cypress (<i>Taxodium distichum</i>)	3

Shrub

Northern Spicebush (<i>Lindera benzoin</i>)	3
False Indigo Bush (<i>Amorpha fruticosa</i>)	3
Rattle Bush (<i>Seshania drummondii</i>)	3
Hemp Sesbania (<i>Sesbania drummondii</i>)	3

Fern

River Fern (<i>Thelypteris kunkelii</i>)	3
Water Clover (<i>Marsilea vestita</i>)	3
Carolina Fern (<i>Azolla caroliniana</i>)	3

Forb

Curly Dock (<i>Rumex crispus</i>)	3
Halberd-leaf Rosemallow (<i>Hibiscus laevis</i>)	3
Mexican Seedbox (<i>Ludwigia octovalvis</i>)	3



Meadow & Wildflower Garden

Tree	
Cedar Elm (<i>Ulmus crassifolia</i>)	2
Texas Red Oak (<i>Quercus buckleyi</i>)	2
American Elm (<i>Ulmus americana</i>)	1
Texas Persimmon (<i>Diospyros texana</i>)	2
Texas Ash (<i>Fraxinus albicans</i>)	2
Eastern Red Cedar (<i>Juniperus virginiana</i>)	1
Mexican Plum (<i>Prunus mexicana</i>)	2
Live Oak (<i>Quercus virginiana</i>)	2
Shumard Oak (<i>Quercus shumardii</i>)	2

Shrub

Possumhaw (<i>Ilex decidua</i>)	2
Texas Persimmon (<i>Diospyros texana</i>)	2
Button Bush (<i>Cephaelanthus occidentalis</i>)	1
Begonia (<i>Begonia x semperflorens</i>)	2
Blackfoot Daisy (<i>Melampodium leucanthum</i>)	2
Res Sage (<i>Salvia greggii</i>)	1
Bootlebrush (<i>Callistemon citrinus</i>)	2
Bulbine (<i>Bulbine frutescens</i>)	1
Cast Iron Plant (<i>Aspidistra elatior</i>)	1

Groundcover

Sage (<i>Salvia roemeriana</i>)	2
Plateau Goldeneye (<i>Viguiera dentata</i>)	1
Gregg Sage (<i>Salvia greggii</i>)	4
Asian Jasmine (<i>Trachelospermum asiaticum</i>)	5
Zoysia Species (<i>Zoysia</i>)	6

II. Landscape Treatments

Ecotone



Wetland Edge



Habitat Island



Wildflower



Riparian Treatment



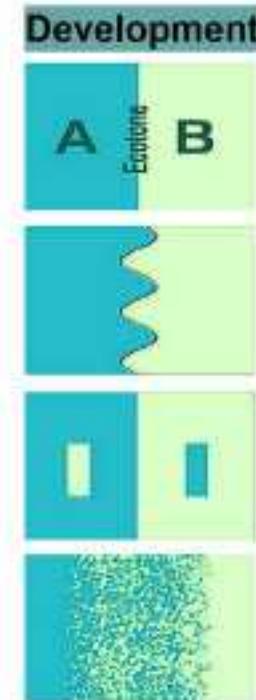
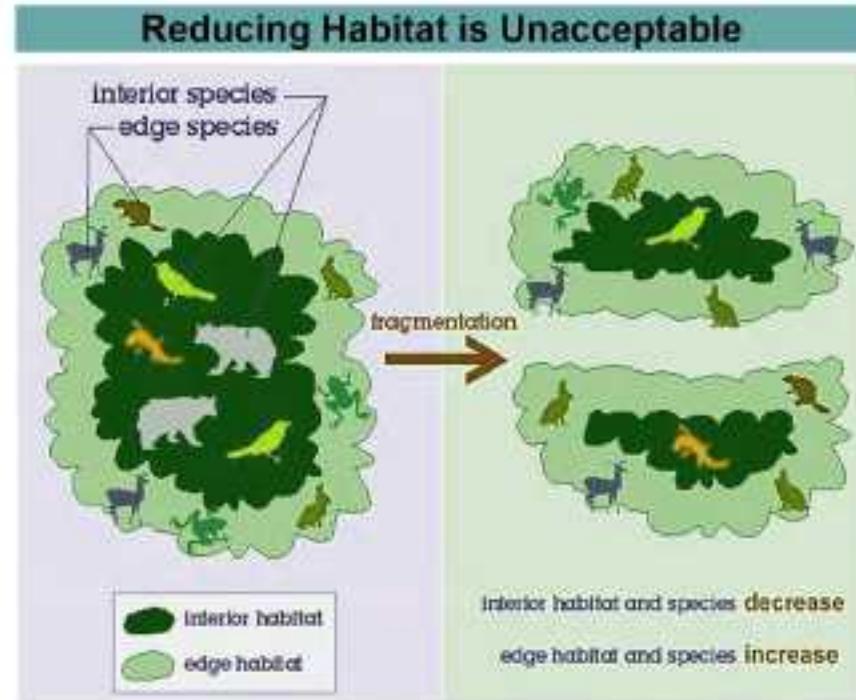
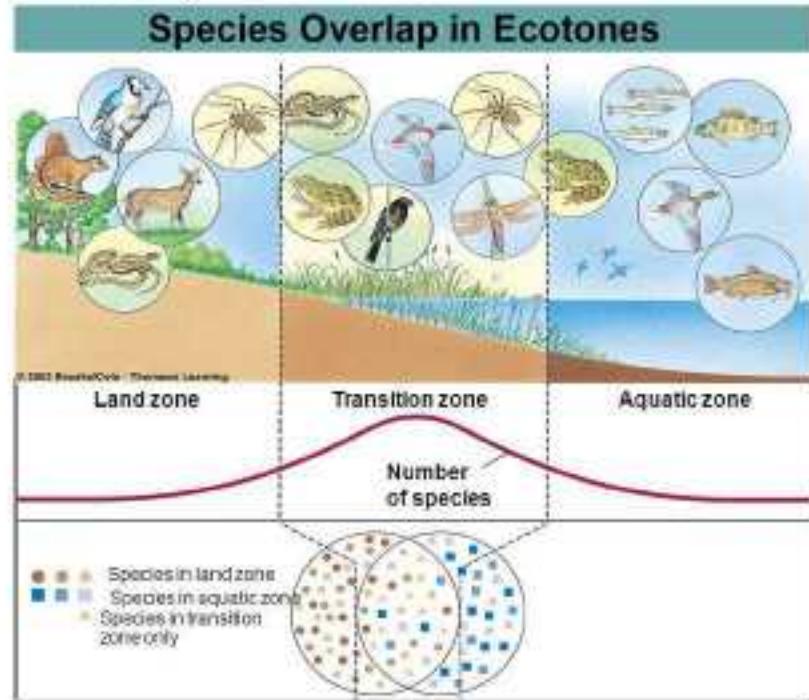
II. Ecotone

Introduction

The transition zones between adjacent ecological systems may intensify or concentrate the flow and processing of materials and organisms between systems.



Ecotones should be allowed to naturally develop between adjacent communities. The amount of area in ecotones can be increased by increasing the interspersion of community types on a given parcel, but this should not be done at the expense of reducing interior habitat.

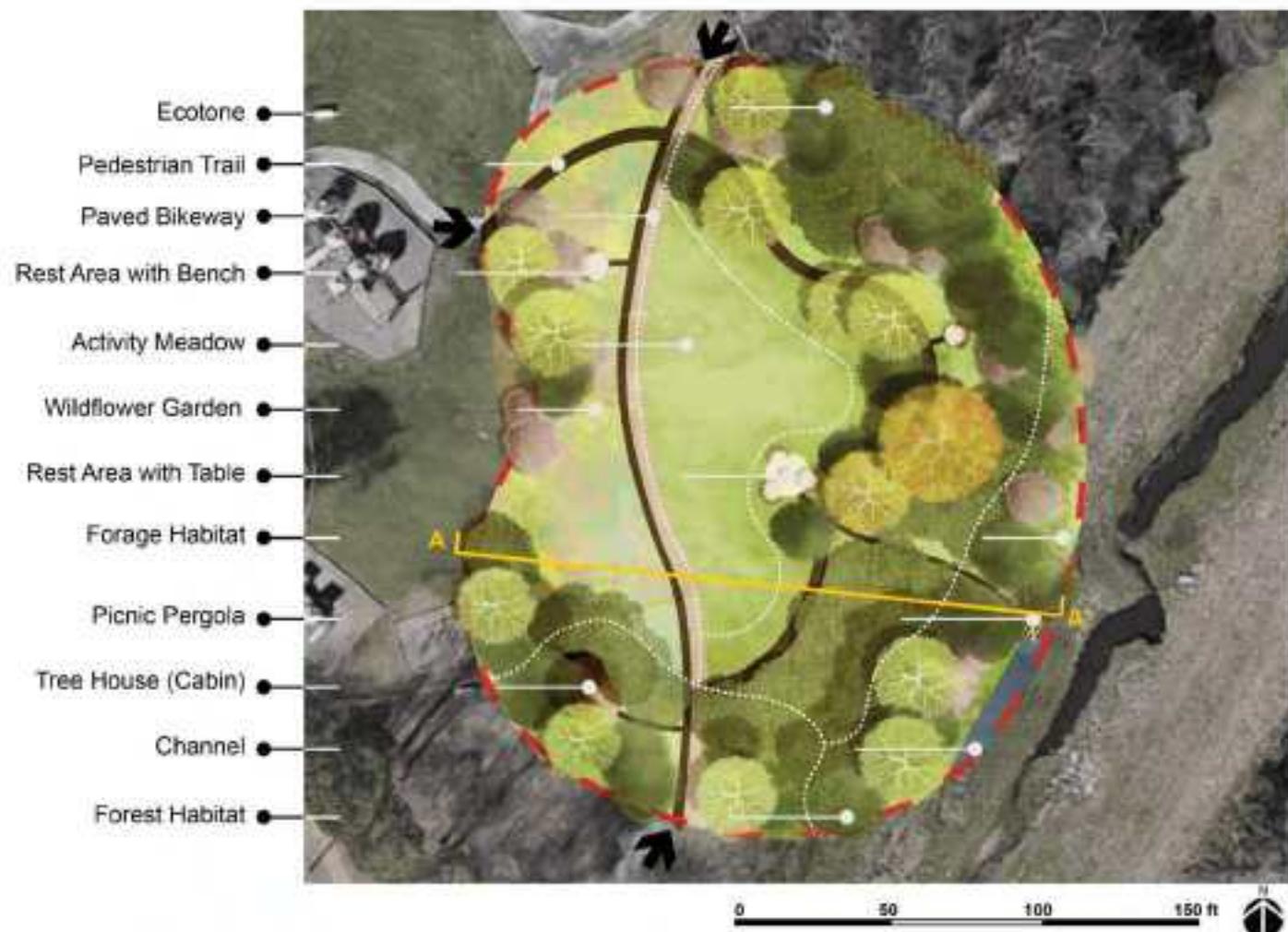


II. Ecotone

Site Selection Sub-site #3-1

Master Plan, Zoom in, 1 Acre

Legend



Site Index



Channel
1 Acre Site

Index Map



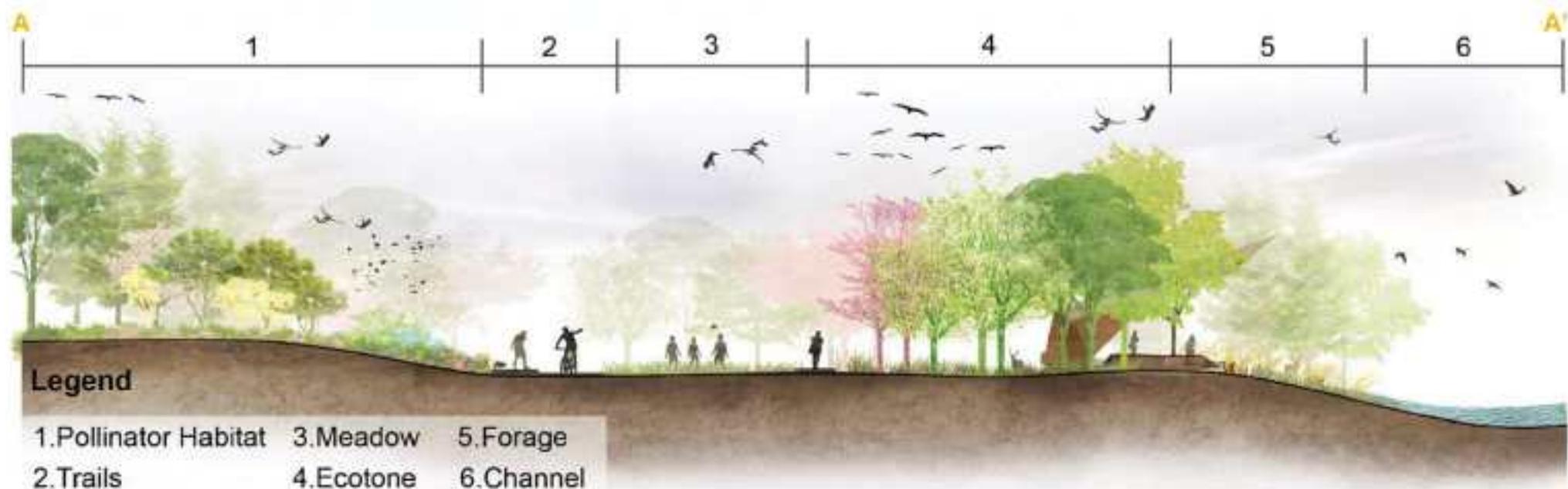
10 Acres Site Location



1 Acre Site Location

II. Ecotone

Special Features



N.T.S



Deer



Raccoon



Gray Fox



Song Bird

II. Ecotone

Plant List, Zoom in, 1 Acre Site

Forage Habitat

Trees	
Cedar Elm (<i>Ulmus crassifolia</i>)	1
Sugar Hackberry (<i>Celtis laevigata</i>)	1
Black Walnut (<i>Juglans nigra</i>)	1
Pecan (<i>Carya illinoiensis</i>)	1

Shrub	
Beauty Berry (<i>Callicarpa americana</i>)	7
Texas Kidneywood (<i>Eysenhardtia texana</i>)	8
Texas Sage (<i>Leucophyllum frutescens</i>)	8
Yaupon (<i>Ilex vomitoria</i>)	7
Little Leaf Sumac (<i>Rhus microphylla</i>)	7

Groundcover	
Coralberry (<i>Symphonocarpos orbiculatus</i>)	7
Horseherb (<i>Calyptocarpus vialis</i>)	1

Vines	
Riverbank Grape (<i>Vitis riparia</i>)	5

Ecotone & Forest Habitat

Trees	
Live Oak (<i>Quercus virginiana</i>)	1
Texas Red Oak (<i>Quercus buckleyi</i>)	1
Western Soapberry (<i>Sapindus drummondii</i>)	1
Cherry Laurel (<i>Prunus caroliniana</i>)	1
Palmetto Palm (<i>Sabal spp.</i>)	1
Mexican Fan Palm (<i>Washingtonia robusta</i>)	1
Lacebark Elm (<i>Ulmus parvifolia</i>)	1

Shrub	
Japanese Barberry (<i>Berberis thunbergii</i>)	7
Nandina (<i>Nandina domestica</i>)	7
Texas Sage (<i>Leucophyllum frutescens</i>)	8
Thorny Elaeagnus (<i>Elaeagnus pungens</i>)	7
Rose of Sharon (<i>Hibiscus syriacus</i>)	8
Waxleaf Ligustrum (<i>Ligustrum Japonica</i>)	7

Groundcover	
Pink Muhly Grass (<i>Muhlenbergia capillaris</i>)	6
Bracken Fern (<i>Pteridium aquilinum</i>)	6
Maidenhair Fern (<i>Adiantum Pedatum</i>)	5
Ivory Feathers Pampas Grass (<i>Cortaderia selloana</i>)	6

Meadow & Pollinator Habitat

Trees	
Mexican Orchid Tree (<i>Bauhinia mexicana</i>)	4
Red Maple (<i>Acer rubrum</i>)	1
Common Crapemyrtle (<i>Lagerstroemia indica</i>)	1
Pomegranate (<i>Punica granatum</i>)	1
Cherry Laurel (<i>Prunus caroliniana</i>)	1

Shrub	
Tree Yellow Bell (<i>Tecoma stans</i>)	2
Camellia (<i>Camellia spp.</i>)	2
Chinese Fringe Flower (<i>Loropetalum chinense</i>)	1
Glossy Abelia (<i>Abelia x grandiflora</i>)	2

Groundcover	
Bee Balm (<i>Monarda spp.</i>)	3
Bluebonnet (<i>Lupinus texensis</i>)	3
Indian Blanket (<i>Gaillardia pulchella</i>)	3
Mexican Blanket (<i>Gaillardia pulcherrima</i>)	4
Butterfly Bush (<i>Buddleia davidii</i>)	4
Cigar Plant / Firecracker Plant (<i>Cuphea spp.</i>)	4
Summer Phlox (<i>Phlox Paniculata</i>)	4
Yellow Senna (<i>Senna Corymbosa</i>)	4
Gulf Muhly (<i>Muhlenbergia capillaris</i>)	4

II. Wetland Edge

Introduction

Wetland edges are the margins of streams, rivers and intermittent draws, where vegetation is strongly influenced by the presence of water. Wetland edge plant communities differ markedly from those of the immediately surrounding non wetland-edge habitats.



Function of Wetlands

1. Wetlands are habitat for a diverse community of plants and animals.



2. Wetland vegetation provides food and cover for waterfowl, muskrats, and other wildlife.



3. Wetlands help keep lakes and rivers clean by filtering sediments and excess nutrients.

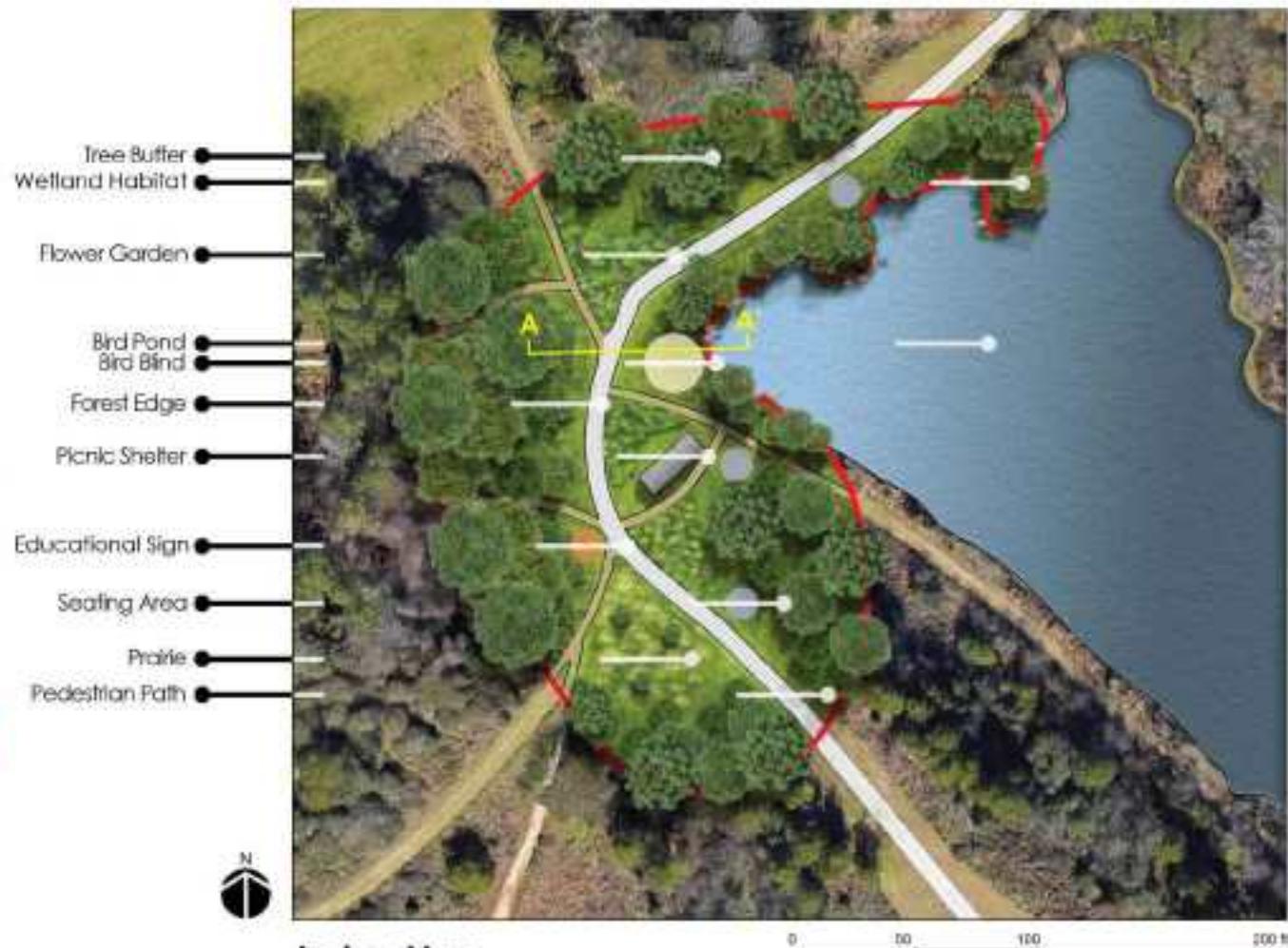


II. Wetland Edge

Site Selection Sub-site #2-1

Master Plan, Zoom in, 1 Acre

Legend



Existing Site

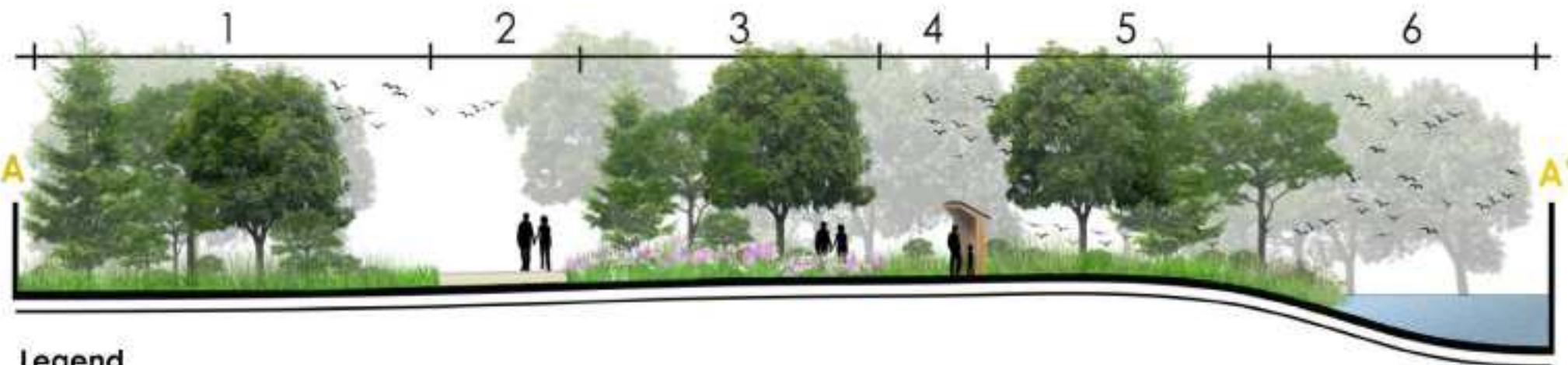


- Forest Patch
- Forest Edge
- Forest Ecotone
- Tree Buffer
- Prairie/Pollinator Garden
- Riparian Habitat



II. Wetland Edge

Special Features



Legend

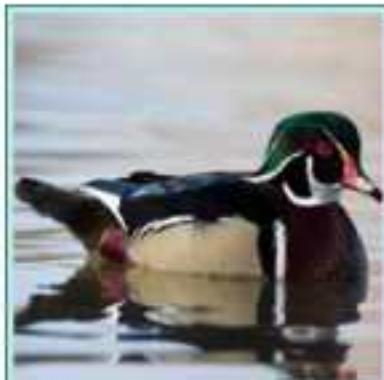
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|--------------------|------------------|--------------------|--------|
| 1. Forest Patch | 3. Tree Buffer | 5. Wetland Habitat | N.T.S. |
| 2. Pedestrian Path | 4. Bird Watching | 6. Bird Pond | |



Turtle



Frog



Wood Duck



Raccoon



American Beaver

II. Wetland Edge

Plant List

Forest Patch

Tree	Wildlife Index
American Beech (<i>fagus grandifolia</i>)	Excellent
Black Walnut (<i>Juglans nigra</i>)	Fair
Baldcypress (<i>Taxodium distichum</i>)	Good
Live Oak (<i>Quercus virginiana</i>)	Excellent
Post Oak (<i>Quercus stellata</i>)	Good
Sweetgum (<i>Liquidambar styraciflua</i>)	Fair
Eastern Red Cedar (<i>Juniperus virginiana</i>)	Excellent
Southern Magnolia (<i>Magnolia grandiflora</i>)	Fair

Shrub	Wildlife Index
Littleleaf Boxwood (<i>Buxus microphylla</i>)	Fair
Chinese Juniper (<i>Juniperus chinensis</i>)	Good
Wax Myrtle (<i>Myrica cerifera</i>)	Excellent
Buttonbush (<i>Cephaelanthus occidentalis</i>)	Fair
Chinese Fringe Flower (<i>Iopetalum chinense</i>)	Fair
Texas Sage (<i>Eucophyllum frutescens</i>)	Good
Chinese Privet (<i>Ligustrum sinense</i>)	Fair
Mountain Laurel (<i>Sophora secundiflora</i>)	Excellent

Vine	Wildlife Index
Wisteria (<i>Wisteria sinensis</i>)	Good
Creeping Fig (<i>Ficus pumila</i>)	Fair



Buttonbush (*Cephaelanthus occidentalis*)

Post Oak (*Quercus stellata*)

Riparian Habitat

Tree
Green Ash (<i>Fraxinus pennsylvanica</i>)
Water Oak (<i>Quercus nigra</i>)
Willow Oak (<i>Quercus phellos</i>)
Black Willow (<i>Salix nigra</i>)
River Birch (<i>Betula nigra</i>)
Chaste Tree (<i>Vitex agnus-castus</i>)

Shrub
Dwarf Palmetto (<i>Sabal minor</i>)
Bushy Bluestem (<i>Andropogon glomeratus</i>)
Buttonbush (<i>Cephaelanthus occidentalis</i>)
Virginia Sweetspire (<i>Itea virginica</i>)
Leucothoe (<i>Leucothoe racemosa</i>)
Water Hyacinth (<i>Eichornia crassipes</i>)
Southern Blue Iris (<i>Iris virginica</i>)
Spikerush (<i>Eleocharis spp.</i>)

Fern
River Fern (<i>Thelypteris Kunthii</i>)
Water Lily (<i>Nymphaeaceae spp.</i>)



Water Hyacinth (*Eichornia crassipes*)

Wildflower Gardens

Flowers	
Common Yarrow (<i>Achillea millefolium</i>)	2
Pink-Scale Blazing Star (<i>Liatris elegans</i>)	2
Winecup (<i>Callirhoe involucrata</i>)	2
Standing Cypress (<i>Pomaria rubra</i>)	2
Violet Ruellia (<i>Ruellia nudiflora</i>)	1
Lyreleaf Sage (<i>Salvia lyrata</i>)	3
Spotted Beebalm (<i>Monarda punctata</i>)	3
Pigeonberry (<i>Orthilia secunda</i>)	1
Partridge Pea (<i>Chamoeleoista fasciculata</i>)	3
Gulf Coast Penstemon (<i>Penstemon tenuis</i>)	3
Pinkladies (<i>Penstemon speciosus</i>)	3
Annual Phlox (<i>Phlox drummondii</i>)	3

Grasses	
Texas Bluegrass (<i>Poa arachnoides</i>)	3
Inland Sea Oats (<i>Chasmanthium latifolium</i>)	1
Texas Sedge (<i>Carex texensis</i>)	1
Little Bluestem (<i>Schizachyrium scoparium</i>)	3
Big Bluestem (<i>Andropogon gerardii</i>)	3
Side-oats Grama (<i>Bouteloua curtipendula</i>)	3



Winecup (*Callirhoe involucrata*)



Standing Cypress (*Pomaria rubra*)

II. Habitat Islands

Introduction

An island of landscape/landform that provides refuge habitat and food sources for the featured species to coexist within a human dominated land parcel.



Function of Habitat Islands

Important biodiversity hotspots.



Providing alternative habitat for feeding and nesting during the breeding season.



Providing stops for migrate birds.

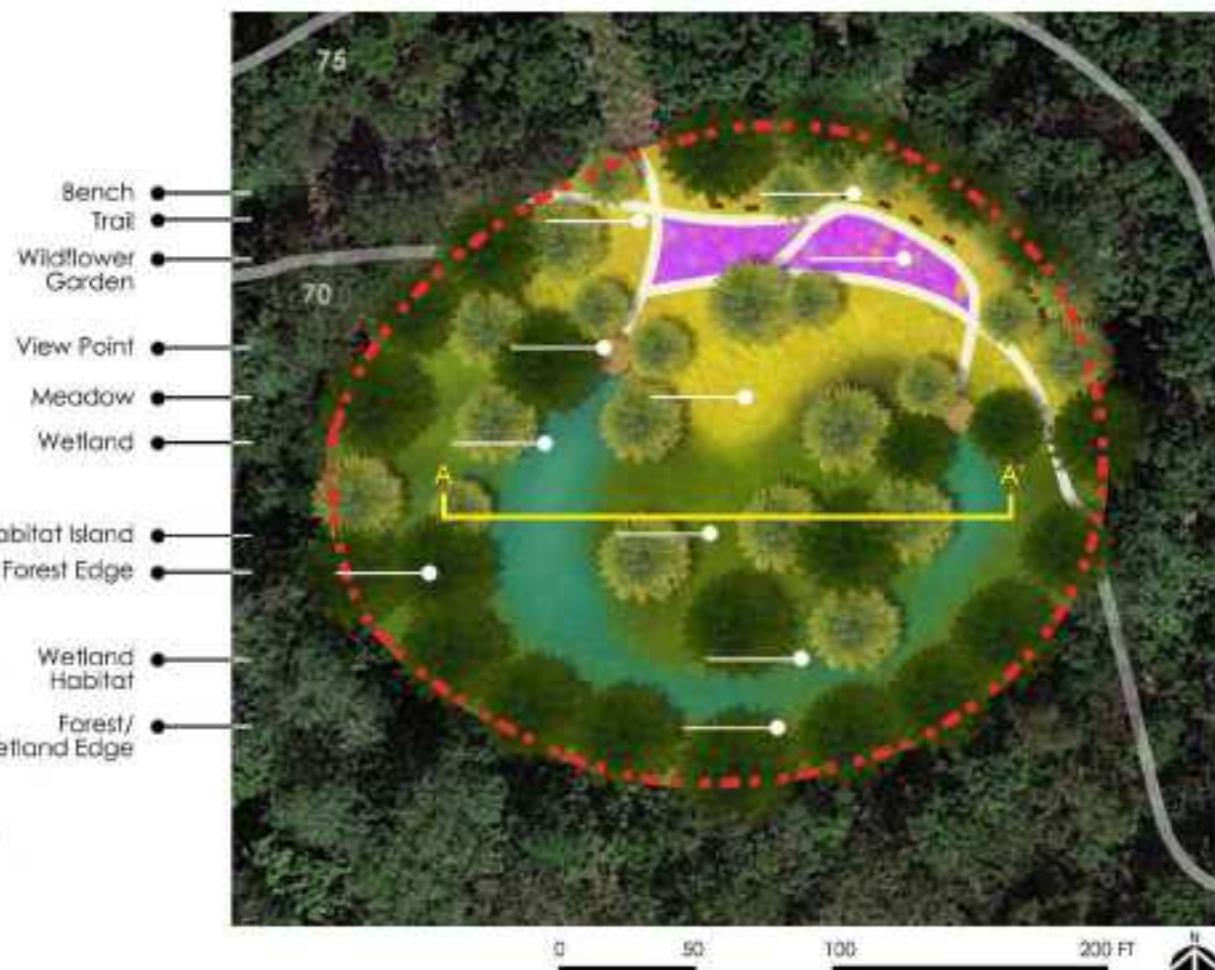
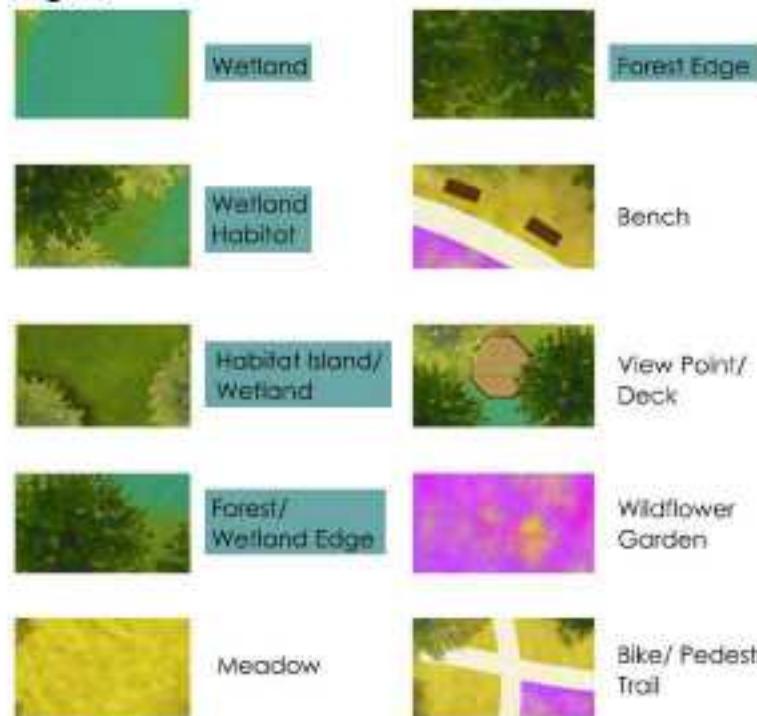


II. Habitat Islands

Site Selection Sub-site #2-4

Master Plan, Zoom in, 1 Acre

Legend



Existing Site



Existing Contour
1 Acre Boundary

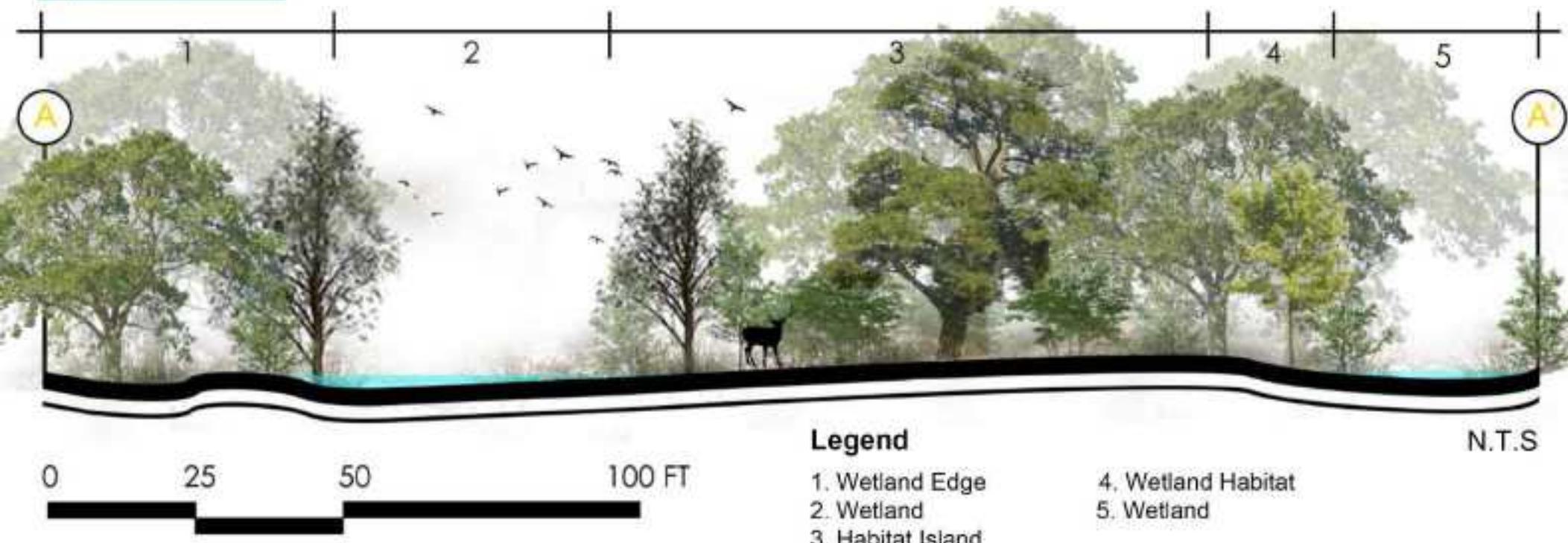
N.T.S.

Index Map



II. Habitat Islands

Special Features



Squirrel



Swamp Rabbit



Red Fox



White-tailed Deer



Black-tailed Jackrabbit

II. Habitat Islands

Plant List

Habitat Island

Tree	Fruit Season	Ref.
Flowering Dogwood (<i>Cornus florida</i>)	Spring to Fall	1
Eastern Redbud (<i>Cercis canadensis</i>)	Spring	1
Green Hawthorn (<i>Crataegus viridis</i>)	Spring	1
Mexican Plum (<i>Prunus Mexicana</i>)	Fall to Spring	1
Red Buckeye (<i>Aesculus pavia</i>)	Spring	1
Red Mulberry (<i>Morus rubra</i>)	Spring to Summer	1
Sweetgum (<i>Liquidambar styraciflua</i>)	Spring	1
Wild Black Cherry (<i>Prunus serotina</i>)	Spring to Summer	1

Shrub	Fruit Season	Ref.
Texas Lantana (<i>Lantana urticoides</i>)	Spring to Fall	1
Indigo Bush (<i>Amorpha fruticosa</i>)	Spring	1
Eastern Coral Bean (<i>Erythrina herbacea</i>)	Spring to Fall	1

Forb	Fruit Season	Ref.
Cardinal Flower (<i>Lobelia cardinalis</i>)	Summer to Fall	1
Blue Sage (<i>Salvia azurea</i>)	Fall	4
Arkansas Yucca (<i>Yucca arkansana</i>)	Summer to Fall	4

Vine	Fruit Season	Ref.
Crossvine (<i>Bignonia capreolata</i>)	Winter	1
Trumpet Creeper (<i>Campsis radicans</i>)	Spring	1



Riparian Wetland

Tree	Ref.
Black Willow (<i>Salix nigra</i>)	2
Bald Cypress (<i>Taxodium distichum</i>)	2
River Birch (<i>Betula nigra</i>)	2
Laurel Oak (<i>Quercus laurifolia</i>)	2

Shrub	Ref.
Virginia Sweetspire (<i>Itea virginica</i>)	2
Leucothoe (<i>Leucothoe racemosa</i>)	2
Dwarf Palmetto (<i>Sabal minor</i>)	2
Rattlebox (<i>Sesbania drummondii</i>)	2

Grass	Ref.
Inland Sea Oak (<i>Chasmanthium latifolium</i>)	2
Gulf Muhly (<i>Muhlenbergia capillaris</i>)	2
Switchgrass (<i>Panicum virgatum</i>)	2

Forb	Ref.
Lowland Rotala (<i>Rotala ramosior</i>)	2
Swamp Rose Mallow (<i>Hibiscus moscheutos</i>)	2
Winged Loosestrife (<i>Lythrum alatum</i>)	2
Shiny Coneflower (<i>Rudbeckia nitida</i>)	2
Plains coreopsis (<i>Coreopsis tinctoria</i>)	2



Native Meadow & Wildflower Garden

Tree	Ref.
Sweetbay Magnolia (<i>Magnolia virginiana</i>)	3
Green Ash (<i>Fraxinus pennsylvanica</i>)	3
Sugar Hackberry (<i>Celtis laevigata</i>)	3
Eastern Cottonwood (<i>Populus deltoides</i>)	4
Eastern Red Cedar (<i>Juniperus virginiana</i>)	4
Mexican Buckeye (<i>Ungnadia speciosa</i>)	4
Western Soapberry (<i>Sapindus Saponaria</i>)	4
Sassafra (<i>Sassafras albidum</i>)	4
Black Walnut (<i>Juglans microcarpa</i>)	4

Shrub/ Herb	Ref.
Texas Frogfruit (<i>Phyla nodiflora</i>)	3
Parsley Hawthorn (<i>Crataegus marshallii</i>)	3
Rattlebush (<i>Sesbania drummondii</i>)	4
Eastern Cottonwood (<i>Populus deltoides</i>)	4
Butterflyweed (<i>Asclepias tuberosa</i>)	4
False Nettle (<i>Boehmeria cylindrica</i>)	4
Heartleaf Hibiscus (<i>Hibiscus martianus</i>)	4
Blue Wild Indigo (<i>Baptisia australis</i>)	4
Purple Coneflower (<i>Echinacea purpurea</i>)	4

Grass	Ref.
Big Bluestem (<i>Andropogon gerardii</i>)	3
Little Bluestem (<i>Schizachyrium scoparium</i>)	3
Texas Sedge (<i>Carex texensis</i>)	3
Wild Millet (<i>Echinochloa muricate</i>)	4
Sideoats Grama (<i>Bouteloua curtipendula</i>)	4

II. Wildflower Site Planting Plan

Introduction

Wildflower Meadow

A mix of flowering native plants and grasses.

Provides habitat for birds, numerous insects (including pollinating bees) and other wildlife.



Plant Selection Criteria

Must work well on the site according to the particular sun, shade and moisture available there.

Plant a diversity of native flowering species.

Choose perennial plant species for use. These species take longer to become established. They will return early and outcompete many weeds.



II. Wildflower Site Planting Plan

Site Selection Sub-site #6-2

Master Plan, Zoom in, 1 Acre

Legend



Wetland



Pollinator
Area A



Pollinator
Area B



Picnic Table



Amphibian
Habitat



Blind



Forest for Deer
and Mammals



Forest for Birds



Erosion Control



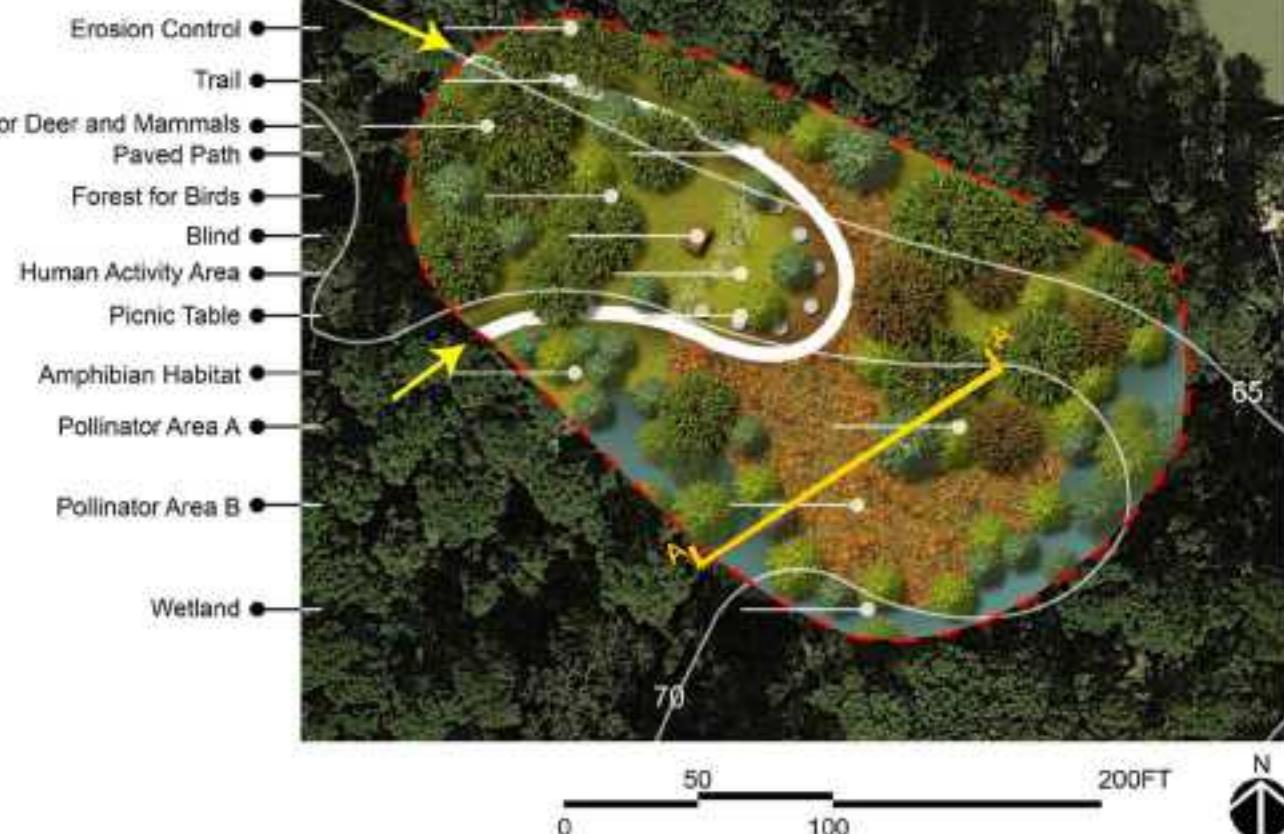
Trail



Human Activity
Area



Paved Path



Existing Site



- 10 Acre Site Boundary
- Tree Canopy
- Wetland

N.T.S.

Index Map



N.T.S.

10 acre site on site 6



N.T.S. 1 acre site on 10 acre site

II. Wildflower Site Planting Plan

Special Features



Legend

Wetland	Riparian Edge	Pollinator Area (Herbaceous and Shrubs)	Pollinator Area (Flowering Trees)
N.T.S			
			
Song Bird	Hummingbird	Butterfly	Bee
			
			Bat

II. Wildflower Site Planting Plan

Plant List

Pollinator Attracting Species

Tree	Flower Time	
Mockernut Hickory (<i>Carya alba</i>)	April-May	3
Persimmon (<i>Diospyros virginiana</i>)	May-June	3
Umbrella Magnolia (<i>Magnolia tripetala</i>)	April-May	3
American Holly (<i>Ilex opaca</i>)	April-June	3
Green Hawthorne (<i>Crataegus viridis</i>)	March-April	3
Sparkleberry (<i>Vaccinium arboreum</i>)	April-May	3

Shrub	Flower Time	
Fringe-tree (<i>Chionanthus virginicus</i>)	April-May	3
Witch-alder (<i>Fothergilla major</i>)	April-May	3
Swamp Rose (<i>Rosa palustris</i>)	June-July	3
Redbud (<i>Cercis canadensis</i>)	March-May	3
Painted Buckeye (<i>Aesculus sylvatica</i>)	April-May	3

Perennial	Flower Time	
Milkweed (<i>Asclepias incarnata</i>)	July-Sept	3
Lobed Coreopsis (<i>Coreopsis auriculata</i>)	April-June	3
Hairy Phlox (<i>Phlox amoena</i>)	April-June	3
Toad Trillium (<i>Trillium cuneatum</i>)	March-April	3
Wild Petunia (<i>Ruellia humilis</i>)	May-June	3

Vine	Flower Time	
Passion Flower (<i>Passiflora incarnata</i>)	May-July	3
Yellow Jessamine (<i>Gelsemium sempervirens</i>)	March-April	3
Coral Honeysuckle (<i>Lonicera sempervirens</i>)	March-July	3

Riparian Wetland

Tree	
Bald Cypress (<i>Taxodium distichum</i>)	1
Water Oak (<i>Quercus nigra</i>)	1
River birch (<i>Betula nigra</i>)	1

Shrub	
Leucothoe (<i>Leucothoe racemosa</i>)	1
Dwarf palmetto (<i>Sabal minor</i>)	1
Buttonbush (<i>Cephaelanthus occidentalis</i>)	1

Forb	
Water hyacinth (<i>Eichornia crassipes</i>)	1
Red milkweed (<i>Asclepias rubra</i>)	1
Iris (<i>Iris spp.</i>)	1
Great coneflower (<i>Rudbeckia maxima</i>)	1
Seaside goldenrod (<i>Solidago sempervirens</i>)	1
Frog fruit (<i>Phyla nodiflora</i>)	1

Grass	
Switchgrass (<i>Panicum virgatum</i>)	1
Southern cattail (<i>Typha domingensis</i>)	1
Horsetail (<i>Equisetum hyemale</i>)	1
Switchgrass (<i>Panicum virgatum</i>)	1

Wild Life Food Source Providers

Tree	
Agarita (<i>Manonia microphylla</i>)	4
Elbow bush (<i>Forestiera pubescens</i>)	4
Texas mulberry (<i>Morus microphylla</i>)	4
Anacua (<i>Ehretia anacua</i>)	4
Desert yaupon (<i>Schefflera cuneifolia</i>)	4
Texas kidneywood (<i>Eysenhardtia texana</i>)	4
Cedar elm (<i>Ulmus crassifolia</i>)	4
Sugar hackberry (<i>Celtis laevigata</i>)	4

Erosion Control Species

Grass	
Little bluestem (<i>Schizachyrium scoparium</i>)	2
Southern dewberry (<i>Rubus trivialis</i>)	2
Rougeplant (<i>Rivina humilis</i>)	2
Scarlet rosemallow (<i>Hibiscus coccineus</i>)	2



Fringe-tree (*Chionanthus virginicus*)

<https://plants.ces.ncsu.edu/plants/all/chionanthus-virginicus/>

II. Riparian Treatment

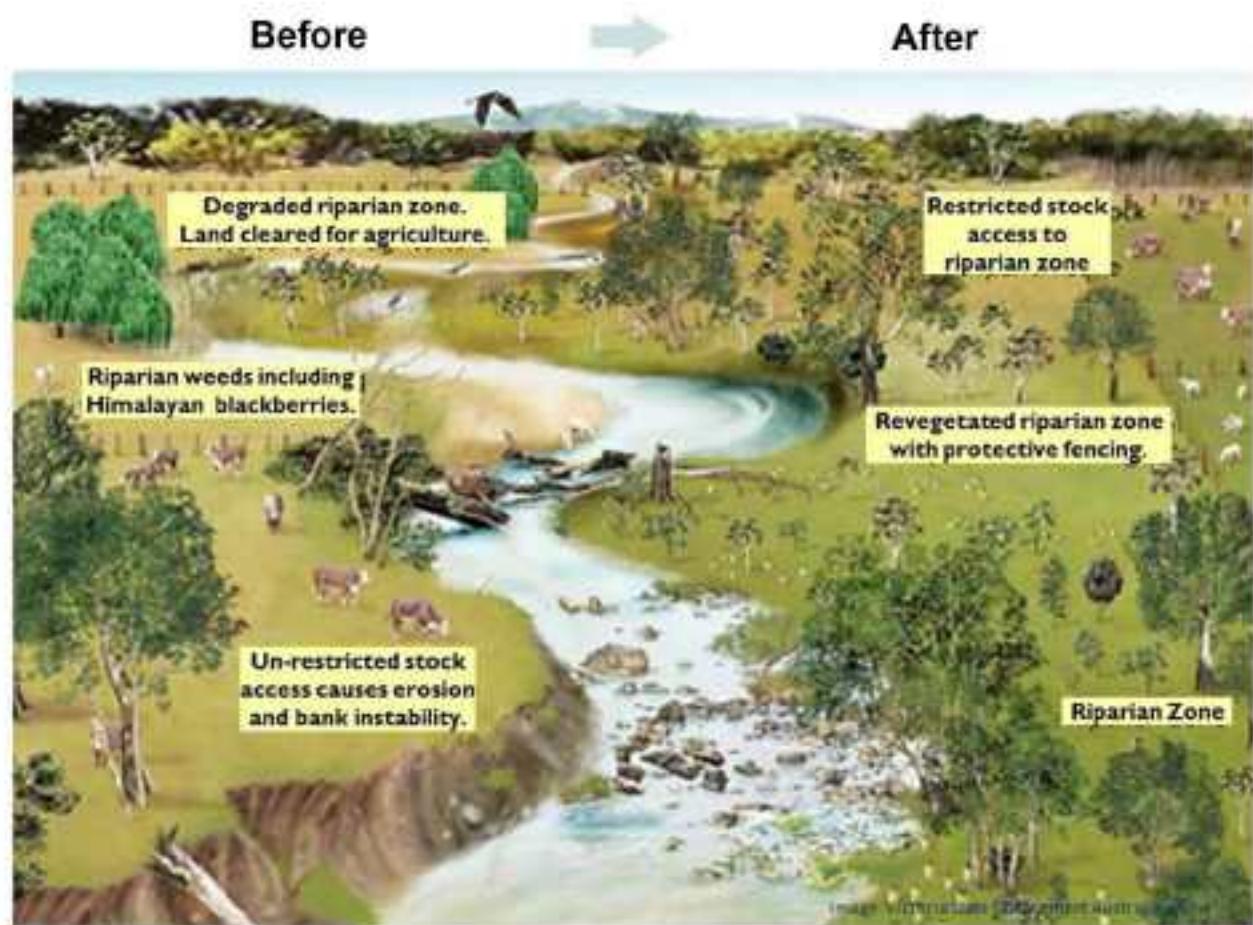
Introduction

Riparian refers to areas that are "transitional between terrestrial and aquatic ecosystems, providing linkages between water bodies and adjacent uplands and include portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems."

The basis for riparian treatments lies with the relationships between biotic and abiotic components. Ideally, the basic unit for management is a watershed. Using the watershed as a management unit provides a focus toward the entire stream system, as well as its individual streams.

Riparian Treatment Techniques

1. Fencing
2. Prescribed Burns
3. Forestry Practices
4. Vegetation Plantings
5. Opportunities from Mineral Activities
6. Structures
7. Beaver
8. Bank Stabilization
9. Recreation Planning
10. Road Construction and Maintenance

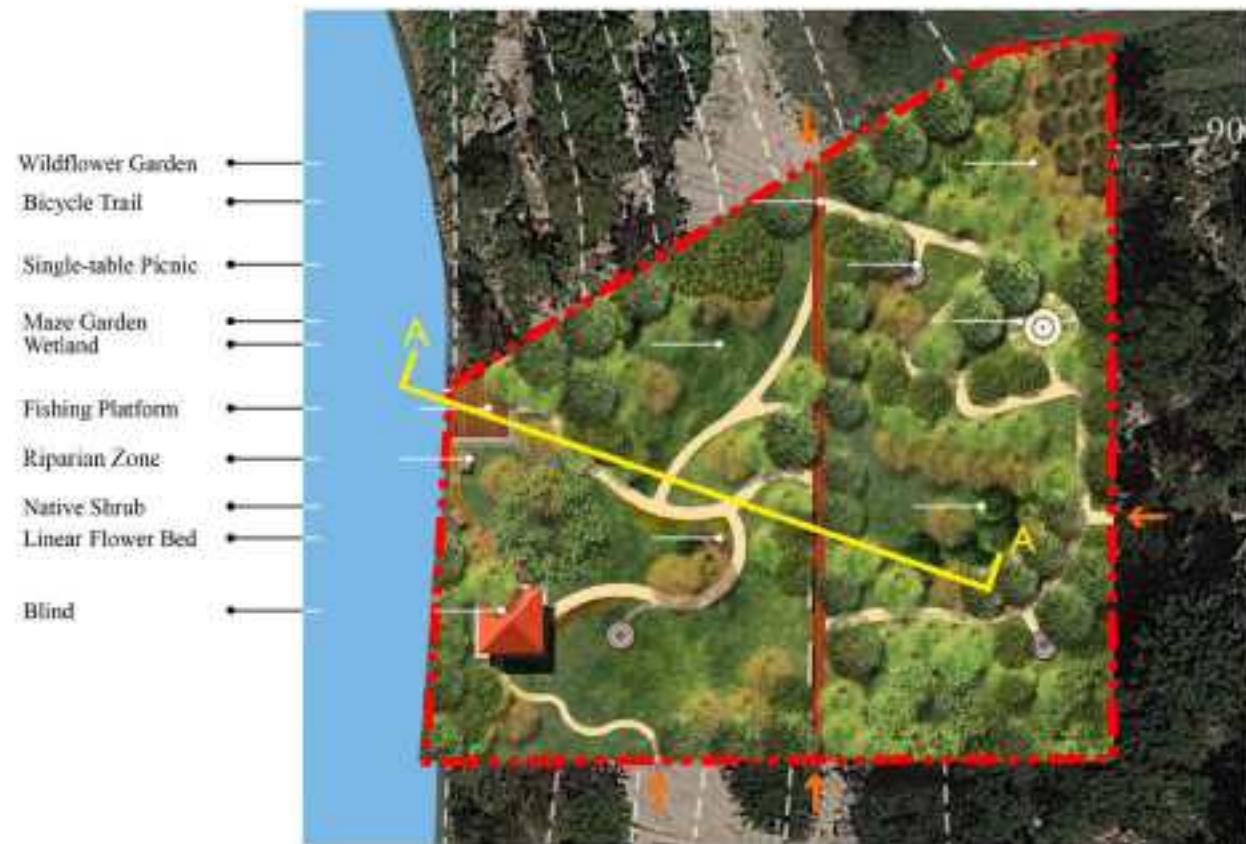
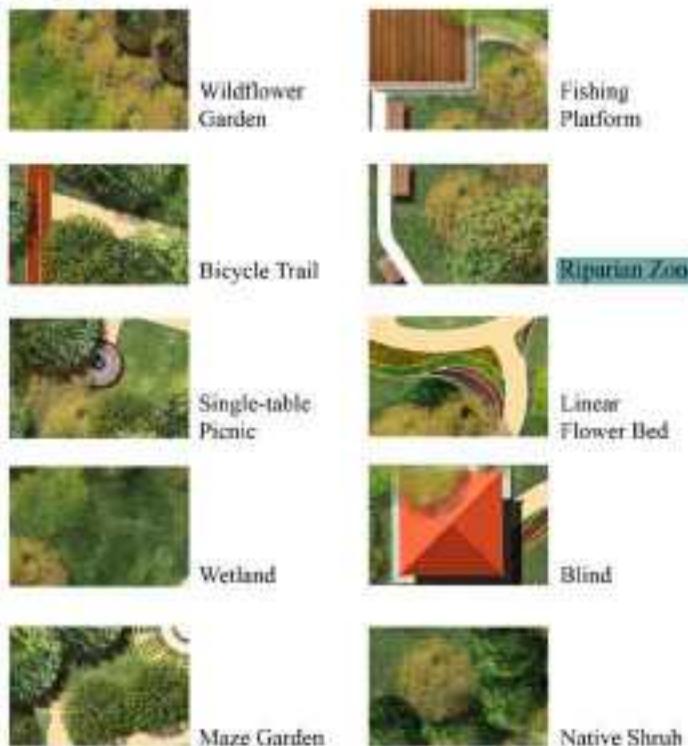


II. Riparian Treatment

Site Selection Sub-site #1-2

Master Plan, Zoom in, 1 Acre

Legend



Index Map



Design Area: 1.31 acres

- Site Boundary
- Creek
- Access Point
- - - Contour Line

N.T.S.

Index Map



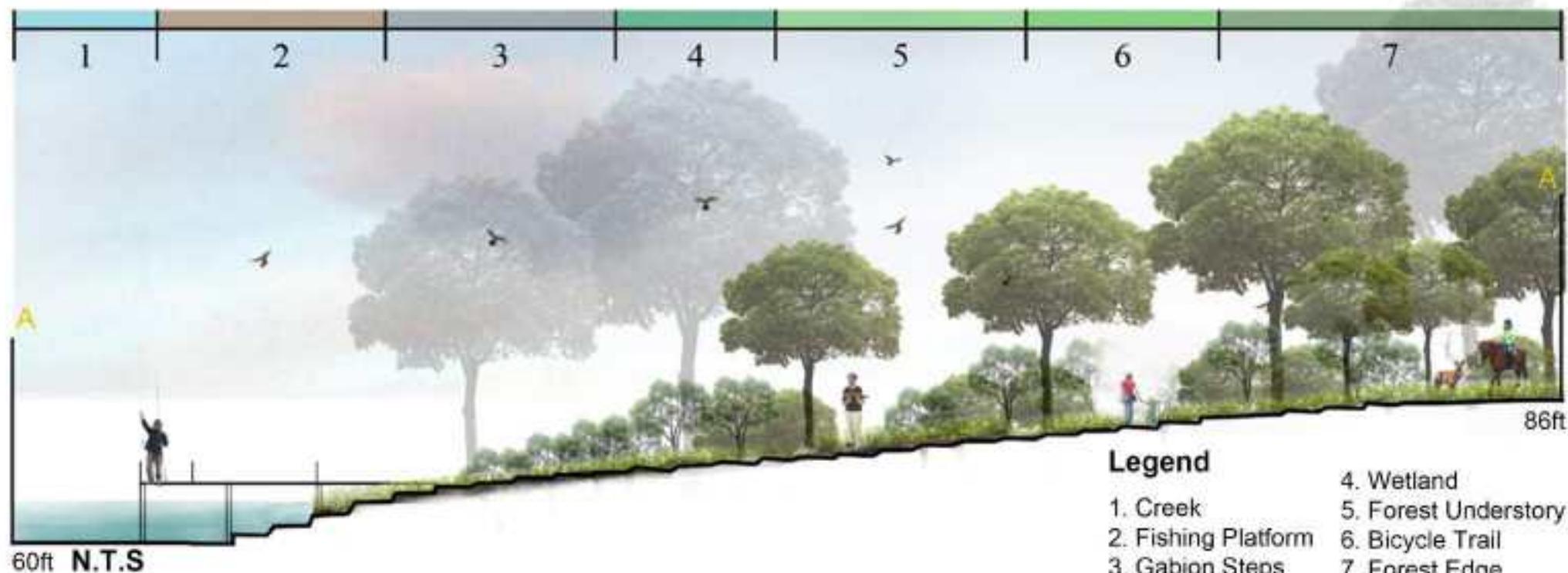
Study Area: 11.91 acres N.T.S.



Design Area: 1.31 acres N.T.S.

II. Riparian Treatment

Special Features



White Bass



Beaver



Shore Bird



Turtle



Frog

II. Riparian Treatment

Plant List

Wildflower Garden

Tree		
Eastern Black Walnut	<i>Juglans nigra</i>	2
American Elm	<i>Ulmus americana</i>	2
Blackgum	<i>Nyssa sylvatica</i>	4
Willow Oak	<i>Quercus phellos</i>	4
Texas Red Oak	<i>Quercus buckleyi</i>	6

Shrub		
Tea Rose	<i>Rosa odorata</i>	5
Japanese Barberry	<i>Berberis thunbergii</i>	5
Green Pittosporum	<i>Berberis thunbergii</i>	6
Texas Mountain Laurel	<i>Sophora secundiflora</i>	4
Bigleaf Hydrangea	<i>Hydrangea macrophylla</i>	5

Forb		
Rose Vervain	<i>Glandularia canadensis</i>	6
Hairy Tubetongue	<i>Justicia pilosella</i>	6
Butterflyweed	<i>Asclepias tuberosa</i>	6
Cardinal Flower	<i>Lobelia cardinalis</i>	6
Partridgeberry	<i>Mitchella repens</i>	6
Texas Spider Lily	<i>Hymenocallis liriosme</i>	6
Standing Cypress	<i>Ipomopsis rubra</i>	6

Vine		
Cape Honeysuckle	<i>Tecoma capensis</i>	5
Solanum 'Potato Vine'	<i>Solanum jasminoides</i>	5
Trumpet Creeper	<i>Campsis radicans</i>	5

Riparian Edge & Wetland

Tree		
White Oak	<i>Quercus alba</i>	2
Water Oak	<i>Quercus nigra</i>	2
Pecan	<i>Carya illinoensis</i>	4
American Holly	<i>Ilex opaca</i>	4

Shrub		
Dwarf palmetto	<i>Sabal minor</i>	6
Chinese Juniper	<i>Juniperus chinensis</i>	6
Boxleaf Euonymus	<i>Euonymus japonicus</i>	5
Littleleaf Boxwood	<i>Buxus microphylla</i>	6
Waxleaf Ligustrum	<i>Ligustrum japonicum</i>	6

Fern		
Green Sprangletop	<i>Leptochloa dubia</i>	6
Horsetail	<i>Equisetum hyemale</i>	6
Sand Spikerush	<i>Eleocharis montevidensis</i>	5
Water hyacinth	<i>Eichhornia crassipes</i>	5
Red milkweed	<i>Asclepias rubra</i>	5
Virginia sweetspire	<i>Itea virginica</i>	5
Iris	<i>Iris spp.</i>	6
Southern cattail	<i>Typha domingensis</i>	6
Leucothoe	<i>Leucothoe racemosa</i>	5

Grass		
Gulf Muhly	<i>Muhlenbergia capillaris</i>	6
Fiber-optic Grass	<i>Isolepis Cernua</i>	6

Native Shrub & Forest Edge

Tree		
Anaqua	<i>Ebretia anacua</i>	2
Texas Persimmon	<i>Diospyros tex.</i>	2
Yaupon	<i>Ilex vomitoria</i>	4
Callery Pear	<i>Pyrus calleryana</i>	4
Farkleberry	<i>Vaccinium arboreum</i>	6
Pawpaw	<i>Asimina triloba</i>	6

Shrub		
Wax Myrtle	<i>Myrica cerifera</i>	6
Crimson Bottlebrush	<i>Callistemon citrinus</i>	6
Virginia Sweetspire	<i>Itea virginica</i>	5
Oleander	<i>Nerium oleander</i>	5
Red Tip Photinia	<i>Photinia x fraseri</i>	6
Gardenia	<i>Gardenia jasminoides</i>	6
Forsythia	<i>Forsythia intermedia</i>	3
Pampass Grass	<i>Cortaderia selloana</i>	8
Dwarf Chinese Holly	<i>Ilex cornuta</i>	6
Texas Sage	<i>Leucophyllum frutescens</i>	6

Forb		
Obedient Plant	<i>Physostegia virginiana</i>	6
Walter's Violet	<i>Viola walteri</i>	6
Scarlet Sage	<i>Salvia coccinea</i>	8
Spotted Beebalm	<i>Monarda punctata</i>	8
Wild Petunia	<i>Ruellia humilis</i>	6
Pigeonberry	<i>Rivina humilis</i>	6

III. Conclusions A. The Study Area

This 327 acre site is unique in its location, size, ecological structure and position bordering a major East-West drainage corridor namely Cypress Creek. An opportunity was conceived of and fulfilled by the TLUD to acquire lands on the north side of the creek for open space and recreation purposes. They further planned, with the assistance of many other environmental and technical groups of people, to link the north side of the creek with the Mercer Arboretum. Mercer Arboretum is renowned for its scientific and outreach educational efforts for Harris County and the greater Houston area.

These two organizations now linked by a pedestrian-bicycle bridge brings a critical mass of environmental oriented people on to these sites to enjoy the pleasures of a very special riparian corridor space.



Mercer Arboretum



Pedestrian-bicycle Bridge



III. Conclusions A. The Study Area

The study area was photographed on the ground at eye level and from the air thanks to the drone camera brought on site by the study team. The natural landscape is now permanently protected by the two organizations. It is hoped more creek side land acquisitions will result in the creation of a larger ecosystem preserve for more urban, suburban and rural communities to enjoy.

Timber Lane Park



Drainage Way between Site 2 and Site 3



Wood Deck on-site



Palustrine Forest on-site



III. Conclusions B. Studio Procedure

The study site needed to be divided up into 7 sub-sites for closer examination. A general procedure to address each of the 7 sub-sites as linked habitat units was devised. Then the sub-sites themselves were broken down further into 10 acre and 1 acre sub units. Here habitat zones were identified then analyzed for habitat protection and restoration activities. The Planning Hierarchy provides for (Step 1) experimental habitat treatments on the 7 sub-sites (1 Acre). Review of the successes and failures within these selected habitat improvement sites will provide TLUD with better ideas to formulate improved habitat action across selected 10 areas. Eventually the 7 sub-sites could be organized into a 327 acre Sustainable Wildlife Habitat Comprehensive Master Plan.

10 Acre + 1 Acre Site Map



III. Conclusions C. Inventory Studies

Future action taken to plan and design actual sites will require an ambitious logistical organization of people and resources. The inventory studies section provides information now for the implementation of plans and designs for the future. The Study Site Inventory surveys specific important landscape level information. The Species Inventory identifies resources found on site and at the regional level. The Landscape and Land Use section provides information needed to plan the activities in the context of the surrounding residential and natural landscapes that make up the study area.

PEOPLE



RESOURCES

Study Site Inventory



Ecosystem Map



Pond & Reservoir



Species Inventory



Landscape and Land Use



III. Conclusions D. Outcomes

The “Outcomes” section provides prototypical habitat and wildlife life form design concepts that might best be used to start the 1 acre experimental plot activities. 17 sites were planned and designed for the TLUD group.

Song Bird



Nectar/ Pollinator Sites



Deer Habitat



Small Mammal



Ecotone



Wetland Edge



Habitat Island



Wildflower



Riparian Treatment



III. Conclusions E. Appendices

The Appendices provide the reader with several wildlife habitat related information pieces that can put this effort on a plane with other similar projects completed here in Texas and in other regions across the United States. This kind of Landscape Conservation Planning is viewed in the planning world as a next best step to take if we are ever to overcome the urban growth-environmental devastation scenario we see happening when large urban growth occurs.

1. Field Investigations



2. The North American Wildlife Conservation Movement



3. Sustainable Wildlife Habitat Management



4. All 17 MLA Final Package





Appendix 1. Field Investigations

Sustainable Wildlife Habitat Comprehensive Master Plan
Spring, Texas

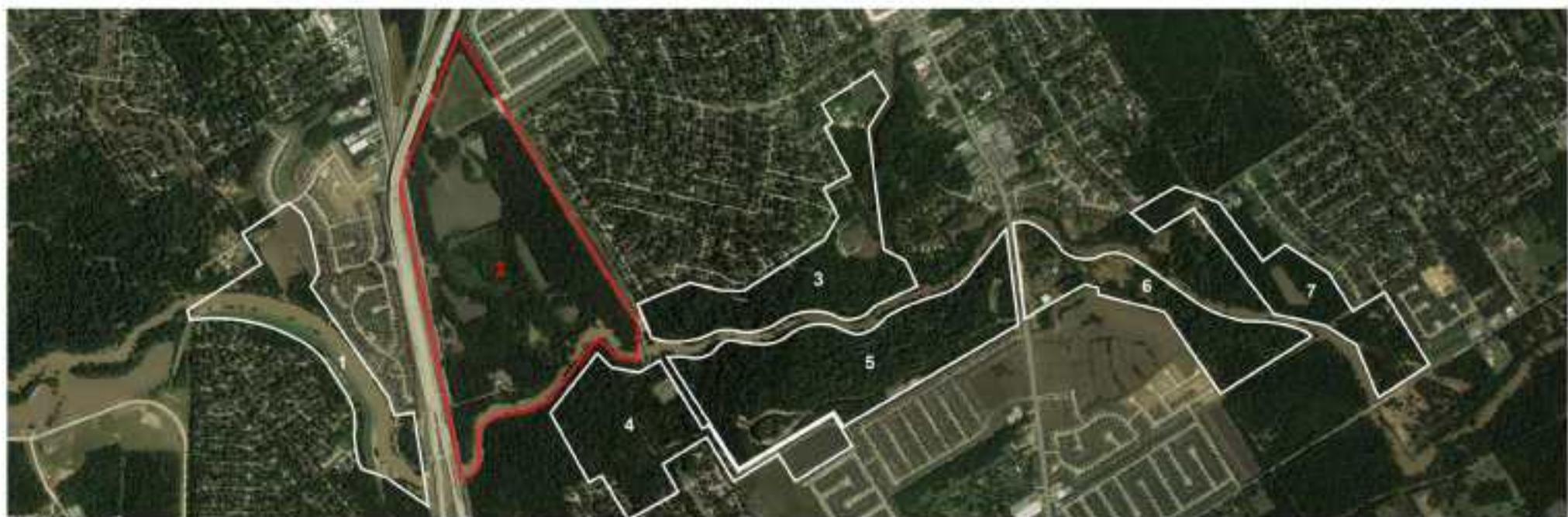
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B. Site #3	140-142
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D. Site #5	146-148

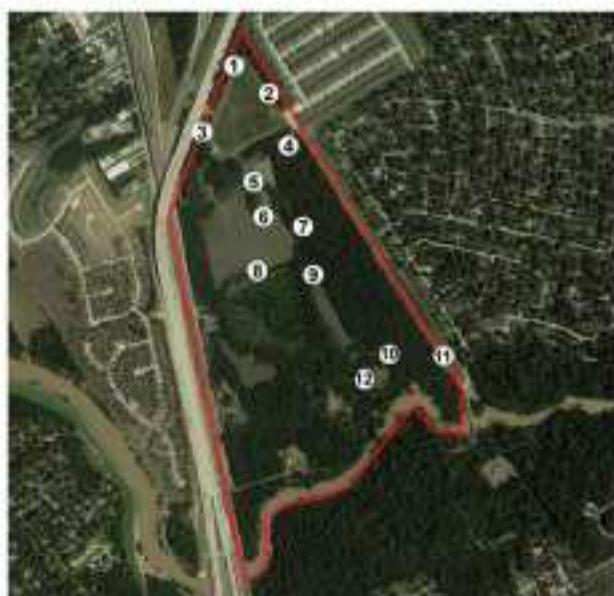
I. Field Investigations A. Site #2

7 Sub-sites



Site #2

Legend



- | | |
|----------------------------|---|
| 1. Soccer Field | 7. Trail to the Beaver Pond |
| 2. Halfpipe Skate | 8. Wood Deck (Big Lake) |
| 3. Skateboard Spine | 9. Wood Deck (Beaver Pond) |
| 4. Bike Pump | 10. Bird Pond |
| 5. Trail to the High Point | 11. Drainage Area between Site #2 & Site #3 |
| 6. High Point | 12. Beaver Pond |

I. Field Investigations A. Site #2

1. Soccer Field



2. Halfpipe Skate



3. Skateboard Spine



4. Bike Pump



I. Field Investigations A. Site #2

5. Trail to the High Point



6. High Point



7. Trail to the Beaver Pond



8. Wood Deck (Big Lake)



I. Field Investigations A. Site #2

9. Wood Deck (Beaver Pond)



10. Bird Pond



11. Drainage Area between Site #2 & Site #3



12. Beaver Pond



I. Field Investigations B. Site #3

7 Sub-sites



Site #3



Legend

- | | |
|-----------------------|-------------------------|
| 1.Main Entrance | 5.Wastewater Management |
| 2.Tributary | 6. Entrance NO.5 |
| 3.Sports Field | 7. Entrance NO.6 |
| 4.Children Playground | 8. Entrance NO.8 |

I. Field Investigations B. Site #3

1. Main Entrance



2. Tributary



3. Sports Field



4. Children Playground



I. Field Investigations B. Site #3

5. Wastewater Management



6. Entrance NO.5



7. Entrance NO.6



8. Entrance NO.8



I. Field Investigations C. Site #4

7 Sub-sites



Site #4



Legend

- | | |
|---------------------------------------|-------------------|
| 1. Aerial View of Bridge Link | 5. Cypress Creek |
| 2. Bridge | 6. Detention Pond |
| 3. Bridge between Site #3 and Site #4 | 7. Wetland |
| 4. Cypress Creek | 8. Entrance |

I. Field Investigations C. Site #4

1. Aerial View of Bridge Link



2. Bridge



3. Bridge between Site #3 and Site #4



4. Cypress Creek



I. Field Investigations C. Site #4

5. Cypress Creek



6. Detention Pond



7. Wetland



8. Entrance



I. Field Investigations D. Site #5

7 Sub-sites



Site #5



Legend

- | | |
|------------------------------|---------------------|
| 1. South Entrance | 5. Restroom |
| 2. Parking Lot near Entrance | 6. Main Driveway |
| 3. Picnic Area | 7. Existing Factory |
| 4. Central Picnic Area | 8. Existing Wetland |

I. Field Investigations D. Site #5

1. South Entrance



2. Parking Lot near Entrance



3. Picnic Area



4. Central Picnic Area



I. Field Investigations D. Site #5

5. Restroom



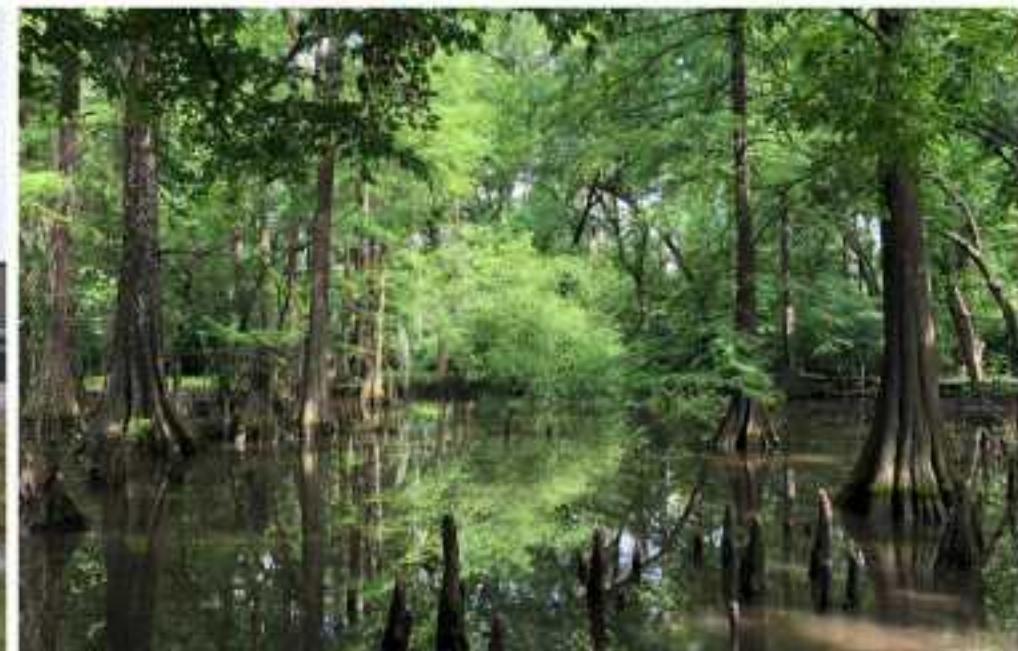
6. Main Driveway



7. Existing Factory



8. Existing Wetland





Deer in a Creek in the National Bison Range, Montana

Appendix 2. The North American Wildlife Conservation Movement

Sustainable Wildlife Habitat Comprehensive Master Plan
Spring, Texas

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III. Interrelated Elements	155
IV. Conclusion	156

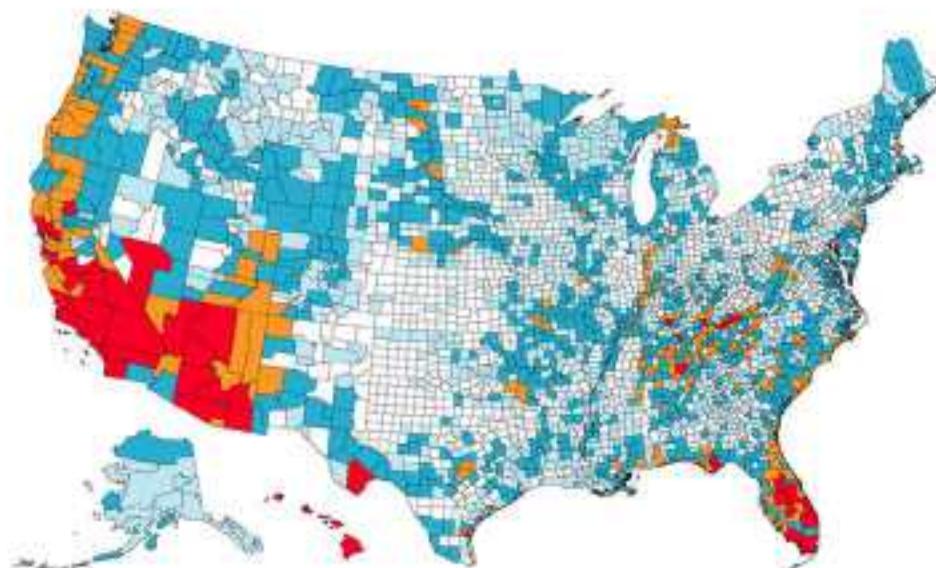
I. Introduction

Historical Perspective

120 - 140 years ago citizens, hunters and fishers among them as well as members of the general population noted that the animals resources of the United States was under siege. Populations of animals were being eliminated due to over hunting, over fishing and commercial extraction. This was common to all portion of the U.S. where ever wildlife populations existed. A quiet but persistent revolution of thinking about the wildlife resource was underway. The landscape that contained these populations suffered from having no game laws, no agencies, no game wardens, and no universities to contribute to this growing need identified by citizens as necessary for continued existence of this resource.

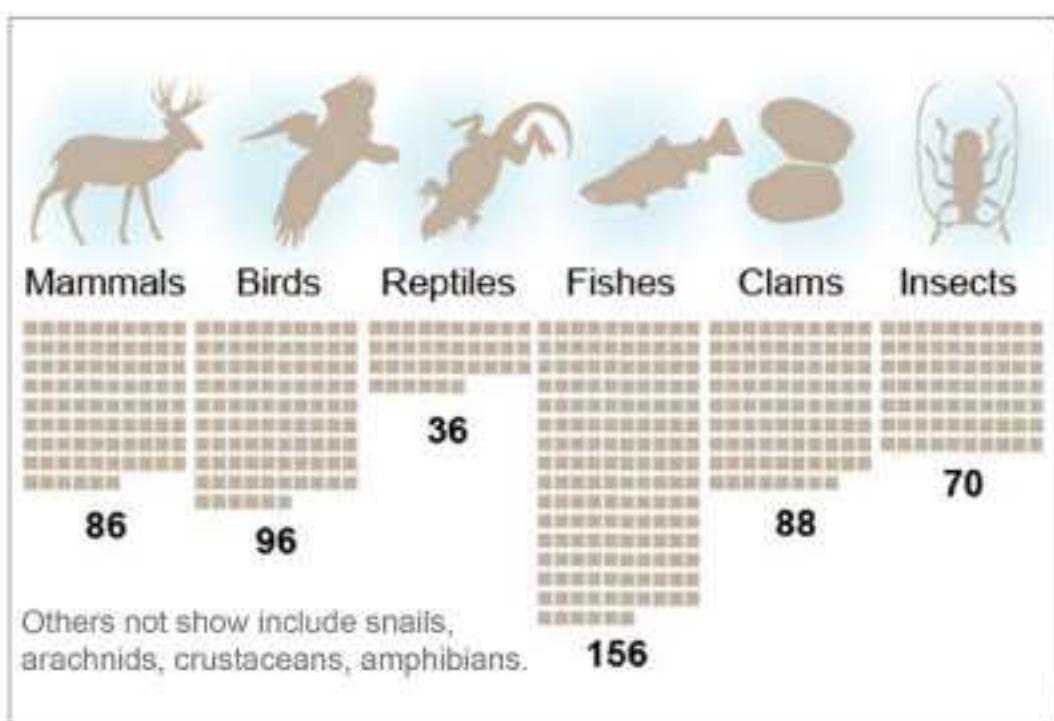
Endangered Species Clustered in Subset of Counties

Number of Federally Listed Species



Species on the Conservation List

The current list of species listed as threatened or endangered totals 1,519 with 874 plants and 645 animals. (2014)

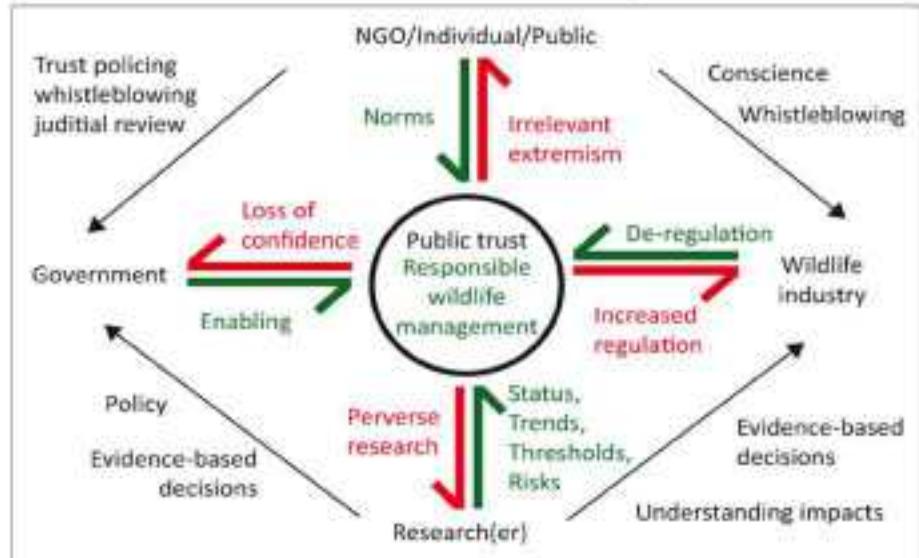


II. The Seven Pillars

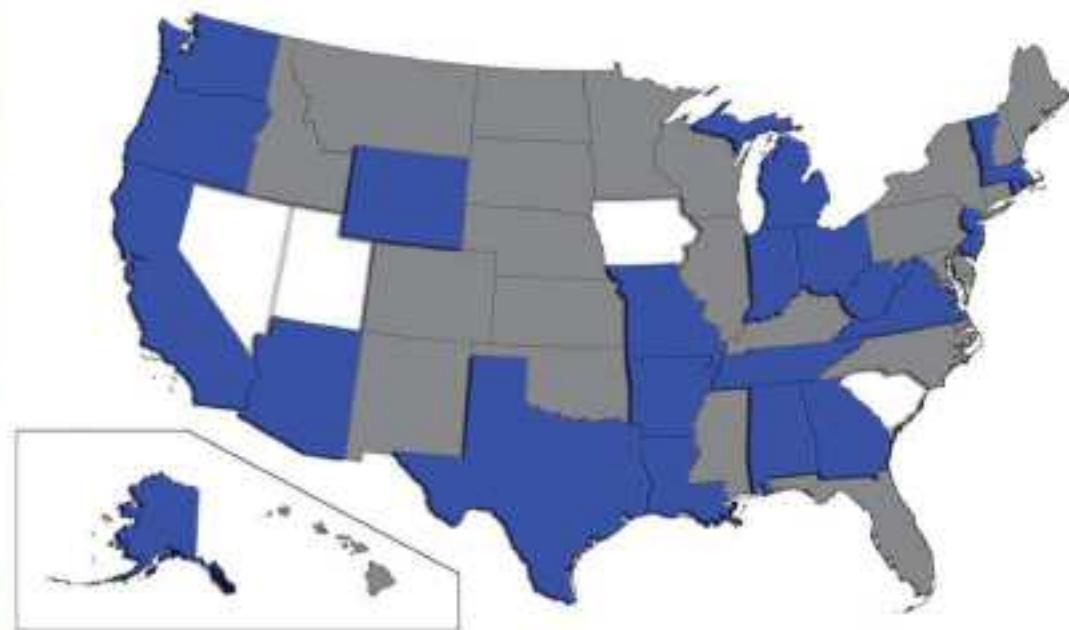
1. Wildlife is held in the public trust



Relationship of key role players and their contribution to wildlife management



Source: Blackmore, A. C. (2017). Public trust doctrine, research and responsible wildlife management in South Africa. *Bothalia-African Biodiversity & Conservation*, 47(1), 1-9.
<https://www.awf.org/blog/state-play-us-ivory-trade-legislation>



Public Trust Doctrine (PTD) in the U.S.A
(2013)

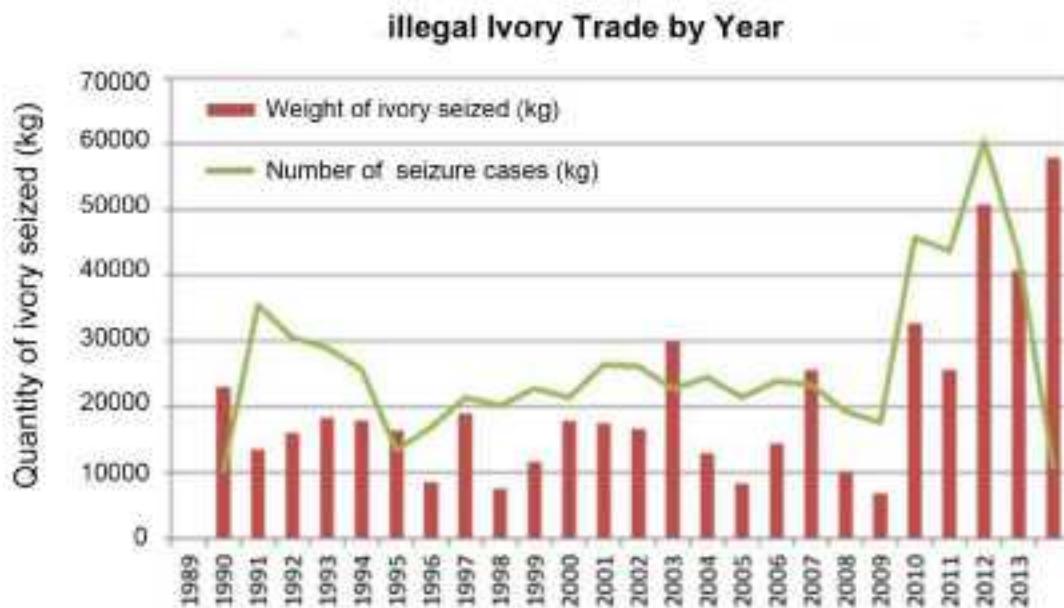
- No acknowledgement of the public trust in wildlife
- Express use of terms such as "trust" or "trustee" in reference to state management of wildlife
- Use of trust-like language such as "sovereign ownership of wildlife for the benefit of all people" or for "the common good," or discussion of the "sovereign capacity" for regulating wildlife in a manner consistent with the public interest



Source: https://www.researchgate.net/figure/A-Three-categories-of-state-public-trust-doctrine-PTD-in-the-USA-following-Blumm_fig1_283459101. Google Image

II. The Seven Pillars

2. The elimination of commercial wildlife hunting



Protected Wilderness Area

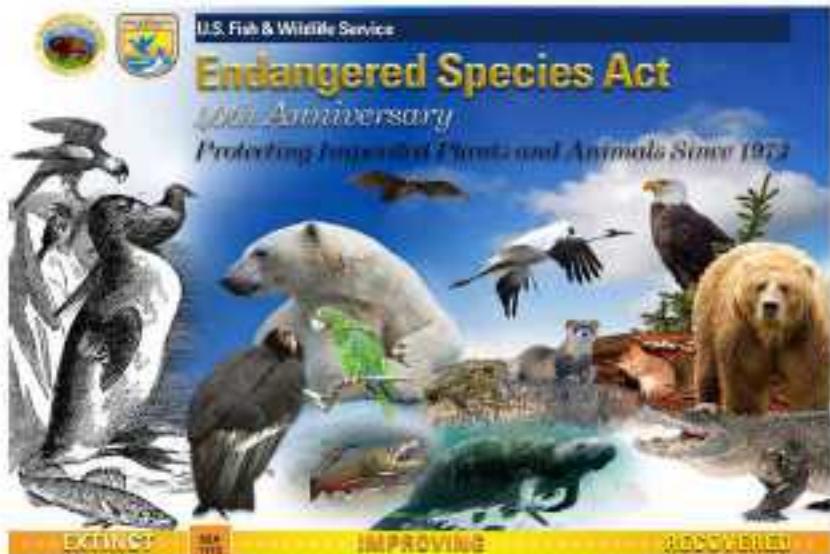


State of Play: U.S. Ivory Trade Legislation



II. The Seven Pillars

3. Allocating wildlife use through the creation of laws



4. Hunting and fishing opportunity for all



II. The Seven Pillars

5. Wildlife may be taken only for legitimate reasons



<https://cn.dreamstime.com> <https://twitter.com/speciesextinct1/status/976990044077555713>
<http://coyotes-wolves-cougars.blogspot.com/2017/10/our-friend-biologist-and-wildlife.html>
<http://www.wideopenspaces.com/learn-proper-shot-placement-black-bear-internal-anatomy-video/>

6. Wildlife is an international resource

Wildlife Migrations of North America



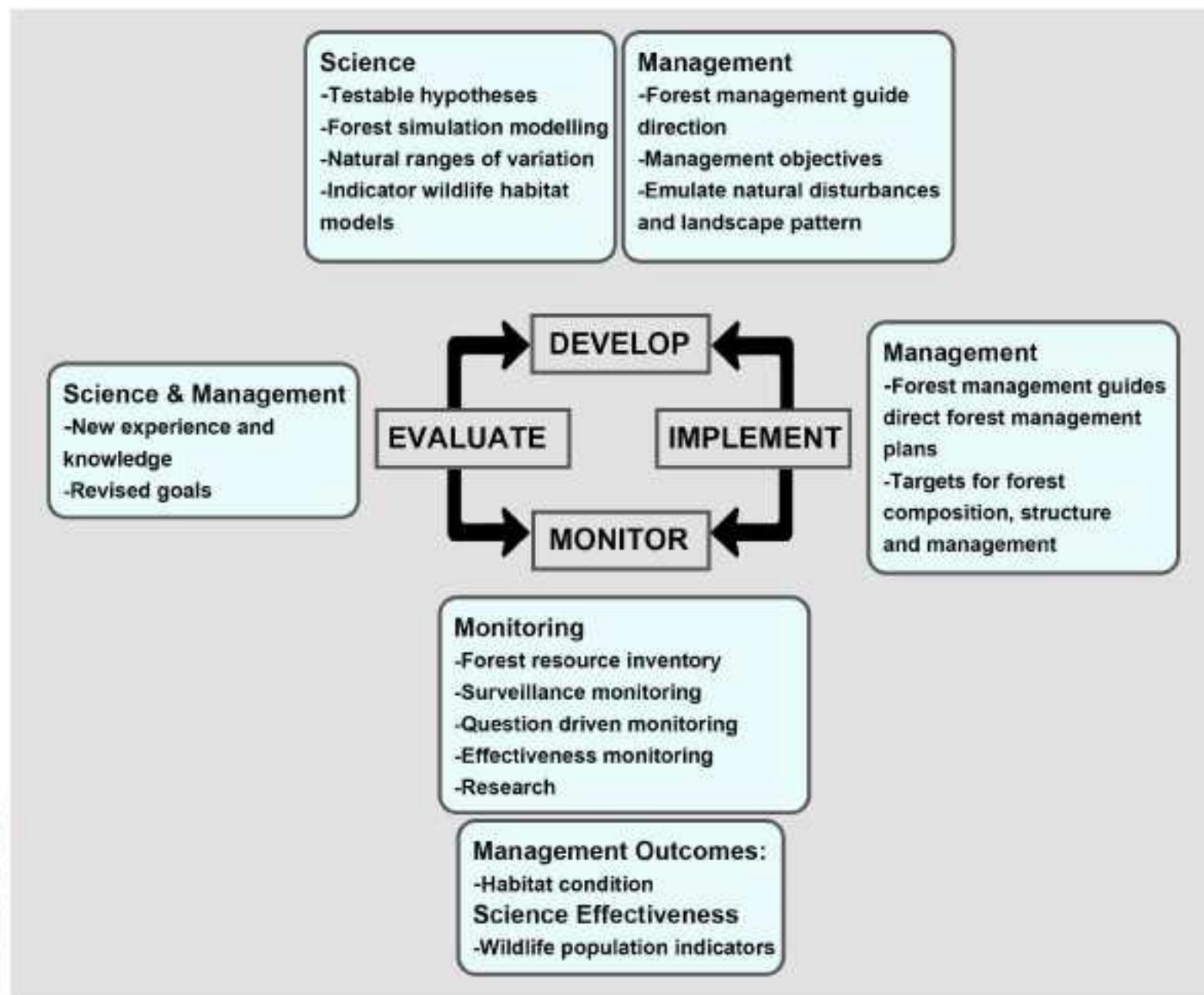
<https://sites.google.com/site/tessciencenatureandretreat/2016-retreat/speaker-information/the-migratory-bird-treaty-act-centennial>
<https://www.fws.gov/birds/grants/neotropical-migratory-bird-conservation-act.php>
<http://www.dailymail.co.uk/sciencetech/article-1213918/Snow-geese-stopover-wildlife-refuge-en-route-wintering-grounds.html>

Canada & U.S. Migratory Bird Protection



II. The Seven Pillars

7. Science is the basis for wildlife policy



III. Interrelated Elements

This conservation movement involves several interrelated elements.

1. Obviously its primary focus is on the existing and future welfare of the wildlife species found in the landscape, aquatic and wetland habitats of the United States and Canada.



2. The terrestrial, aquatic and wetland habitats are the fundamental building blocks that support the wildlife species. Their management, planning and protection are of importance in the resolution to the problem.



3. The ecology of the habitats and the context of the surrounding environment are inextricably involved in the problem solutions.



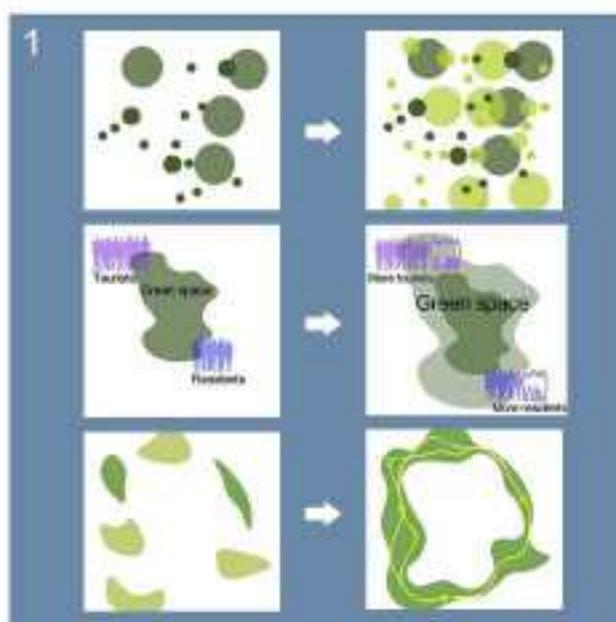
4. Finally the social/cultural elements are a part of the problem solution as well. Human values, beliefs and ethics of environmental management come into play.



IV. Conclusion

It is for this reason, the interrelated nature of the problem of conservation of the wildlife species that this studio project has been developed. Our graduate program is organized to bring skill sets to the student in a comprehensive manner. Three skill sets will be emphasized this semester. They are:

1. Landscape strategic planning concepts.
2. Environmental design tactics and technology.
3. Spatial configuration of comprehensive master plans and site designs that can resolve this problem of wildlife conservation within the context of regional landscape planning for a given area



Results of the legislation providing financial resources for the conservation of wildlife amounts to \$7.5 billion dollars. It also generates 1.5 million jobs to locate economies by way of supporting:

1. Birding activities
2. Nature photography
3. Outdoor adventures
4. National parks, forest service Lands, wildlife refuges





*Brazos Bend State Park
Fort Bend County, Texas*

Appendix 3. Sustainable Wildlife Habitat Management

Sustainable Wildlife Habitat Comprehensive Master Plan
Spring, Texas

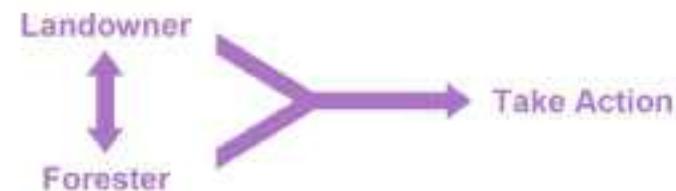
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II. Wildlife Habitat Relationship	159-160
III. Special Requirements	161-163

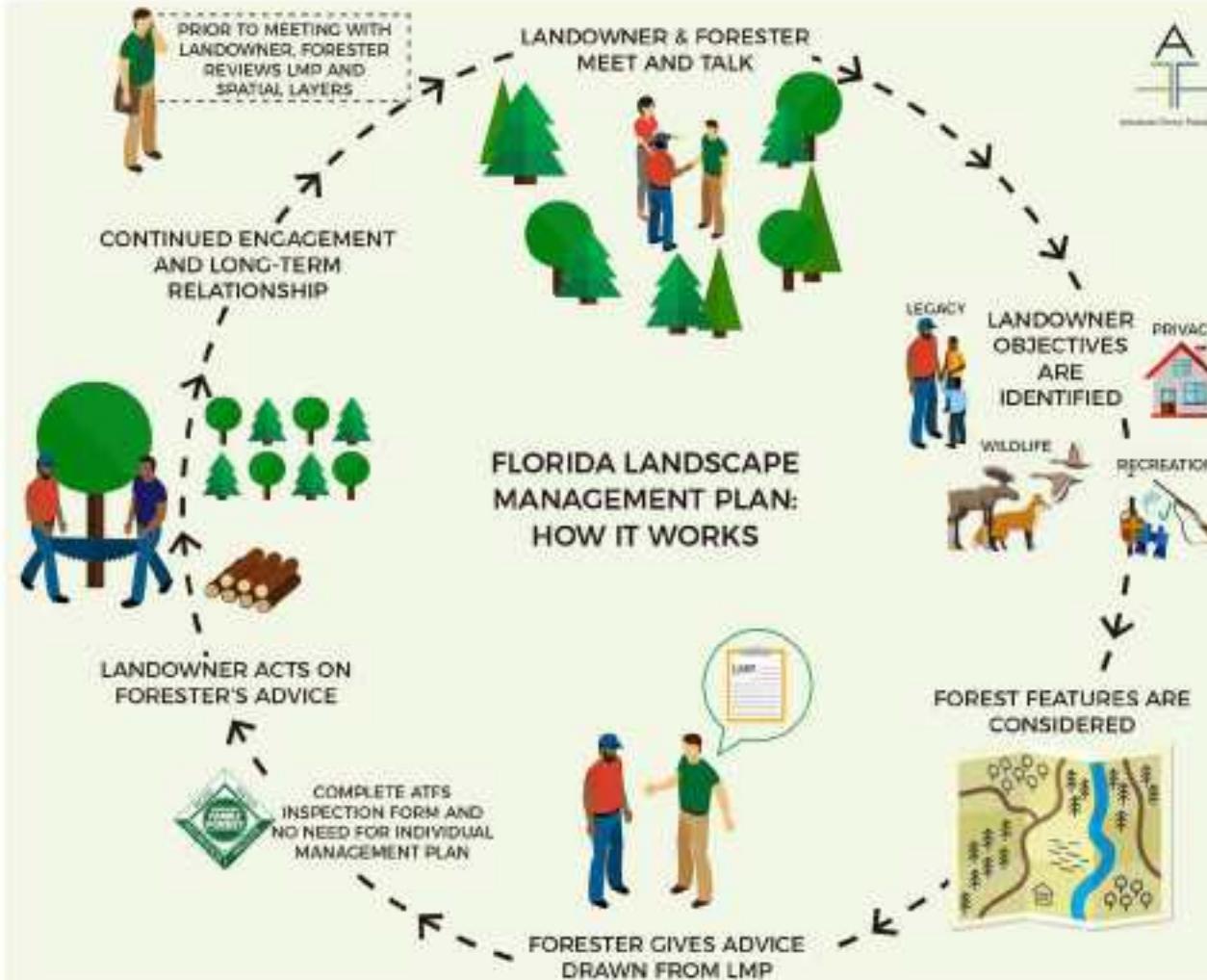
I. Wildlife as A Product of Landscape Management Planning

Landscape Management

Landscape Management is a process of manipulating the land to produce a mix of products (Plant Patches) desired by the owners. These plant patches change with time, economic conditions, public demands, legislation and capacity of the land.



Florida Panhandle Landscape Management Plan Pilot



Mix of Plant Patches



I. Wildlife as A Product of Landscape Management Planning

Wildlife Habitat Management

Wildlife habitat management requires manipulation of the existing plant communities. This is often too expensive for wildlife purpose. Sustainable wildlife habitat management therefore requires the addition of other land use plans to be part of the overall actions plans to change the landscape condition. The most popular land use to put on a landscape is the creation of recreation and open space structures and fuctions. When this plan is formulated it becomes more resonable to change the landscape for multiple purpose uses by the public.

Wildlife Habitat



Open Space



Trail



Recreation



II. Wildlife Habitat Relationship

Plant communities and their successional stages have unique environmental conditions that are ecologically important as niches for wildlife species. The niches are a product of the plant community. Its successional stages and other environmental factors include soil type, moisture regime, microclimate, slope aspect, elevation, and temperature. The plant community structure should be integrated with animal community structure needs in order to create a valid habitat for resident wildlife.

Life Form, Plant Community, Successional Stage

To plan for a selected wildlife habitat the designer must select a featured species then select the appropriate plant community(s) and successional stage(s) to provide the species with its needs.

Life Form Needs

All wildlife species have five basic needs from their environments: food, cover, water, space and reproduction areas.

Food



Cover



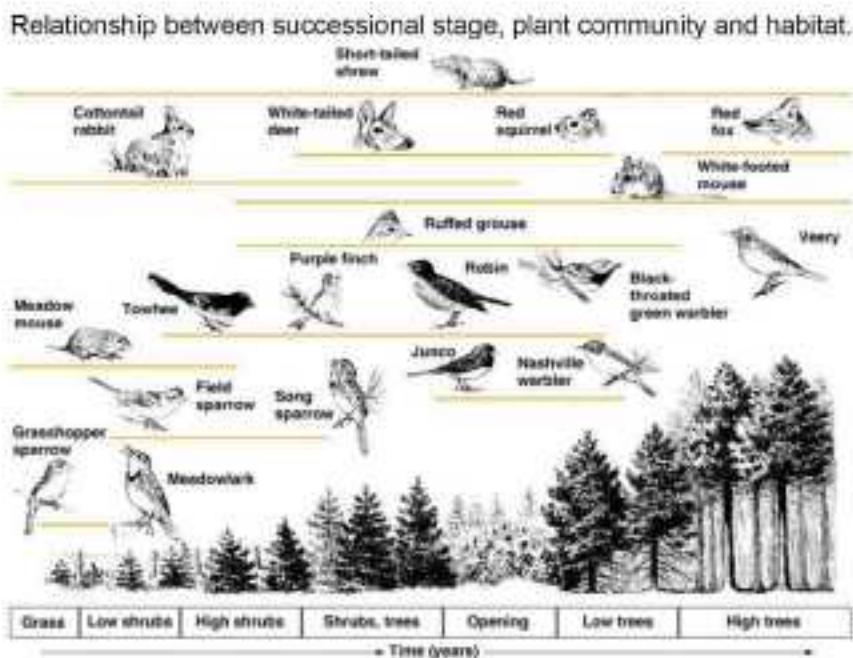
Water



Space



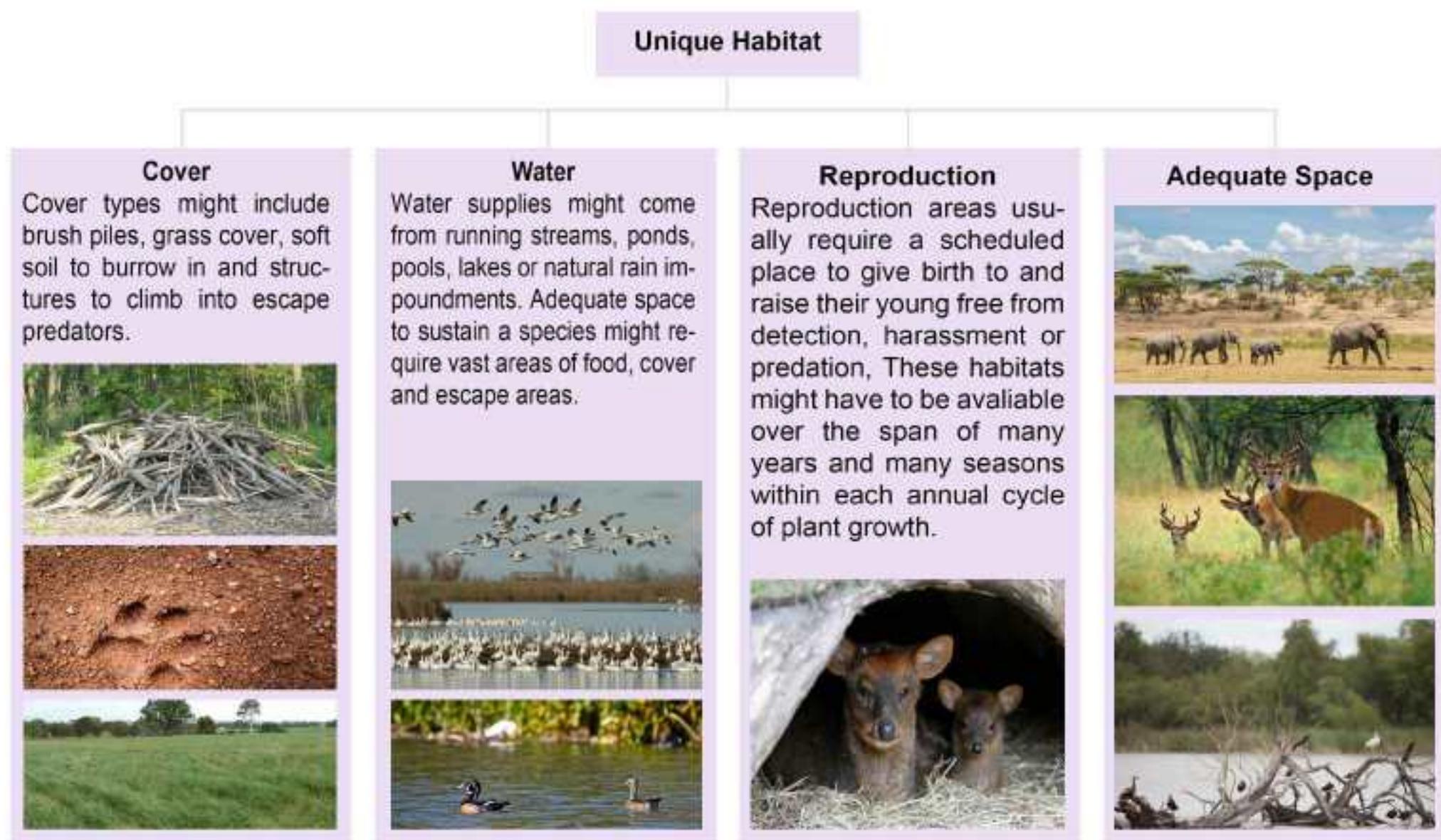
Reproduction Area



II. Wildlife Habitat Relationship

Unique Habitats

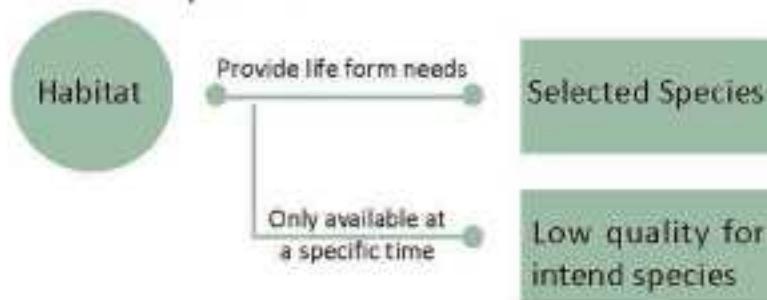
Most species require more than one type of habitat in order to thrive in a given landscape. One habitat might be for food supplies from berries, nuts, and insects etc. Other might include:



III. Special Requirements

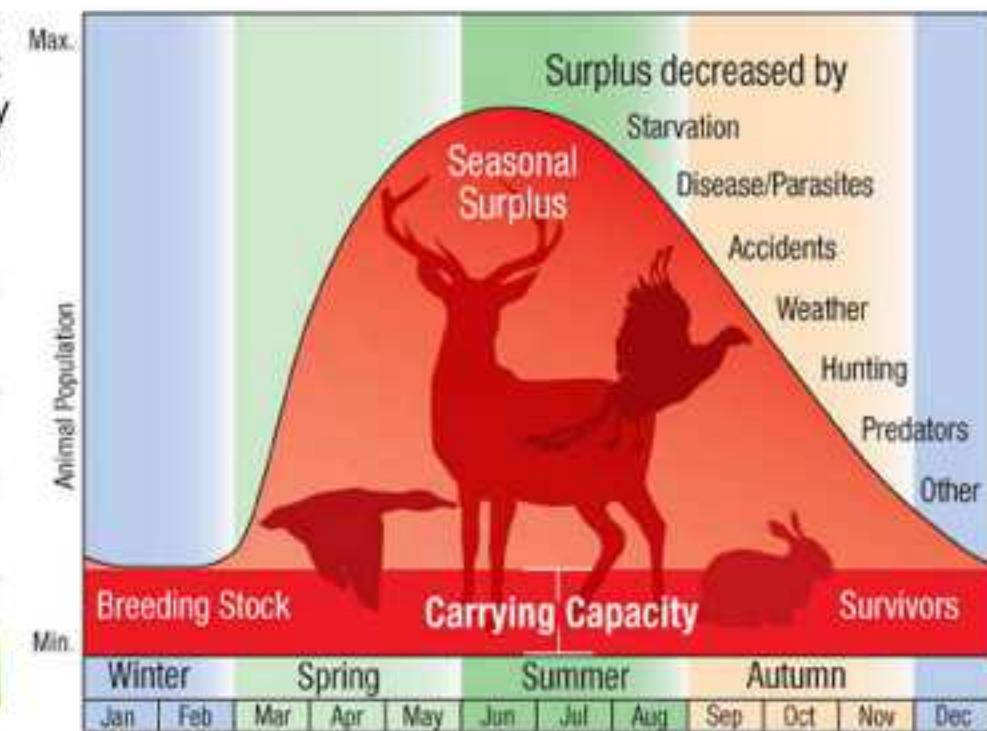
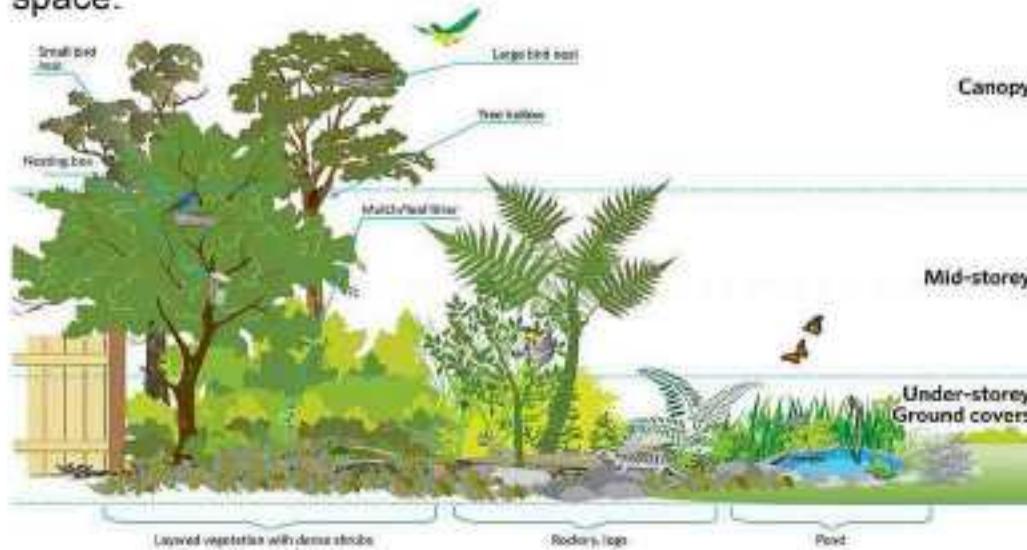
Habitat Quality

The type of resources is defined by the species selected. A habitat is not necessarily a good habitat. It may only be available at a specific time during the year. Therefore it may not be a suitable habitat. It is referred to as a habitat of low quality for the intended species.



Carrying Capacity

Some sites can provide an adequate amount of needs for a given number of the species in question. An adequate amount of habitat is referred to as having enough carrying capacity when it meets the needs of the intended species occupying the space.



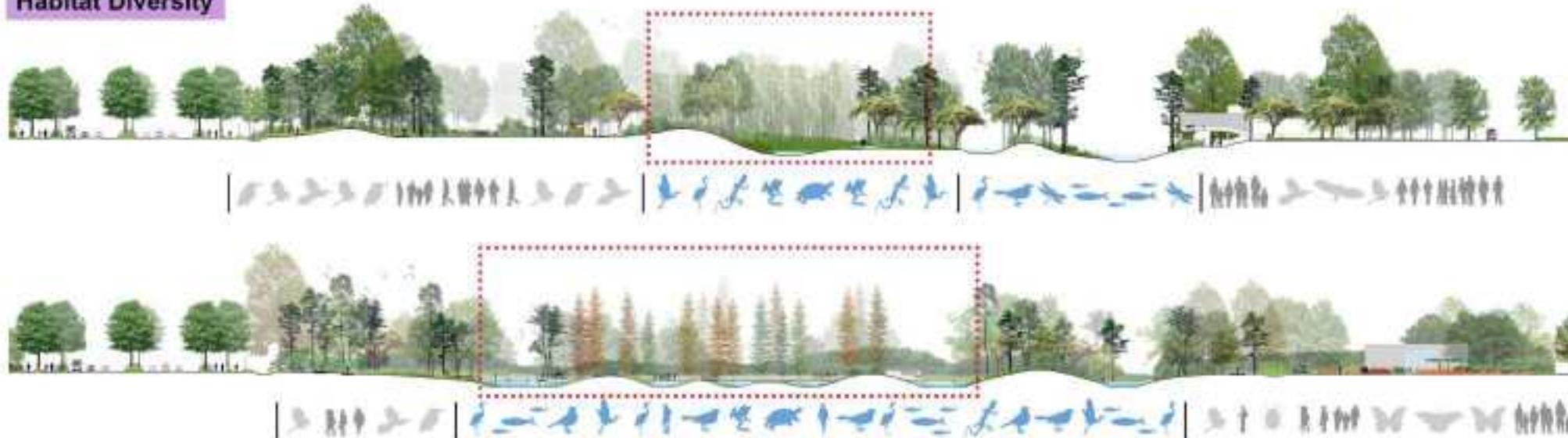
III. Special Requirements

Structural Diversity

The habitat should provide the basic needs for species occupying the site in question. Not all sites have to be available at all times of the year. There needs to be a diversity of habitats. This can be achieved by providing diverse types of food, cover and water requirements.



Habitat Diversity



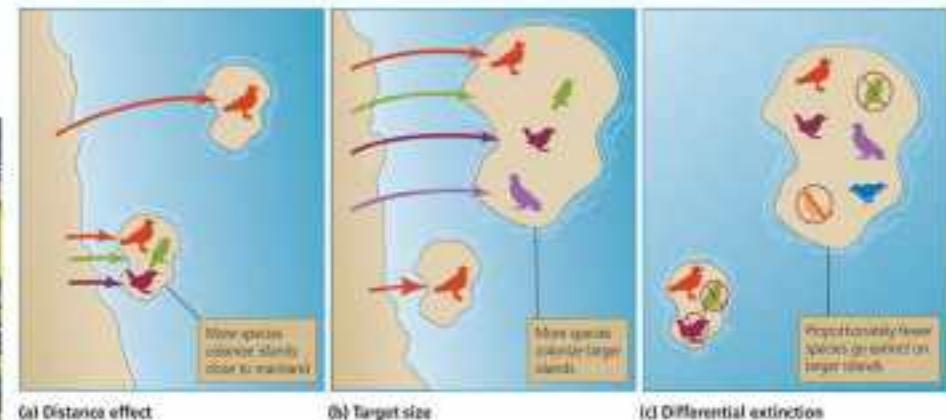
III. Special Requirements

Island Biogeography

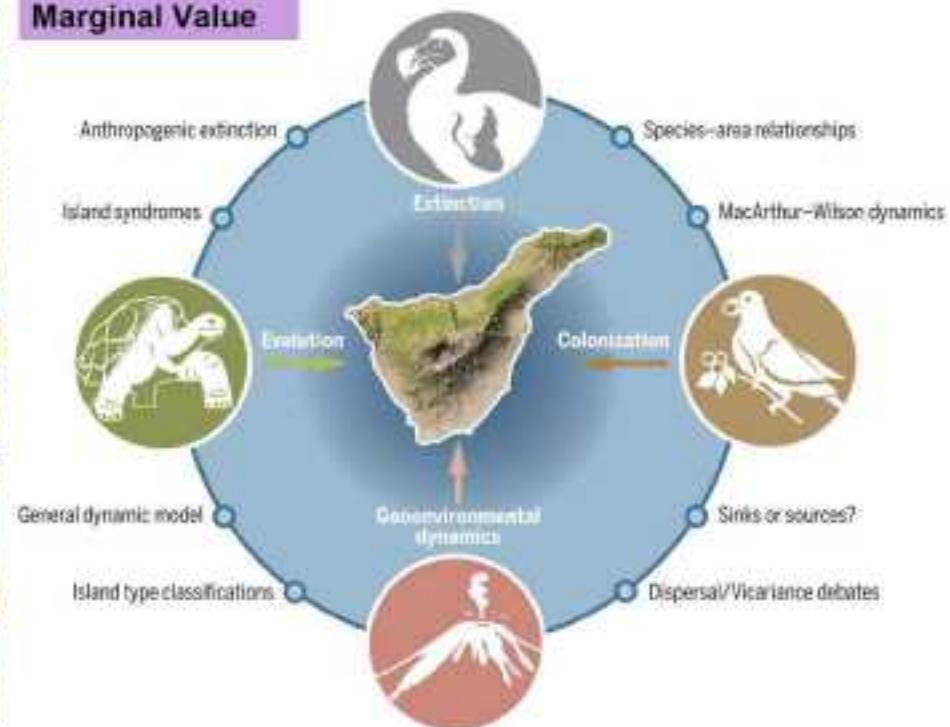
Some sites are limited by their shapes and sizes and contexts. A habitat might be surrounded by urban land uses so as to isolate it from nearby habitats. Therefore, these habitats are of marginal value due to the isolation.



Island Biogeography Theory



Marginal Value





Bridge on-site

Appendix 4. All 17 MLA Final Packages

Sustainable Wildlife Habitat Comprehensive Master Plan
Spring, Texas

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I. Site #1-1



Chenxia Pu
April 2018

I. Site #1-1

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I. Site #1-1

Site Selection



Site 1

I. Site #1-1

Property Boundary

Location



Harris County

N.T.S.

Aerial Photo



Site 1: 84.94 acres

N.T.S.

Habitat Map



Legend

— Boundary	Detention-Pond	Pond	Wetland	Corridor
→ Access	Detention Edge	Water Edge	Forest	Bank Stabilization
— 10 Acre Site	Meadow	Ecolone	Nectar	Riparian

Description

- Vegetation:** The site has 12 types of eco-systems; Meadow, Impoundment, Detention Pond Edge, Pond, Water edge, Ecolone, Forest, Nectar, Corridor, Bank stabilization and Riparian.
- Access:** The site has 7 accesses; 4 North east entries connect the neighborhoods; 2 South east entries connect the Cypress Creek park; 1 South west entry connects the Harris County parks.
- Water:** The site has 4 water bodies; Detention pond, pond, wetland, and cypress creek.
- Area:** Site 1 area is 84.94 acres; study area is 10.04 acres; blow up area is 1 acre.

I. Site #1-1

Elevation Zones Map



I. Site #1-1

Land Use Strategic Plan, 10 Acres

10 Acre Site



Proposed Habitat Zones



Legend

- - - Boundary - - - 1 Acre Site — Contour line □ Access — Trails • Rest Stop Site area: 10.04 acres

0 125 250 500ft



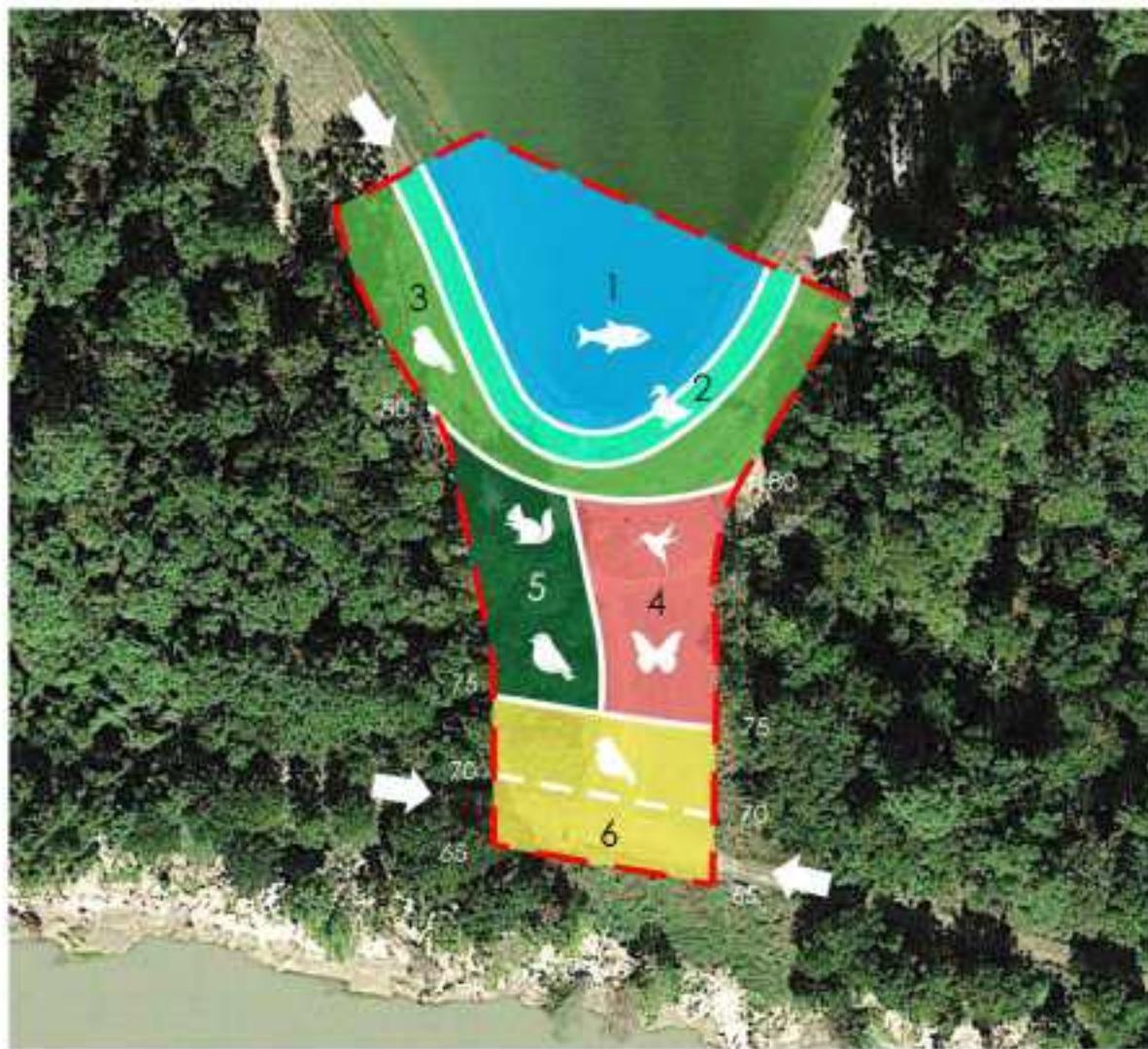
Existing Pavilion

Detention Pond

Habitat	Wildlife	Treatment	Habitat	Wildlife	Treatment
1 Detention pond		Grasses/Soccer Field/Impoundment	8 Buffer	Song bird/ small mammal	Shrub/ vines/ grasses
2 Detention edge	Butterfly	Wild grasses/ wildflowers/ vines	9 Forest	Song bird/ small mammal	Tree/ understorey/ shrub/ non-native
3 Meadow	Butterfly/ Bees/ Hummingbird	Wild grasses/ vines	10 Nectar	Butterfly/ Bees/ Hummingbird	Wildflower/ food source shrub/ ornamental grass
4 Pond	Stocking fish	Shallow water/ deep water	11 Corridor	Song bird	Canopy/ bird understorey Tree/ shrub
5 Water edge	Shore bird	Living water edge/ wetland plants/ food source/ nesting shrubs/ trees	12 Bank stabilization	Shore bird	Tree/ shrub/ grass/ wetland plants
6 Forest	Song bird	Forest/ shrub / wildgrasses	13 Creek	Fish/ shore bird	Creek/ Fishing pier
7 Wetland	Shore bird	Wetland plants			

I. Site #1-1

Land Use Zoning Plan, Zoom In, 1 Acre



Legend

— Boundary
➡ Access
~~~~~ Contour line:

Aquatic  
Water Edge  
Ecotone  
Forest  
Nectar  
Corridor

Site Area: 1 acre

0 25 50 100 150ft ↑

|   | Habitat         | Wildlife                      | Treatment                                                                        |
|---|-----------------|-------------------------------|----------------------------------------------------------------------------------|
| 1 | Aquatic         | Small Stacking Fish           | Shallow Water / Deep Water                                                       |
| 2 | Water Edge      | Shore Bird                    | Living Water Edge/ Wetland Plants/ Shore Bird Food Source/ Nesting Shrub / Blind |
| 3 | Ecotone         | Song Bird                     | Forest/ Shrub / Wild Grasses                                                     |
| 4 | Nectar          | Butterfly / Bees/ Hummingbird | Wildflower/ Food Source Shrub/ Ornamental Grass                                  |
| 5 | Forest          | Song Bird / Small Mammal      | Tree/ Understory/ Shrub/ Food-Source                                             |
| 6 | Corridor/ Trail | Song Bird                     | Canopy/ Bird Understory Tree/ Shrub                                              |

### Index Map



10 Acre Site

N.T.S.

1 Acre Site

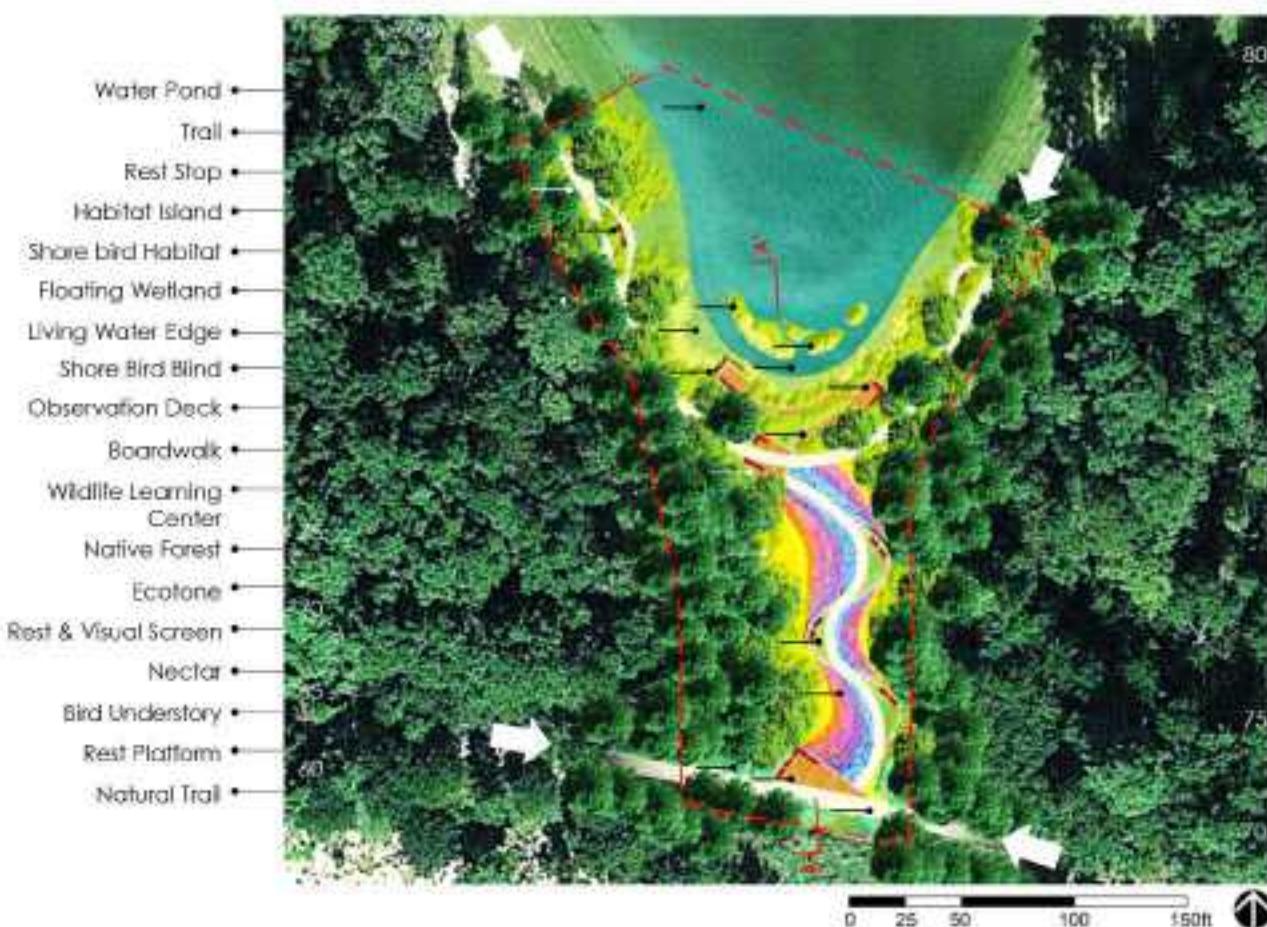
N.T.S.

# I. Site #1-1

## Master Plan, Zoom in, 1 Acre

### Legend

|  |                          |  |                                       |
|--|--------------------------|--|---------------------------------------|
|  | Water Pond               |  | Trail                                 |
|  | Rest Stop                |  | Habitat Island                        |
|  | Shore Bird Habitat       |  | Living Water Edge                     |
|  | Floating Wetland         |  | Shore Bird Blind                      |
|  | Observation Deck         |  | Boardwalk<br>[Close: Breeding Season] |
|  | Wildlife Learning Center |  | Native Forest                         |
|  | Ecotone                  |  | Rest & Visual Screen                  |
|  | Nectar                   |  | Bird Understory                       |
|  | Rest Platform            |  | Natural Trail                         |



### Existing Site



### Section A-A'

- 1.7 Natural Trail
- 2.5 Rest Platform
3. Bird Understory
- 4.6.8. Nectar
9. Trail
10. Shore Bird Habitat
11. Shore Bird Blind
12. Habitat Island
13. Floating Wetland
14. Water Pond

1 Acre Site

0 10 20 40ft



# I. Site #1-1

## Plant List, Zoom in, 1 Acre

### Shore Bird Habitat

| Forbs                                            | Hydric Zone          | Value                 |
|--------------------------------------------------|----------------------|-----------------------|
| Primroses/ <i>Ludwigia</i> spp.                  | Emergent             | 0 Food/ brood         |
| Pondweed/ <i>Potamogeton</i> spp.                | Emergent/ Submerging | 0 Food/ seed)         |
| Inswamp milkweed/ <i>Asclepias incarnata</i>     | Toe slope            | 0 Cover               |
| Smartweed/ <i>Polygonum</i> spp.                 | Toe slope/ Emergent  | 0 Food/ Invertebrate) |
| Grasses                                          | Hydric Zone          | Value                 |
| Spikerush/ <i>Eleocharis</i> <i>equisetoides</i> | Toe slope/ Emergent  | 0 Food/ seed)         |
| Sedge/ <i>Carex</i> spp.                         | Upper/ Middle/ Toe   | 0 Cover/ food         |
| Shrubs                                           | Hydric Zone          | Value                 |
| Buttonbush/ <i>Cephalanthus occidentalis</i>     | Toe slope/ Emergent  | 0 Cover/ food         |
| Trees                                            | Hydric Zone          | Value                 |
| Black willow/ <i>Salix nigra</i>                 | Toe slope/ Emergent  | 0 Food/ screen        |
| Sugarcane/ <i>Celosia</i> <i>argentea</i>        | Upper/ Middle/ Toe   | 0 Food/ fruit)        |

### Visual Screen

| Vines                                            | Color         | Wildlife      |
|--------------------------------------------------|---------------|---------------|
| Cat's claw vine/ <i>Mastodynamic unguis-cati</i> | Yellow        | 0 Butterflies |
| Orange jubilee/ <i>Tecoma x hybrid</i>           | Orange        | 0 Butterflies |
| Cypress vine/ <i>Ipomoea quamoclit</i>           | Red           | 0 Butterflies |
| Passionflower/ <i>Passiflora incarnata</i>       | White, purple | 0 Butterflies |

### Nectar Habitat

| Nectar Plants                                  | Color          | Season               | Wildlife      |
|------------------------------------------------|----------------|----------------------|---------------|
| Bluebonnet/ <i>Lupinus texensis</i>            | Blue           | Spring               | 0 Butterflies |
| Mist flower/ <i>Ageratum houstonianum</i>      | Blue           | Summer/ fall         | 0 Butterflies |
| Heliotrope/ <i>Heliotropium arborescens</i>    | Blue           | Summer/ fall/ winter | 0 Butterflies |
| Phlox/ <i>Phlox</i> spp.                       | Purple         | Spring               | 0 Butterflies |
| Verbena/ <i>verbena</i> spp.                   | Purple         | Summer               | 0 Butterflies |
| Aster/ <i>Aster</i> spp.                       | Purple         | Summer/ fall         | 0 Butterflies |
| Bee balm/ <i>Monarda</i> spp.                  | Red/ pink      | Summer               | 0 Butterflies |
| Feebaine/ <i>Erigeron</i> spp.                 | Pink/ yellow   | Spring/ summer       | 0 Butterflies |
| Coneflower/ <i>Echinacea purpurea</i>          | Pink           | Summer               | 0 Butterflies |
| Pink candle celosia/ <i>Celosia argentea</i>   | Pink           | Summer/ fall         | 0 Butterflies |
| Mexican milkweed/ <i>Asclepias curassavica</i> | Orange         | Summer/ fall         | 0 Butterflies |
| Cosmos/ <i>Cosmos bipinnatus</i>               | Orange/ yellow | Summer/ fall         | 0 Butterflies |
| Coreopsis/ <i>Coreopsis</i> spp.               | Yellow         | Spring/ fall/ summer | 0 Butterflies |
| Yarrow/ <i>Achillea millefolium</i>            | Yellow         | Spring/ summer       | 0 Butterflies |
| Goldenrod/ <i>Solidago</i> spp.                | Yellow         | Summer/ fall         | 0 Butterflies |
| Lantana/ <i>Lantana camara</i>                 | Yellow/ orange | Summer               | 0 Butterflies |
| Dahlberg daisy/ <i>Thymophyllum tenuiloba</i>  | Yellow         | Summer/ fall         | 0 Butterflies |

### Song Bird Habitat & Ecotone

| Trees                                             | Value         | Wildlife |
|---------------------------------------------------|---------------|----------|
| White ash/ <i>Fraxinus americana</i>              | 0 Caterpillar | 0 Birds  |
| Bur oak/ <i>Quercus alba</i>                      | 0 Caterpillar | 0 Birds  |
| Cedar elm/ <i>Ulmus crassifolia</i>               | 0 Caterpillar | 0 Birds  |
| Pecan/ <i>Carya illinoinensis</i>                 | 0 Nut/ seed   | 0 Birds  |
| Shumard oak/ <i>Quercus shumardii</i>             | 0 Nut/ seed   | 0 Birds  |
| Shrubs                                            | Value         | Wildlife |
| American beautyberry/ <i>Callicarpa americana</i> | 0 Fruit       | 0 Birds  |
| Cherry laurel/ <i>Prunus caroliniana</i>          | 0 Fruit       | 0 Birds  |
| Dwarf chinse holly/ <i>Ilex cornuta</i>           | 0 Fruit       | 0 Birds  |
| Possumhaw/ <i>Ilex decidua</i>                    | 0 Fruit       | 0 Birds  |
| Yaupon holly/ <i>Ilex vomitoria</i>               | 0 Fruit       | 0 Birds  |
| Grasses                                           | Value         | Wildlife |
| Indian grass/ <i>Sorghastrum nutans</i>           | 0 Seed        | 0 Birds  |
| Switchgrass/ <i>Panicum virgatum</i>              | 0 Seed        | 0 Birds  |
| Little bluestem/ <i>Schizachyrium scoparium</i>   | 0 Seed        | 0 Birds  |
| Vines                                             | Value         | Wildlife |
| Pepper vine/ <i>Ampelopsis arborea</i>            | 0 Fruit       | 0 Birds  |
| Mockberries/ <i>Rubus</i> spp.                    | 0 Fruit       | 0 Birds  |

## I. Site #1-1

### Reference, Plant List, 1 Acre

1. <https://www.chron.com/life/health/article/Park-named-for-Kingwood-resident-Herman-Little-9301490.php#photo-11057866> (Herman little park pavilion)
2. [https://www.hgr.com/lisseth/sold\\_detail/22454-highland-point-ln/68292862](https://www.hgr.com/lisseth/sold_detail/22454-highland-point-ln/68292862) (Herman little park detention pond)
3. <http://www.kesternursery.com/index.htm> (Wetland Management For Waterfowl)
4. <https://www.hcfcd.org/media/1974/wetland-guide-final.pdf> (Harris County Field Guide for Plant Identification)
5. <http://counties.agrilife.org/harris/files/2011/05/bflygrdn.pdf> (A Guide to Butterfly Gardening in Harris County)
6. <https://counties.agrilife.org/harris/files/2011/05/perennials.pdf> (Gardening with Perennials in Harris County)
7. <https://www.hcfcd.org/media/1749/final-prairie-management-plan-v3.pdf> (Coastal Prairie Management Plan in Harris county)
8. [http://tx.audubon.org/sites/g/files/amh541/f/static\\_pages/attachments/plantsforbirds\\_plantlist.pdf](http://tx.audubon.org/sites/g/files/amh541/f/static_pages/attachments/plantsforbirds_plantlist.pdf) (Plants for Birds in Texas)
9. [https://tpwd.texas.gov/fishboat/fish/action/stock\\_bywater.php?WB\\_code=1281](https://tpwd.texas.gov/fishboat/fish/action/stock_bywater.php?WB_code=1281) (Stocking History for Herman Little Pond)

## I. Site #1-2



TIANQI SHI  
April, 2018

# I. Site #1-2

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| References                            |    |
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## I. Site #1-2

### Site Selection



Site #1

# I. Site #1-2

## Property Boundary

Final Study - Site Selection - Analysis Final



N.T.S.

## Aerial Photo



N.T.S.

Site Area: 84.93 acres

## Habitat Map



### Legend

|                   |                  |                     |                      |
|-------------------|------------------|---------------------|----------------------|
| Site Boundary     | Main Road        | Existing Trails     | Contour Line         |
| Study Area        | Wetland          | Creek               | Entry                |
| I Human Activity  | II Wetland Edge  | III Forest Corridor | IV Forest Understory |
| V Erosion Control | 91ft, High Point | 58ft, Low Point     |                      |

### Description

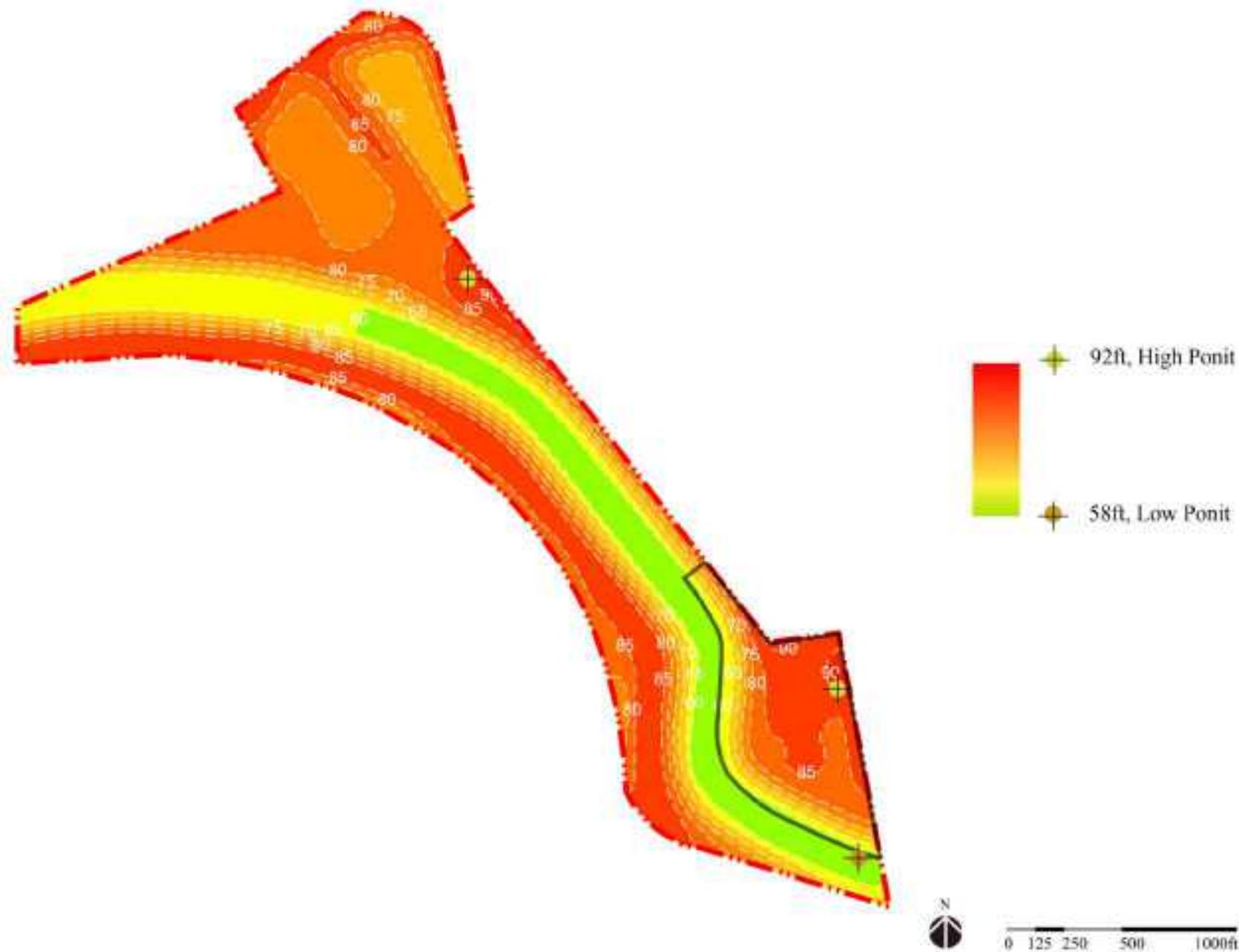
1. Ecoregional: Through analysis, the area has a single type of soil, less vegetation coverage, and is heavily erosive.
2. Access Point: There is an existing road going through the site. Two access points are located in the northeast corner providing convenience for the visitors.
3. Water: There is an existing creek going through the site. It brings more possibilities on interests of visitors, but it also faces the threat of flooding.
4. Surface Area: The study area is 84.93 acres. A total of 12 habitats are located in the area. The main purpose is to provide tourists with recreational facilities while protecting local species resources; increasing species diversity, and preventing flooding and soil erosion.

# I. Site #1-2

## Elevation Zones Map

### Legend

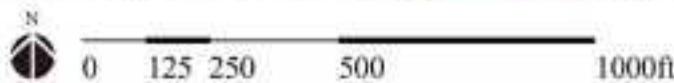
- Site Boundary
- 90 feet
- 85 - 90 feet
- 80 - 85 feet
- 75 - 80 feet
- 70 - 75 feet
- 65 - 70 feet
- 60 feet



# I. Site #1-2

## Land Use Strategic Plan, 10 Acres

### 10 Acres Individual Site

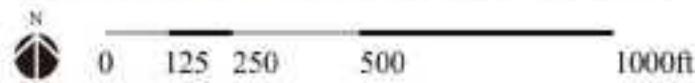
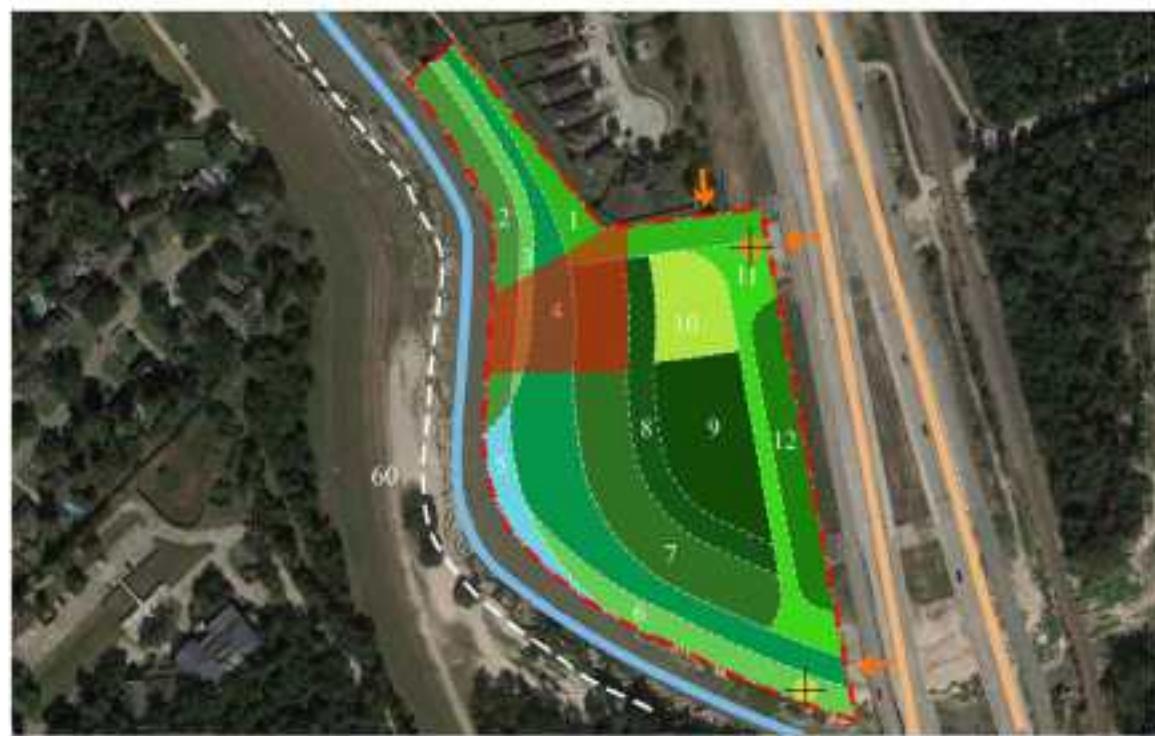


#### Legend

- Creek
- Trail
- Boundary
- Vehicle Road
- Entry
- Contour Line

Study Area: 11.91 acres

### Proposed Habitat Map



#### Legend

- Site Boundary
- Main Road
- Creek
- Contour Line
- Study Area
- 92ft, High Point
- 58ft, Low Point
- Entry
- Habitat
- Shrub Buffer
- Creek Edge Restoration
- Riparian Restoration I
- Erosion Control
- Creek
- Riparian Restoration II
- Meadow/Shrub Edge
- Shrub/Forest Edge
- Forest Interior
- Forest Replant
- Forest/Meadow Edge
- Shrub/Butterfly Habitat

Design Area: 1.31 acres

# I. Site #1-2

## Land Use Zoning Plan, Zoom In, 1 Acre



### Legend

|                     |                          |                          |                   |
|---------------------|--------------------------|--------------------------|-------------------|
| Recreation Zone     |                          | Habitat Zone             |                   |
| Site Boundary       | Existing Trail           | Contour Line             | Hiking Trail 572B |
| Creek               | Access Point             | 7 Picnic Sites           | Biking Trail 405B |
| Habitat Zone        | 8 Platform               | 9 Gabion Steps 141B      |                   |
| 1 Shrub Buffer      | 2 Creek Edge Restoration | 3 Riparian Restoration I | 4 Erosion Control |
| 5 Meadow/Shrub Edge | 6 Native Shrub           | 7 Wildflower Garden      |                   |

Source: Google Earth Pro

| Zone | Habitat                | Treatments                                        |
|------|------------------------|---------------------------------------------------|
| 1    | Shrub Buffer           | Visual Screen<br>Native Grass Seed                |
| 2    | Creek Edge Restoration | Gabion Steps<br>Wetland Plants                    |
| 3    | Riparian Restoration I | Shrub/ Meadow Cover<br>Riparian                   |
| 4    | Erosion Control        | Trail / Human Activity<br>Erosion Control         |
| 5    | Meadow/Shrub Edge      | Shrub Path<br>Forest Understory                   |
| 6    | Native Shrub           | Food Source Plants                                |
| 7    | Picnic Sites           | Single-table Picnic Area<br>Group Picnic Pavilion |
| 8    | Platform               | Fishing Platform<br>Fishing Habitat               |
| 9    | Wildflower Garden      | Native Flower<br>Butterfly Habitat                |

### Index Map



N.T.S. Study Area: 11.91 acres

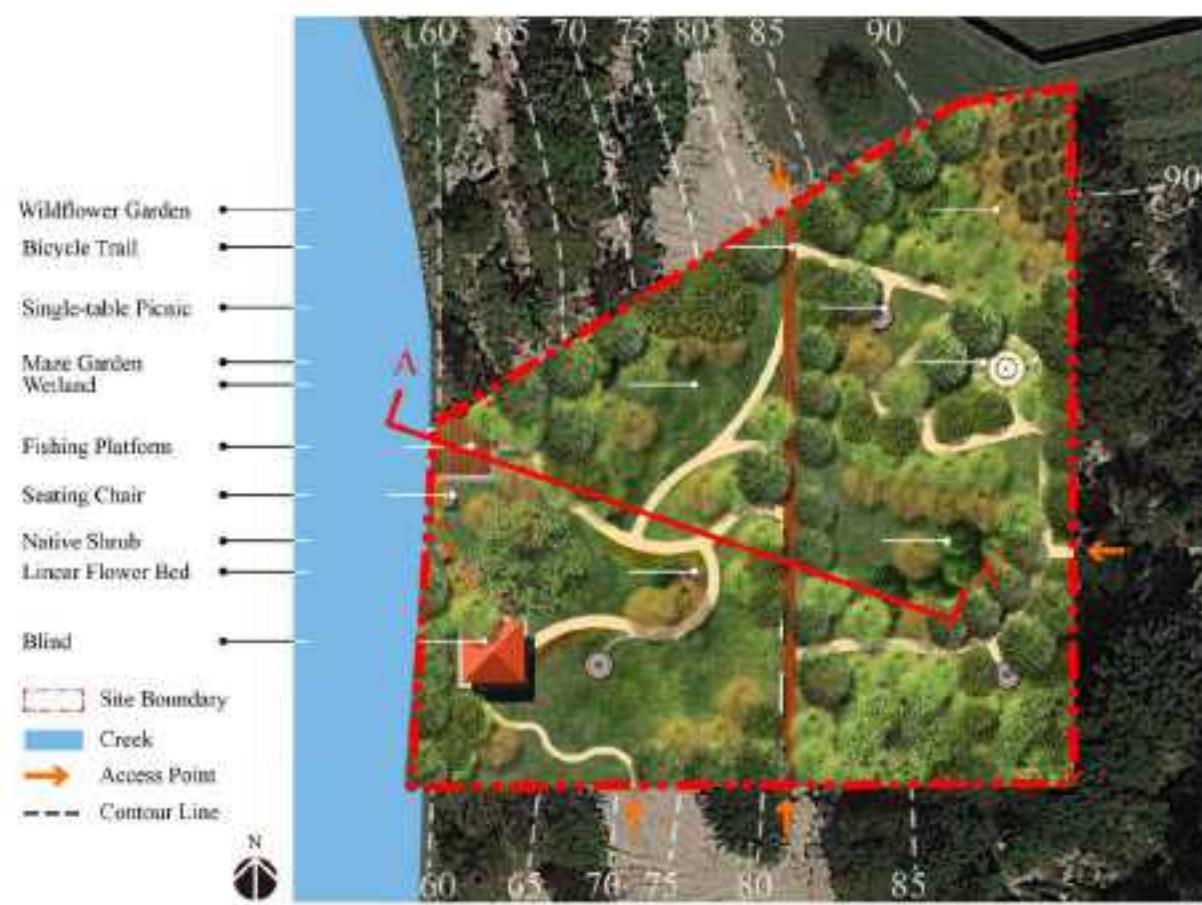


N.T.S Design Area: 1.31 acres

# I. Site #1-2

## Master Plan, Zoom in, 1 Acre

### Legend



### Index Map

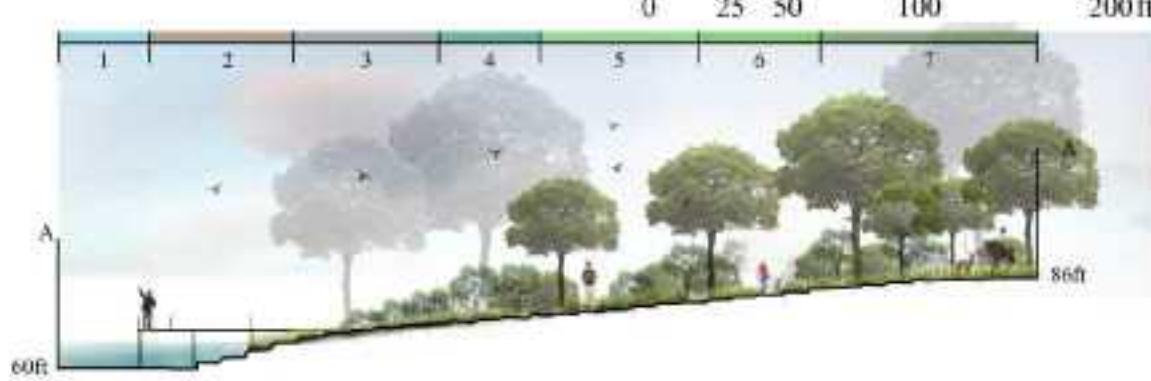


Design Area: 1.31 acres

N.T.S.

### Section A-A'

1. Creek
2. Fishing Platform
3. Gabion Steps
4. Wetland
5. Forest Understory
6. Bicycle Trail
7. Forest Edge



# I. Site #1-2

## Plant List, Zoom in, 1 Acre

### Wildflower Garden

| Tree                 |                         |   |
|----------------------|-------------------------|---|
| Eastern Black Walnut | <i>Juglans nigra</i>    | 2 |
| American Elm         | <i>Ulmus americana</i>  | 2 |
| Blackgum             | <i>Nyssa sylvatica</i>  | 4 |
| Willow Oak           | <i>Quercus phellos</i>  | 4 |
| Texas Red Oak        | <i>Quercus buckleyi</i> | 6 |

| Shrub                 |                              |   |
|-----------------------|------------------------------|---|
| Tea Rose              | <i>Rosa odorata</i>          | 5 |
| Japanese Barberry     | <i>Berberis thunbergii</i>   | 5 |
| Green Pittosporum     | <i>Berberis thunbergii</i>   | 6 |
| Texas Mountain Laurel | <i>Sophora secundiflora</i>  | 4 |
| Bigleaf Hydrangea     | <i>Hydrangea macrophylla</i> | 5 |

| Forb              |                               |   |
|-------------------|-------------------------------|---|
| Rose Vervain      | <i>Glandularia canadensis</i> | 6 |
| Hairy Tubetongue  | <i>Justicia pilosella</i>     | 6 |
| Butterflyweed     | <i>Asclepias tuberosa</i>     | 6 |
| Cardinal Flower   | <i>Lobelia cardinalis</i>     | 6 |
| Partridgeberry    | <i>Mitchella repens</i>       | 6 |
| Texas Spider Lily | <i>Hymenocallis liriosme</i>  | 6 |
| Standing Cypress  | <i>Ipomopsis rubra</i>        | 6 |

| Vine                  |                            |   |
|-----------------------|----------------------------|---|
| Cape Honeysuckle      | <i>Tecoma capensis</i>     | 5 |
| Solanum 'Potato Vine' | <i>Solanum jasminoides</i> | 5 |
| Trumpet Creeper       | <i>Campsis radicans</i>    | 5 |

### Riparian Edge & Wetland

| Tree           |                           |   |
|----------------|---------------------------|---|
| White Oak      | <i>Quercus alba</i>       | 2 |
| Water Oak      | <i>Quercus nigra</i>      | 2 |
| Pecan          | <i>Carya illinoiensis</i> | 4 |
| American Holly | <i>Ilex opaca</i>         | 4 |

| Shrub              |                            |   |
|--------------------|----------------------------|---|
| Dwarf palmetto     | <i>Sabal minor</i>         | 6 |
| Chinese Juniper    | <i>Juniperus chinensis</i> | 6 |
| Boxleaf Euonymus   | <i>Euonymus japonicus</i>  | 5 |
| Littleleaf Boxwood | <i>Buxus microphylla</i>   | 6 |
| Waxleaf Ligustrum  | <i>Ligustrum japonicum</i> | 6 |

| Fern                |                                 |   |
|---------------------|---------------------------------|---|
| Green Spranglestop  | <i>Leptochloa dubia</i>         | 6 |
| Horsetail           | <i>Equisetum hyemale</i>        | 6 |
| Sand Spikerush      | <i>Eleocharis montevidensis</i> | 5 |
| Water hyacinth      | <i>Eichhornia crassipes</i>     | 5 |
| Red milkweed        | <i>Asclepias rubra</i>          | 5 |
| Virginia sweetspire | <i>Itea virginica</i>           | 5 |
| Iris                | <i>Iris spp.</i>                | 6 |
| Southern cattail    | <i>Typha domingensis</i>        | 6 |
| Leucothoe           | <i>Leucothoe racemosa</i>       | 5 |

| Grass             |                                |   |
|-------------------|--------------------------------|---|
| Gulf Muhly        | <i>Muhlenbergia capillaris</i> | 6 |
| Fiber-optic Grass | <i>Isolepis Cernua</i>         | 6 |

### Native Shrub & Forest Edge

| Tree            |                           |   |
|-----------------|---------------------------|---|
| Anaqua          | <i>Ebretia anacua</i>     | 2 |
| Texas Persimmon | <i>Diospyros tex</i>      | 2 |
| Yaupon          | <i>Ilex vomitoria</i>     | 4 |
| Callery Pear    | <i>Pyrus calleryana</i>   | 4 |
| Farkleberry     | <i>Vaccinium arboreum</i> | 6 |
| Pawpaw          | <i>Asimina triloba</i>    | 6 |

| Shrub               |                                |   |
|---------------------|--------------------------------|---|
| Wax Myrtle          | <i>Myrica cerifera</i>         | 6 |
| Crimson Bottlebrush | <i>Callistemon citrinus</i>    | 6 |
| Virginia Sweetspire | <i>Itea virginica</i>          | 5 |
| Oleander            | <i>Nerium oleander</i>         | 5 |
| Red Tip Photinia    | <i>Photinia x fraseri</i>      | 6 |
| Gardenia            | <i>Gardenia jasminoides</i>    | 6 |
| Forsythia           | <i>Forsythia intermedia</i>    | 8 |
| Pampass Grass       | <i>Cortaderia selloana</i>     | 8 |
| Dwarf Chinese Holly | <i>Ilex cornuta</i>            | 6 |
| Texas Sage          | <i>Leucophyllum frutescens</i> | 6 |

| Forb            |                               |   |
|-----------------|-------------------------------|---|
| Obedient Plant  | <i>Physostegia virginiana</i> | 6 |
| Walter's Violet | <i>Viola walteri</i>          | 6 |
| Scarlet Sage    | <i>Salvia coccinea</i>        | 8 |
| Spotted Beebalm | <i>Monarda punctata</i>       | 8 |
| Wild Petunia    | <i>Ruellia humilis</i>        | 6 |
| Pigeonberry     | <i>Rivina humilis</i>         | 6 |

## I. Site #1-2

### Reference, Plant List, 1 Acre

01. <http://mapio.net/pic/p-50331157/>
02. [https://en.wikipedia.org/wiki/Harris\\_County,\\_Texas](https://en.wikipedia.org/wiki/Harris_County,_Texas)
03. <http://www.gosur.com/google-earth/?lang=cn>
04. <http://www.arcgis.com>
05. <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
06. <https://www.bigtextrées.com/plants/vines>
07. <http://npsot.org/wp/houston/files>
08. <http://www.hicksenvplantdatabase.com/PlantFind.asp>
09. <http://www.seedsource.com>
10. <http://www.hicksenvplantdatabase.com/PlantFind.asp>
11. <https://www.calloways.com/plants-flowers/grasses/>
12. <https://aggie-horticulture.tamu.edu/vegetble/guides/the-crops-of-texas/forage-grasses/>

## II. Site #2-1



Trevor Maciejewski  
Spring 2018

## II. Site #2-1

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Site #2

## II. Site #2-1

### Site Selection



Site #2

## II. Site #2-1

### Property Boundary

Final Study - Site Selection - Site Analysis



Site Location



Proposed Habitat Map



#### Legend

| 1. Site Boundary/Roads  | 3. Existing Water    | 5. Land Types       |
|-------------------------|----------------------|---------------------|
| — Site Boundary         | Lake                 | 1 Recreational      |
| — Paved Pathway         |                      | 2 Human Access      |
| — Nature Trail          |                      | 3 Human Ecotone     |
| 2. High Point/Low Point | 4. Contours          | 4 Habitat Island    |
| ○ High Point - 110ft    | Contour Line (White) | 5 Meadow/Forest     |
| ○ Low Point - 59ft      |                      |                     |
| 6. Wetland Ecotone      | 7. Wildlife Corridor | 8. Riparian Habitat |
| 9. Forest Buffer        |                      |                     |

#### Description

- Vegetation:** After using aerial images for analysis, the 10 acre site could be categorized into 5 different landscape types. The most prominent types were forest patches, red cedar mottes, and oaks. These natural resources should be preserved and utilized.
- Access Points:** There is a main paved pathway that enters through the NE corner of the 10 acre site and leads to the viewing area. There are multiple natural trails that provide good access throughout the site.
- Water:** There are two main water bodies within the site. The Big Lake is a large water body used for recreation/swimming. The smaller water body is the Bird Pond which is used for bird watching.
- Area:** The size of the farm site is 192 acres. The size of the individual site is 11.05 acres.

## II. Site #2-1

### Elevation Zones Map



## II. Site #2-1

### Land Use Strategic Plan, 10 Acres

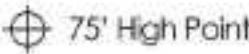
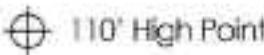
10 Acre Site



Legend

1. Site Boundary/Paths  
— Site Boundary  
— Main Paths

2. High/Low Point



3. Land Types

|  |                   |
|--|-------------------|
|  | Forest Patch      |
|  | Tree Buffer       |
|  | Shoreline Habitat |

4. Existing Water Bodies



5. Existing Contours



6. Proposed 1-Acre Site

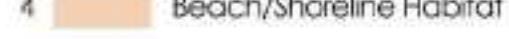
----- Site Boundary

Proposed Habitat Zones - 10 Acre Site

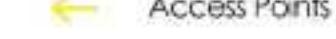
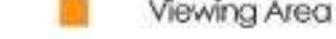
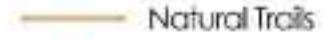
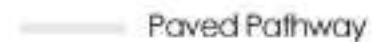


Legend

Land Types



Pedestrian Activity



## II. Site #2-1

### Land Use Zoning Plan, Zoom In, 1 Acre



#### Legend

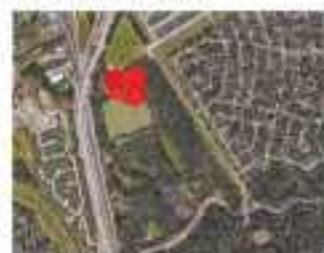
| Recreation Features |  |
|---------------------|--|
| Paved Pathway       |  |
| Nature Trail        |  |
| Bird Blind          |  |
| Picnic Shelter      |  |
| Access Points       |  |

| Natural Features |              |
|------------------|--------------|
| 1                | Forest Patch |
| 2                | Forest Edge  |
| 3                | Ecotone Area |
| 4                | Tree Buffer  |

| Special Features |                    |
|------------------|--------------------|
| 5                | Bird Watching      |
| 6                | Native Prairie     |
| 7                | Pollinator Gardens |

|                              |                                                 |
|------------------------------|-------------------------------------------------|
| Zone 1<br>Forest/Trails      | Deer/Small Mammals Habitat                      |
| Zone 2<br>Forest Edge        | Small Trees/Large Shrubs                        |
| Zone 3<br>Ecotone Area       | Small Shrubs/Grasses                            |
| Zone 4<br>Tree Buffer        | Visual Screening                                |
| Zone 5<br>Pollinator Gardens | Wildflowers<br>Butterflies                      |
| Zone 6<br>Native Prairie     | Tall Grasses                                    |
| Zone 7<br>Bird Pond          | Shorebird/Songbird Habitat<br>Wetland Plantings |
| Zone 8<br>Bird Watching      | Bird Blinds                                     |

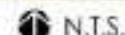
#### Index Map



10 Acre Site



1 Acre Site



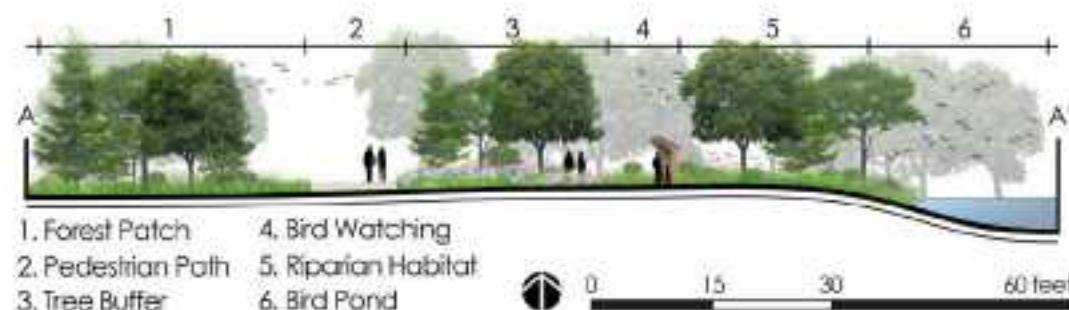
## II. Site #2-1

### Master Plan, Zoom in, 1 Acre

#### Legend



#### Existing Site



## II. Site #2-1

### Plant List, Zoom in, 1 Acre

#### Forest Patch

| Tree                                              | Wildlife Index |   |
|---------------------------------------------------|----------------|---|
| American Beech ( <i>fagus grandifolia</i> )       | Excellent      | 6 |
| Black Walnut ( <i>Juglans nigra</i> )             | Fair           | 7 |
| Bald Cypress ( <i>Taxodium distichum</i> )        | Good           | 6 |
| Live Oak ( <i>Quercus virginiana</i> )            | Excellent      | 7 |
| Post Oak ( <i>Quercus stellata</i> )              | Good           | 7 |
| Sweetgum ( <i>Liquidambar styraciflua</i> )       | Fair           | 7 |
| Eastern Red Cedar ( <i>Juniperus virginiana</i> ) | Excellent      | 6 |
| Southern Magnolia ( <i>Magnolia grandiflora</i> ) | Fair           | 7 |

| Shrub                                                 | Wildlife Index |   |
|-------------------------------------------------------|----------------|---|
| Littleleaf Boxwood ( <i>Buxus microphylla</i> )       | Fair           | 6 |
| Chinese Juniper ( <i>Juniperus chinensis</i> )        | Good           | 7 |
| Wax Myrtle ( <i>Myrica cerifera</i> )                 | Excellent      | 6 |
| Buttonbush ( <i>Cephaelanthus occidentalis</i> )      | Fair           | 6 |
| Chinese Fringe Flower ( <i>Iosepetaium chinense</i> ) | Fair           | 7 |
| Texas Sage ( <i>Leucophyllum frutescens</i> )         | Good           | 6 |
| Chinese Privet ( <i>Ligustrum sinense</i> )           | Fair           | 7 |
| Mountain Laurel ( <i>Sophora secundiflora</i> )       | Excellent      | 7 |

| Vine                                  | Wildlife Index |   |
|---------------------------------------|----------------|---|
| Wisteria ( <i>Wisteria sinensis</i> ) | Good           | 7 |
| Creeping Fig ( <i>Ficus pumila</i> )  | Fair           | 7 |



Buttonbush (*Cephaelanthus occidentalis*)

Post Oak (*Quercus stellata*)

Source: <https://www.wildflower.org/expert/show.php?id=808>

#### Riparian Habitat

| Tree                                        |   |  |
|---------------------------------------------|---|--|
| Green Ash ( <i>Fraxinus pennsylvanica</i> ) | 7 |  |
| Water Oak ( <i>Quercus nigra</i> )          | 3 |  |
| Willow Oak ( <i>Quercus phellos</i> )       | 3 |  |
| Black Willow ( <i>Salix nigra</i> )         | 2 |  |
| River Birch ( <i>Betula nigra</i> )         | 3 |  |
| Chaste Tree ( <i>Vitex agnus-castus</i> )   | 7 |  |

| Shrub                                            |   |  |
|--------------------------------------------------|---|--|
| Dwarf Palmetto ( <i>Sabal minor</i> )            | 1 |  |
| Bushy Bluestem ( <i>Andropogon glomeratus</i> )  | 7 |  |
| Buttonbush ( <i>Cephaelanthus occidentalis</i> ) | 3 |  |
| Virginia Sweetspire ( <i>Itea virginica</i> )    | 3 |  |
| Leucothoe ( <i>Leucothoe racemosa</i> )          | 2 |  |
| Water Hyacinth ( <i>Eichornia crassipes</i> )    | 1 |  |
| Southern Blue Iria ( <i>Iris virginica</i> )     | 2 |  |
| Spikerush ( <i>Eleocharis spp.</i> )             | 3 |  |

| Fern                                      |   |  |
|-------------------------------------------|---|--|
| River Fern ( <i>Helyopteris kunthii</i> ) | 7 |  |
| Water Lily ( <i>Nymphaeaceae spp.</i> )   | 7 |  |



Water Hyacinth (*Eichornia crassipes*)

Source: <https://www.wildflower.org/expert/show.php?id=140>

#### Wildflower Gardens

| Flowers                                            |   |  |
|----------------------------------------------------|---|--|
| Common Yarrow ( <i>Achillea millefolium</i> )      | 2 |  |
| Pink-Scale Blazing Star ( <i>Liatris elegans</i> ) | 2 |  |
| Winecup ( <i>Calliopsis involucrata</i> )          | 2 |  |
| Standing Cypress ( <i>Pomadopsis rubra</i> )       | 2 |  |
| Violet Ruellia ( <i>Ruellia nudiflora</i> )        | 1 |  |
| Lyreleaf Sage ( <i>Salvia lyrate</i> )             | 3 |  |
| Spotted Beebalm ( <i>Monarda punctata</i> )        | 3 |  |
| Pigeonberry ( <i>Phytolacca humilis</i> )          | 1 |  |
| Partridge Pea ( <i>Chamoeleostra fasciculata</i> ) | 3 |  |
| Gulf Coast Penstemon ( <i>Penstemon tenuis</i> )   | 3 |  |
| Pinkladies ( <i>Monotheca speciosa</i> )           | 3 |  |
| Annual Phlox ( <i>Phlox drummondii</i> )           | 3 |  |

| Grasses                                            |   |  |
|----------------------------------------------------|---|--|
| Texas Bluegrass ( <i>Poa arachnifera</i> )         | 3 |  |
| Inland Sea Oats ( <i>Chasmanthium latifolium</i> ) | 1 |  |
| Texas Sedge ( <i>Carex texensis</i> )              | 1 |  |
| Little Bluestem ( <i>Schizachyrium scoparium</i> ) | 3 |  |
| Big Bluestem ( <i>Andropogon gerardii</i> )        | 3 |  |
| Side-oats Grama ( <i>Bouteloua curtipendula</i> )  | 3 |  |



Winecup (*Calliopsis involucrata*)



Standing Cypress (*Pomadopsis rubra*)

Source: <https://www.wildflower.org/expert/show.php?id=318>

## II. Site #2-1

### Reference, Plant List, 1 Acre

1. Wildflower Center - <https://www.wildflower.org/expert/show.php?id=10430>
2. Wildflower Center - <https://www.wildflower.org/expert/show.php?id=8096>
3. Wildflower Center - <https://www.wildflower.org/expert/show.php?id=2048>
4. Texas Coastal Watershed Program - <http://tcwp.tamu.edu/files/2012/06/brochure.pdf>
5. Cover Photo - <https://fineartamerica.com/featured/cypress-creek-texas-steve-snyder.html>
6. Wildlife Forage Plants - <http://www.foragingtexas.com/>
7. Aggie Horticulture Plants - <https://aggie-horticulture.tamu.edu/>
8. Bird Watching - <https://tpwd.texas.gov/state-parks/parks/things-to-do/birding-in-state-parks>
9. Native Plants of Texas - <https://npsot.org/wp/resources/finding-natives/>

## II. Site #2-2



Priya Katoch  
April, 2018

## II. Site #2-2

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| Plant List, Reference, 1 Acre<br>Cypress Creek Park at Timber Lane, Spring Texas .....          | .08 |

## II. Site #2-2

### Site Selection



Site 2

## II. Site #2-2

### Property Boundary

Final Study – Site Selection – Analysis Final



N.T.S.

### Land Cover Type



0 0.35 0.70 1.4 Miles

### Aerial Photo



Area: 192 acres

N.T.S.

### Legend

- Site
- Main Road:
  - Stream:
  - Existing Contour (5 ft interval)
  - Boundary

- Habitat Zones
- 1 Recreational Area
  - 2 Human Access
  - 3 Human-Ecotone
  - 4 Lake
  - 5 Habitat Island

### High/Low Points

- + High Point +110 ft
- + Low Point +85 ft

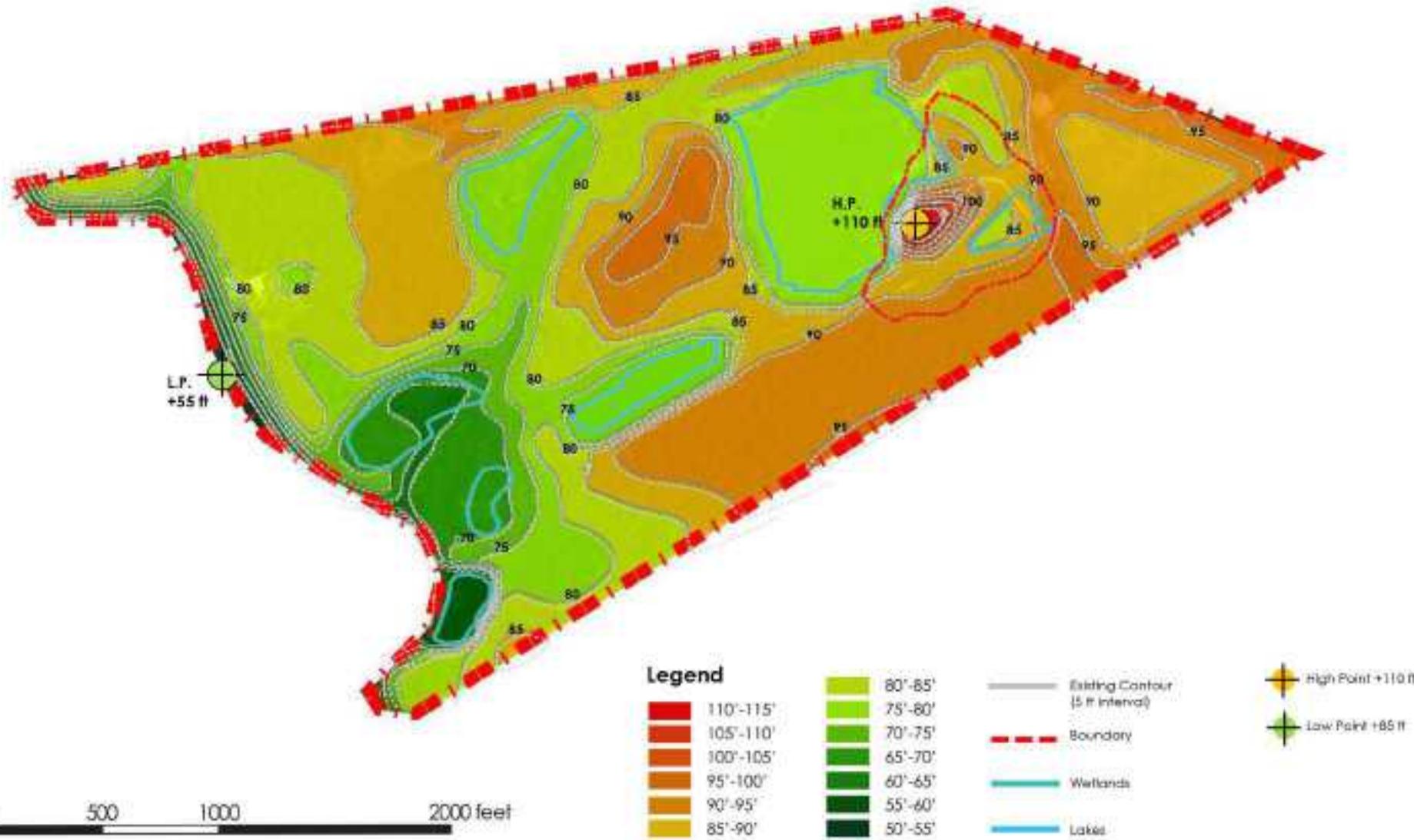
### Description

1. Vegetation: The site is majority under the canopy cover.
2. Access: Three access points are on the south-eastern, south-western, and north-eastern points.
3. Water: There are three lakes and three wetland bodies on the site.
4. Area: the area of the selected parcel is 10.02 acres.

## II. Site #2-2

### Elevation Zones Map

Area 192 acres



## II. Site #2-2

### Land Use Strategic Plan, 10 Acres

#### Proposed Site Selection – 10 acre parcel



#### Legend

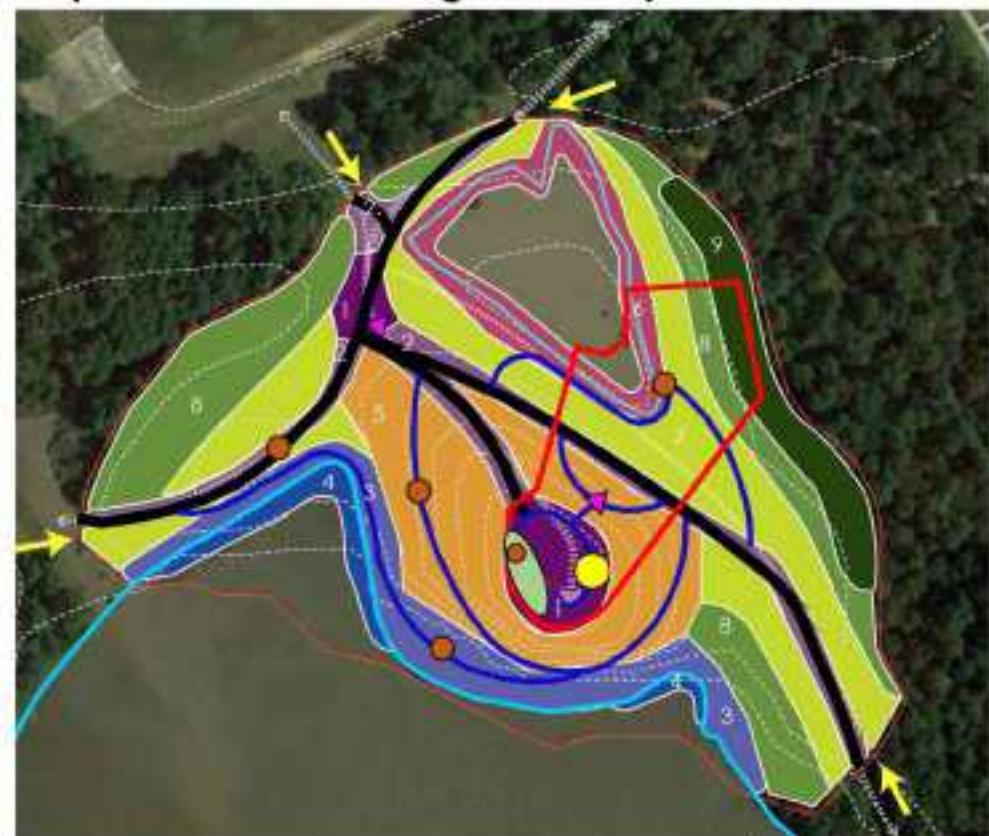
##### Site

- Existing Contours (5ft interval)
- 10.02 acre Boundary
- 1.2 acre Boundary
- Primary Trails
- Secondary Trails
- Access

- High Point - 110 ft
- Low Point - 85 ft
- Lake Edge
- Wetland Edge



#### Proposed Habitat Zoning – 10 acre parcel



#### Legend

##### Site

- Educational Center
- Recreational Area
- Viewing Decks
- Favilion
- Primary Trails
- Secondary Trails

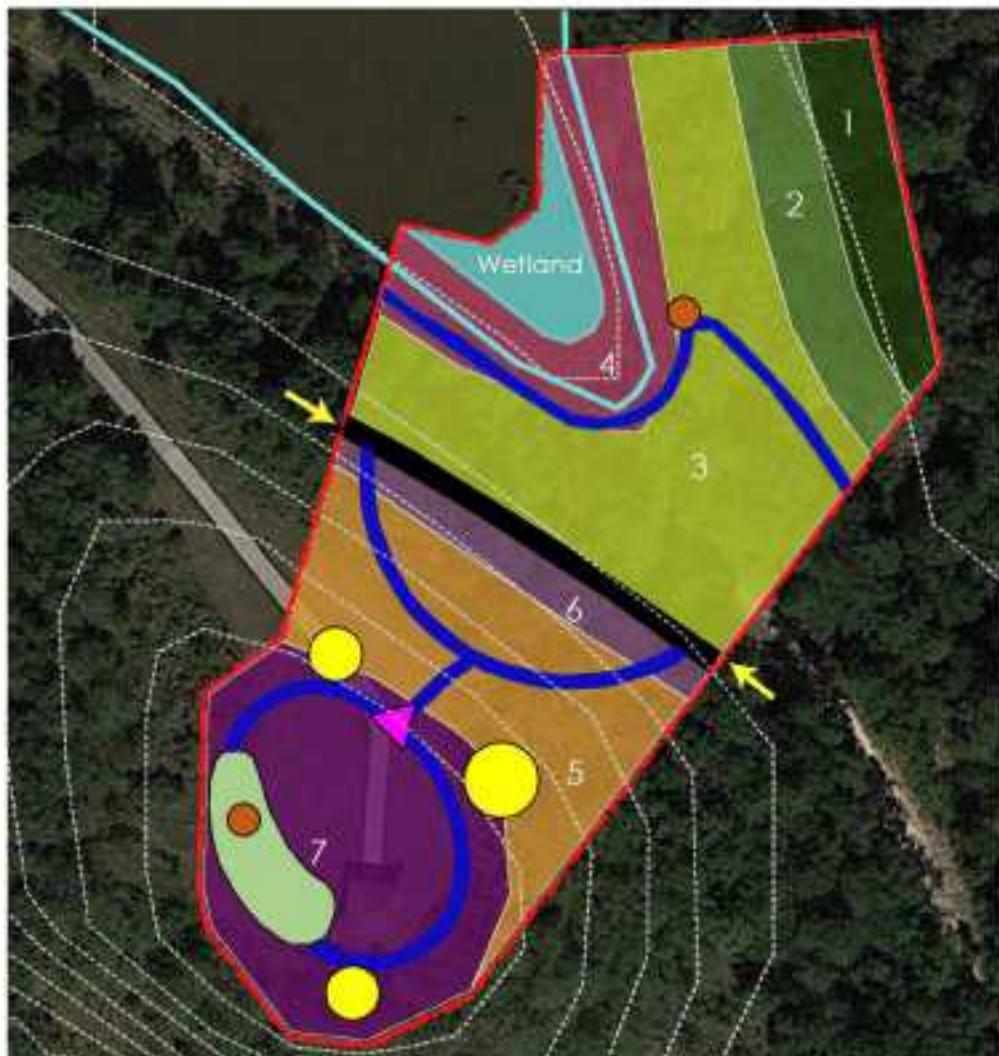
##### Habitat Zones

- |                    |                   |                   |
|--------------------|-------------------|-------------------|
| 1 Human Habitation | 4 Special Habitat | 7 Shrub           |
| 2 Human Corridor   | 5 Meadow          | 8 Forest Thinning |
| 3 Aquatic Edge     | 6 Wetland         | 9 Dense Forest    |



## II. Site #2-2

### Land Use Zoning Plan, Zoom In, 1 Acre



| Habitat             | Featured Wildlife | Treatments                                                                                                                      | Plant Life Forms                                                                                         |
|---------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 1. Forest           | Mammals           | <ul style="list-style-type: none"> <li>Dense Canopy</li> </ul>                                                                  | <ul style="list-style-type: none"> <li>Large Canopy Trees</li> </ul>                                     |
| 2. Forest           | Deer              | <ul style="list-style-type: none"> <li>Canopy thinning</li> <li>Stem thinning</li> <li>Deer forage</li> </ul>                   | <ul style="list-style-type: none"> <li>Large, Medium trees</li> <li>Understory</li> </ul>                |
| 3. Shrub            | Deer              | <ul style="list-style-type: none"> <li>Food source</li> <li>Visual screening barrier</li> </ul>                                 | <ul style="list-style-type: none"> <li>Large, Medium and Small shrubs</li> </ul>                         |
| 4. Wetland          | Shore Birds       | <ul style="list-style-type: none"> <li>Food source</li> <li>Nesting areas</li> </ul>                                            | <ul style="list-style-type: none"> <li>Wetland Plants</li> </ul>                                         |
| 5. Meadow           | Pollinators       | <ul style="list-style-type: none"> <li>Food source</li> <li>Nesting areas</li> </ul>                                            | <ul style="list-style-type: none"> <li>Pollinator attracting plants</li> </ul>                           |
| 6. Corridors        | Humans/ Birds     | <ul style="list-style-type: none"> <li>Food source</li> <li>Nesting areas</li> <li>Human circulation</li> <li>Trails</li> </ul> | <ul style="list-style-type: none"> <li>Barrier</li> <li>Screening plants</li> <li>Fruit trees</li> </ul> |
| 7. Human Habitation | Humans            | <ul style="list-style-type: none"> <li>Recreation</li> <li>Lodging</li> <li>Human uses</li> <li>Viewing decks</li> </ul>        | <ul style="list-style-type: none"> <li>Shade trees</li> <li>Flowering trees/shrubs</li> </ul>            |

Index Map



## II. Site #2-2

### Master Plan, Zoom in, 1 Acre



- 1 - Wetland
- 2 - Wetland edge
- 3 - Meadow
- 4 - Human habitat

#### Legend



Wetland



Viewing Pavilion



Forest - Stem Thinning



Forest - Canopy Coverage



Shrubs



Educational Center



Recreational Center & Viewing Deck



Primary Trail



Secondary Trail



Meadow



- Lake Edge
- Wetland Edge
- 10.02 acre Boundary
- 1.2 acre Boundary
- Access

#### Existing Site



## II. Site #2-2

### Plant List, Zoom in, 1 Acre

#### Wetland Habitat

| Shrubs                                        | Ecoregion   | Color      | Ref No. |
|-----------------------------------------------|-------------|------------|---------|
| Virginia sweetspire ( <i>Itea virginica</i> ) | Hydric Zone | White      | 1       |
| Leucothoe ( <i>Leucothoe racemosa</i> )       | Hydric Zone | White, Red | 1       |

| Forbs                                                         | Ecoregion       | Color           | Ref No. |
|---------------------------------------------------------------|-----------------|-----------------|---------|
| Twoheaded water-starwort ( <i>Callitrichia heterophylla</i> ) | Submergent Zone | Green           | 1       |
| Banana water-lily ( <i>Nymphaea mexicana</i> )                | Emergent Zone   | Yellow          | 1       |
| Red milkweed ( <i>Asclepias rubra</i> )                       | Toe Slope       | Pink            | 1       |
| Great coneflower ( <i>Rudbeckia maxima</i> )                  | Middle Slope    | Yellow          | 1       |
| Frog fruit ( <i>Phytolacca nodiflora</i> )                    | Upper Slope     | Purple<br>White | 1       |

| Grass                                              | Ecoregion          | Color         | Ref No. |
|----------------------------------------------------|--------------------|---------------|---------|
| southern cattail ( <i>Typha domingensis</i> )      | Submergent         | Green, Brown  | 1       |
| Sand spikerush ( <i>Eleocharis montevidensis</i> ) | Emergent           | Green         | 1       |
| Spikerush ( <i>Eleocharis equestrisoides</i> )     | Toe Slope          | Green         | 1       |
| Switchgrass ( <i>Panicum virgatum</i> )            | Upper/Middle Slope | Green, Bronze | 1       |
| Thin-trull sedge ( <i>Carex flaccosperma</i> )     | Upper/Middle Slope | Blue-Green    | 1       |

#### Meadow

| Shrubs                                           | Color        | Ref No. |
|--------------------------------------------------|--------------|---------|
| Japanese Barberry ( <i>Berberis thunbergii</i> ) | Pink, Purple | 2,4,5   |
| Texas Sage ( <i>Leucocarpus frutescens</i> )     | Grey         | 2,4,5   |

| Forbs                                                   | Color         | Ref No. |
|---------------------------------------------------------|---------------|---------|
| Butterflyweed ( <i>Asclepias tuberosa</i> )             | Orange-Yellow | 1       |
| Eastern Purple Coneflower ( <i>Echinacea purpurea</i> ) | Purple        | 1       |
| Spoiled bee balm ( <i>Monarda punctata</i> )            | White, Purple | 1       |
| Rose Vervain ( <i>Glandularia canadensis</i> )          | Purple, Blue  | 1       |

| Grasses                                                             | Color              | Ref No. |
|---------------------------------------------------------------------|--------------------|---------|
| Gulf Muhly ( <i>Muhlenbergia capillaris</i> )                       | Pink, Green-Bronze | 4,7,8   |
| Leucothoe ( <i>Leucothoe racemosa</i> )                             | White, Red         | 4,7,8   |
| Indian Blanket ( <i>Gallardia pulchella</i> )                       | Red-Yellow         | 4,7,8   |
| Kigo Bluestem ( <i>Andropogon gerardii</i> )                        | Copper, Red, Green | 4,7,8   |
| Golden Goddess Bamboo ( <i>Bambusa multiplex 'Golden Goddess'</i> ) | Yellow-Green       | 4,7,8   |
| Mexican Feather Grass ( <i>Stipa tenuissima</i> )                   | Bronze-Green       | 4,7,8   |

#### Forest

| Trees                                             | Foliage         | Ref No. |
|---------------------------------------------------|-----------------|---------|
| American Beech ( <i>Fagus grandifolia</i> )       | Rounded         | 2,3     |
| Pecan ( <i>Carya illinoensis</i> )                | Spreading       | 2,3     |
| Loblolly Pine ( <i>Pinus taeda</i> )              | Columnar, Round | 2,3     |
| Southern Magnolia ( <i>Magnolia grandiflora</i> ) | Round           | 2,3     |

| Shrubs                                                | Color         | Ref No. |
|-------------------------------------------------------|---------------|---------|
| Crimson Bottlebrush ( <i>Callistemon citrinus</i> )   | Red           | 2,4,5   |
| Dwarf palmetto ( <i>Sabal minor</i> )                 | Green         | 2,4,5   |
| Red Tip Photinia ( <i>Photinia x Fraseri</i> )        | Red           | 2,4,5   |
| Texas Mountain Laurel ( <i>Sophora secundiflora</i> ) | Purple        | 2,4,5   |
| Oleander ( <i>Nerium oleander</i> )                   | Multiple hues | 2,4,5   |

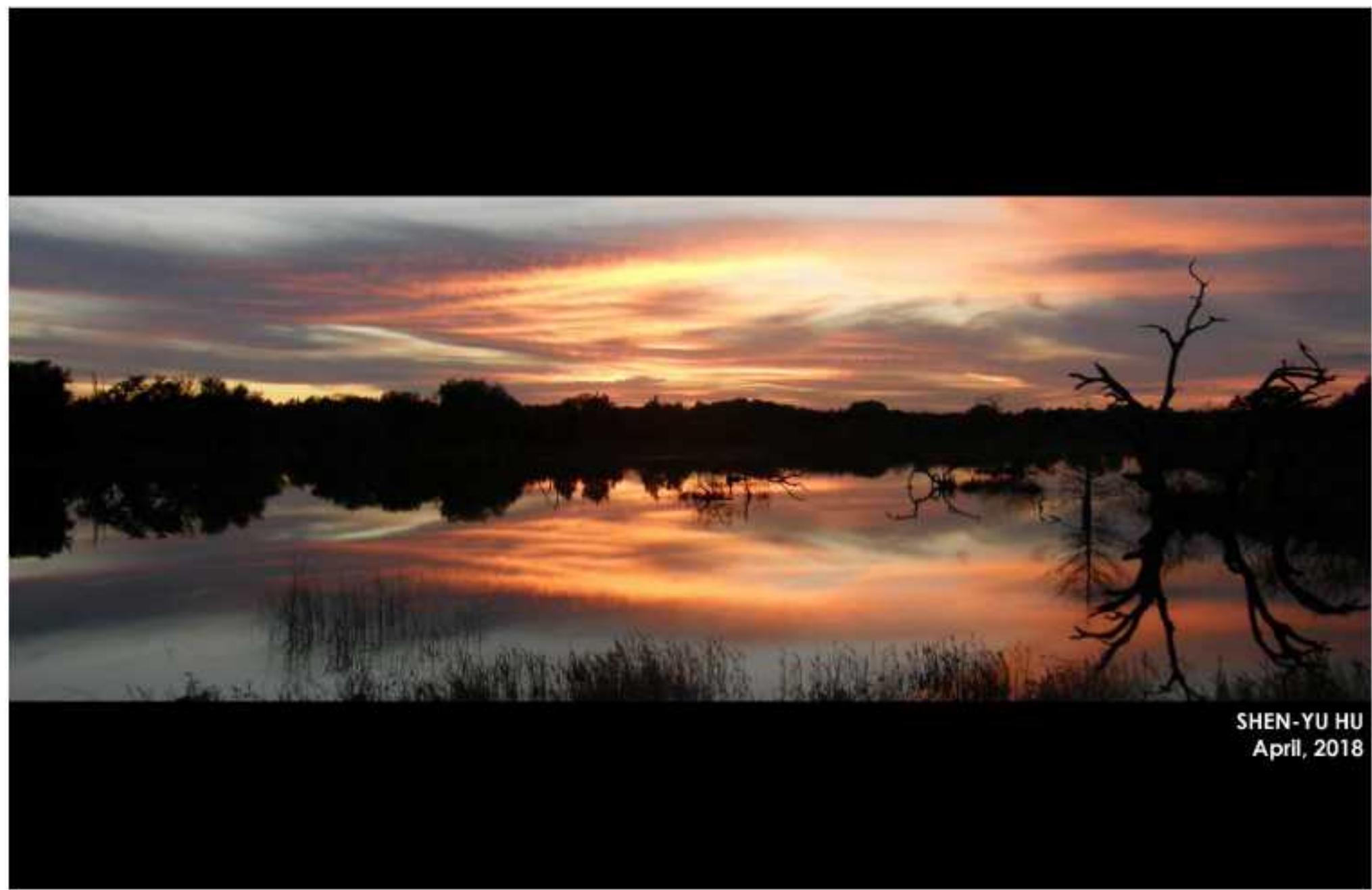
| Forbs                                                            | Color               | Ref No. |
|------------------------------------------------------------------|---------------------|---------|
| Prairie Verbena ( <i>Glandularia bipinnatifida</i> )             | Multiple hues       | 1       |
| Scarlet Sage ( <i>Salvia coccinea</i> )                          | Red                 | 1       |
| Wild Petunia ( <i>Petunia molacosperma</i> )                     | Pink, Purple, White | 1       |
| Creeping Spottedflower ( <i>Acmeella otophylla var. repens</i> ) | Yellow              | 1       |

## II. Site #2-2

### Reference, Plant List, 1 Acre

1. Field Guide for Plant Identification Volume Two: Wetlands | Vegetation common to Harris County wetland areas
2. [www.wildflower.org/plants](http://www.wildflower.org/plants)
3. [www.counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf](http://www.counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf)
4. [www.houstongardencenters.com/whattoplant](http://www.houstongardencenters.com/whattoplant)
5. [www.nspot.org/wp](http://www.nspot.org/wp)
6. [www.hickensvplantdatabase.com](http://www.hickensvplantdatabase.com)
7. [www.calloways.com/plants-flowers/grasses](http://www.calloways.com/plants-flowers/grasses)
8. [www.plants.gardenstylesanantonio.com/find-plant-results](http://www.plants.gardenstylesanantonio.com/find-plant-results)
9. Cover Page - <http://www.cypresscreekproject.net/about/>

## II. Site #2-3



SHEN-YU HU  
April, 2018

## II. Site #2-3

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| 1. Site Selection.....             | 1 | 5. Blow Up 1 Acre Zoom In.....     | 5 |
| 2. Proposed Property Boundary..... | 2 | 6. Blow Up 1 Acre site Design..... | 6 |
| 3. Elevation Zones Map.....        | 3 | 7. Plant List.....                 | 7 |
| 4. Land Use Strategic Plan.....    | 4 | 8. Reference.....                  | 8 |

## II. Site #2-3

### Site Selection



SITE 2

## II. Site #2-3

### Property Boundary

#### Study Site Location



N.T.S.

#### Aerial Photo



Area: 325 Acres

N.T.S.

#### Habitat Map



#### LEGEND

##### 1. Site Environment

- Boundary
- Stream
- Main Road
- 10 Acre Site

##### 2. Habitat Zones

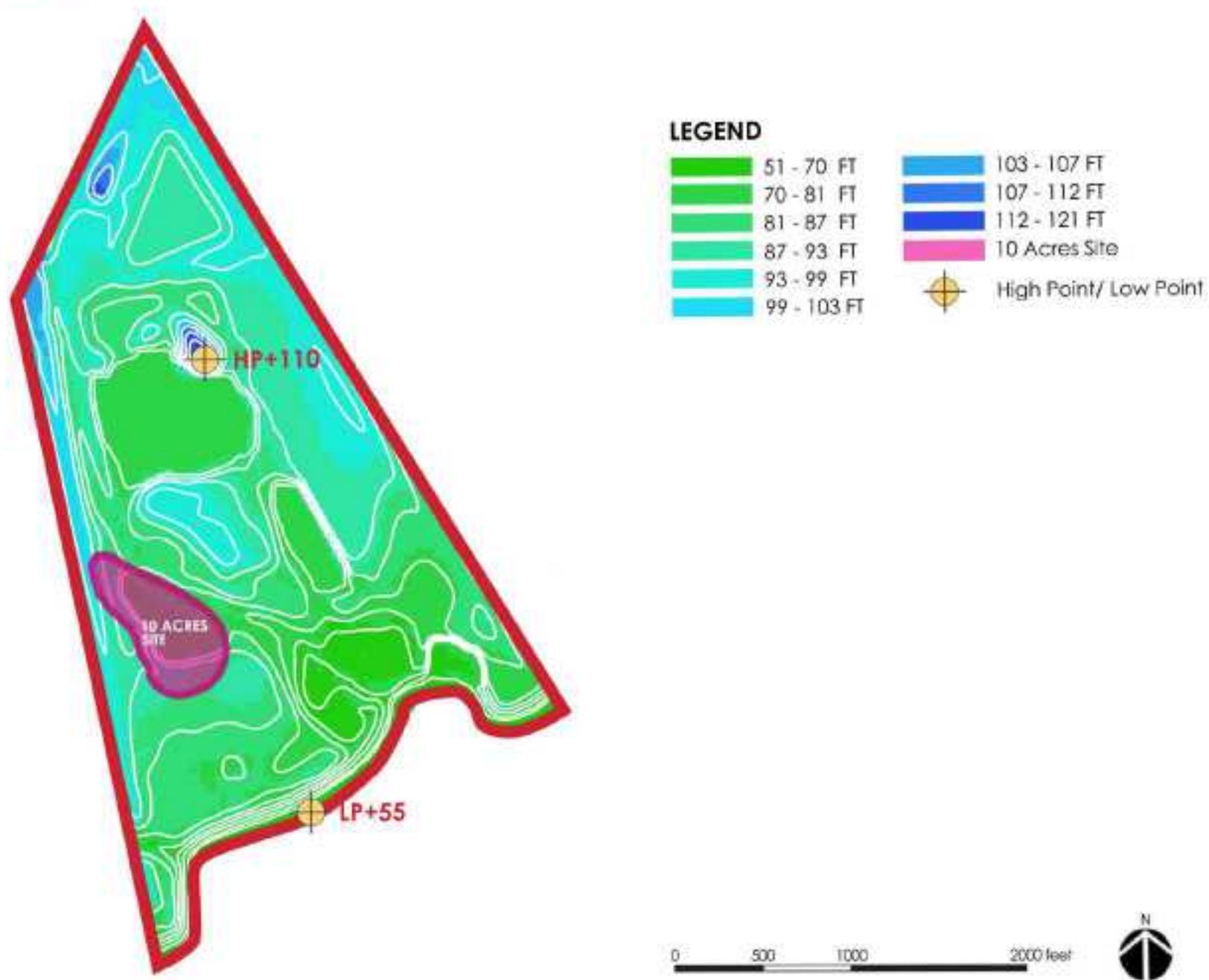
|   |                        |    |                           |
|---|------------------------|----|---------------------------|
| 1 | Recreational area      | 5  | Habitat Island            |
| 2 | Human Access           | 6  | Meadow Forest             |
| 3 | Human-Ecotone          | 7  | Wetland-Ecotone           |
| 4 | Lake                   | 8  | Wildlife Corridor-Ecotone |
| 9 | Riparian Forest Buffer | 10 |                           |

#### DESCRIPTION

1. **Vegetation:** Since the study site is close to the Gulf of Mexico, and is located in "Western Gulf Coastal Plain". Prairies and mottes occupy most of the site.
2. **Access:** Residential neighborhoods are primary composition in the surrounding area. These subdivisions create the face of low density urban; also, three entries are open to these areas.
3. **Water:** Besides Cypress Creek which penetrates the center of study site, 24 different types of wetland disperse into whole area, above all, our team site owns 7 wetlands.
4. **Area:** 10 acre site is located in south-west of team site; and one wetland occupies the heart of land.

## II. Site #2-3

### Elevation Zones Map



## II. Site #2-3

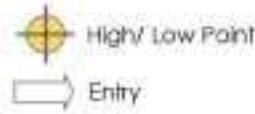
### Land Use Strategic Plan, 10 Acres

10 Acres Site Map

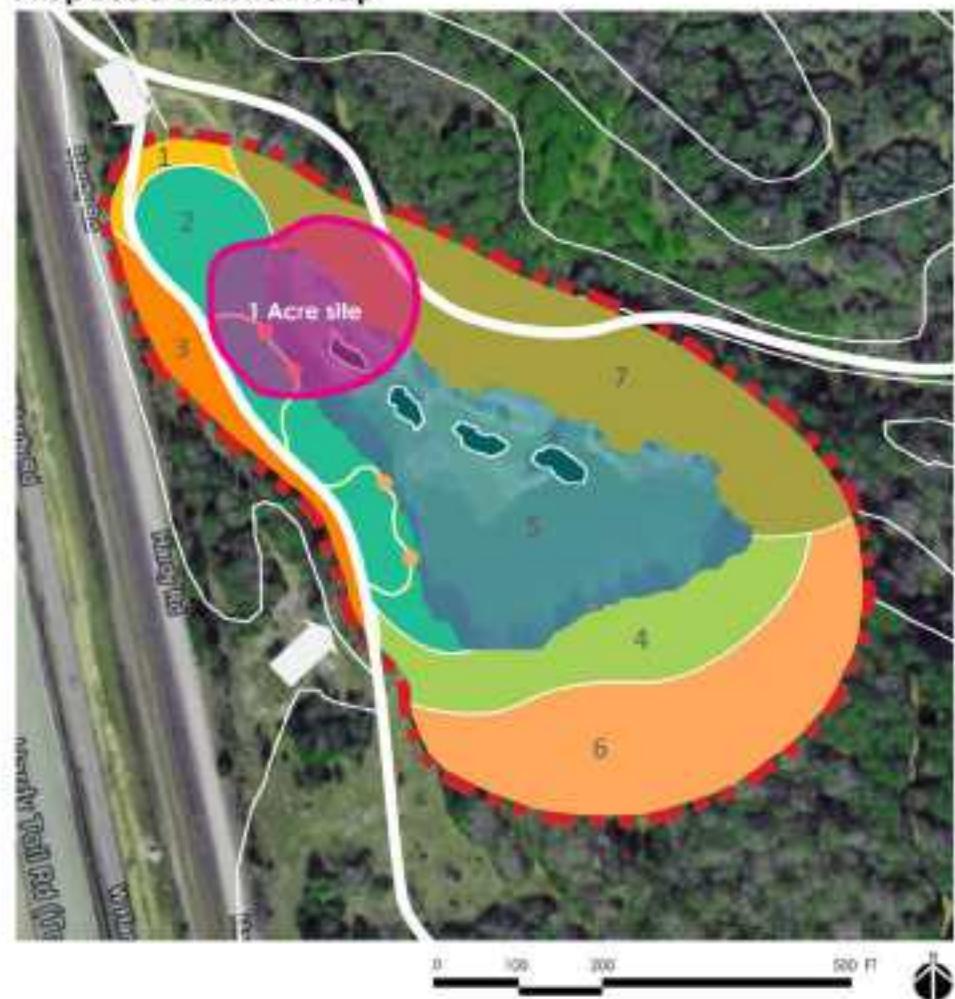


#### LEGEND

- 1. Site Environment
  - Boundary
  - Stream
  - Main Road
  - Railway



Proposed Habitat Map



#### 2. Habitat Zones

- 1 Human Access
- 2 Wetland Forest Ecotone
- 3 Forest Buffer
- 4 Wetland Forest Ecotone
- 5 Off Shore Island Emergent
- 6 Deer Forage Habitat

- 7 Forest/Wetland/Habitat
- 1 Acre Site
- Biking/Walking Trail
- Walking Trail
- Outlook Point

## II. Site #2-3

### Land Use Zoning Plan, Zoom In, 1 Acre

Land Use Strategic Plan Map



#### LEGEND

|        |        |                          |               |                  |
|--------|--------|--------------------------|---------------|------------------|
| ZONE 1 | ZONE 2 | ZONE 3                   | ZONE 4        | ZONE 5           |
| ZONE 6 | ZONE 7 | Biking/<br>Walking Trail | Walking Trail | Outlook<br>Point |

| HABITATS                        | FEATURED WILDLIFE                          | TREATMENTS                               | PLANT LIFE FORM                         |
|---------------------------------|--------------------------------------------|------------------------------------------|-----------------------------------------|
| ZONE 1<br>Forest                | Song Bird/ Small Mammal                    | Forest/ Layer Addition                   | Tree                                    |
| ZONE 2<br>Forest/ Shrub         | Song Bird/ Small Mammal                    | Forest-Shrub                             | Tree/ Shrub/ Vine                       |
| ZONE 3<br>Emergent Wetland      | Shore Bird/ Amphibians/ Reptile/ Dragonfly | Shrub-Lake/ Lake Shore/ Emergent wetland | Tree/ Shrub/ Grass/ Herb/ Wetland plant |
| ZONE 4<br>Forest/ Shrub         | Song Bird/ Small Mammal                    | Forest-Shrub/ Food Plot/ Canopy Thinning | Tree/ Shrub/ Grass                      |
| ZONE 5<br>Welland/ Aquatic      | Song Bird/ Shore Bird/ Duck/ Fish          | Lake Shore/ New Wetland                  | Shrub/ Grass/ Herb/ Wetland plant       |
| ZONE 6<br>Managed Forest        | Song Bird/ Shore Bird                      | Shrub/ Forest Habitat                    | Tree/ Shrub                             |
| ZONE 7<br>Forest/ Shrub/ Meadow | Song Bird/ Small Mammal                    | Forest-Shrub/ Shrub-Meadow               | Tree/ Shrub/ Grass/ Herb                |

10 Acres Site



N.T.S.

1 Acre Site

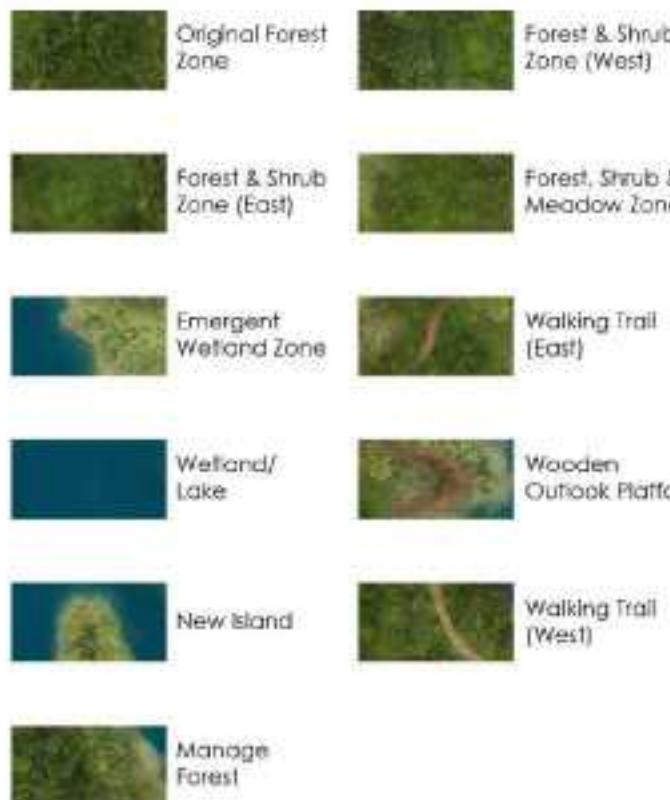


N.T.S.

## II. Site #2-3

### Master Plan, Zoom in, 1 Acre

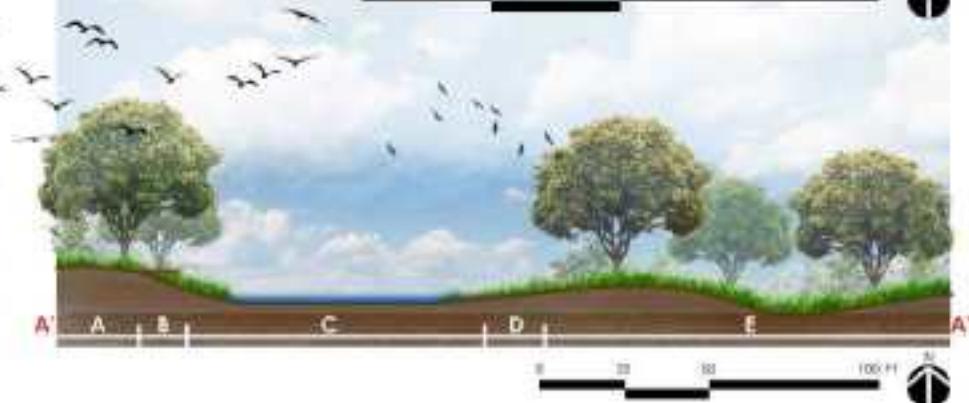
#### Legend



#### Site Location

- 1 Acre Site
- 10 Acres site Boundary

- A. Manage Forest
- B. Walking Trail (West)
- C. Wetland/ Lake
- D. Emergent Wetland Zone
- E. Original Forest Zone



## II. Site #2-3

### Plant List, Zoom in, 1 Acre

#### ZONE 1 FOREST

| SPECIES NAME                          | WILDLIFE INDEX |
|---------------------------------------|----------------|
| <b>TREES</b>                          |                |
| <i>Quercus phellos</i> (Willow Oak)   | Excellent      |
| <i>Carya illinoinensis</i> (Pecan)    | Excellent      |
| <i>Fraxinus Americana</i> (White Ash) | Good           |

#### ZONE 2 FOREST/ SHRUB

| SPECIES NAME                                | WILDLIFE INDEX |
|---------------------------------------------|----------------|
| <b>TREES</b>                                |                |
| <i>Juglans nigra</i> (Eastern Black Walnut) | Good           |
| <i>Prunus virginiana</i>                    | Excellent      |
| <b>SHRUBS</b>                               |                |
| <i>Punica granatum</i> (Pomegranate)        | Excellent      |
| <i>Nerium oleander</i> (Oleander)           | Good           |
| <b>VINES</b>                                |                |
| <i>Bougainvillea</i> sp. (Bougainvillea)    | Good           |
| <i>Tecoma x hybrid</i> (Orange Jubilee)     | Excellent      |

#### ZONE 3 EMERGENT WETLAND

| SPECIES NAME                                               | WILDLIFE INDEX |
|------------------------------------------------------------|----------------|
| <b>TREES</b>                                               |                |
| <i>Viburnum rufidulum</i> (Rusty Blackhaw)                 | Excellent      |
| <i>Prunus Mexicana</i> (Mexican Plum)                      | Good           |
| <b>SHRUBS</b>                                              |                |
| <i>Ilex vomitoria</i> (Yaupon Holly)                       | Excellent      |
| <i>Photinia x fraseri</i> (Red Tip Photinia)               | Good           |
| <b>FORBS</b>                                               |                |
| <i>Asclepias tuberosa</i> (Butterflyweed)                  | Excellent      |
| <i>Calyptocarpus vialis</i> (Prostrate Love-lies-bleeding) | Excellent      |

#### ZONE 3 EMERGENT WETLAND

| SPECIES NAME                                                | WILDLIFE INDEX |
|-------------------------------------------------------------|----------------|
| <b>GRASSES</b>                                              |                |
| <i>Juncus tenuis</i> (Blue Dart Juncus)                     | Good           |
| <i>Andropogon gerardii</i> (Big Bluestem)                   | Good           |
| <b>WETLAND PLANTS</b>                                       |                |
| <i>Callitrichia heterophylla</i> (Twoheaded water-starwort) | Submergent     |
| <i>Eichhornia crassipes</i> (Water hyacinth)                | Emergent       |
| <i>Asclepias rubra</i> (Red milkweed)                       | Toe Slope      |
| <i>Solidago sempervirens</i> (Seaside goldenrod)            | Middle Slope   |

#### ZONE 4 FOREST/ SHRUB

| SPECIES NAME                                      | WILDLIFE INDEX |
|---------------------------------------------------|----------------|
| <b>TREES</b>                                      |                |
| <i>Vaccinium arboreum</i> (Fuckleberry)           | Good           |
| <i>Cornus florida</i> (Dogwood)                   | Excellent      |
| <b>SHRUBS</b>                                     |                |
| <i>Buxus microphylla</i> (Littleleaf Boxwood)     | Excellent      |
| <i>Callistemon citrinus</i> (Crimson Bottlebrush) | Good           |
| <b>GRASSES</b>                                    |                |
| <i>Pteridium aquilinum</i> (Bracken Fern)         | Excellent      |
| <i>Symporicarpos orbiculatus</i> (Coralberry)     | Excellent      |

#### ZONE 5 WETLAND/ AQUATIC

| SPECIES NAME                                         | WILDLIFE INDEX |
|------------------------------------------------------|----------------|
| <b>WETLAND PLANTS</b>                                |                |
| <i>Nothaea guadalupensis</i> (Guadalupe water-nymph) | Submergent     |
| <i>Equisetum hyemale</i> (Horsetail)                 | Emergent       |
| <i>Cephaelanthus occidentalis</i> (Buttonbush)       | Toe Slope      |
| <i>Sabal minor</i> (Dwarf palmetto)                  | Middle Slope   |

#### ZONE 6 MANAGE FOREST

| SPECIES NAME                                 | WILDLIFE INDEX |
|----------------------------------------------|----------------|
| <b>TREES</b>                                 |                |
| <i>Nyssa sylvatica</i> (Blackgum)            | Excellent      |
| <i>Quercus shumardii</i> (Shumard Oak)       | Excellent      |
| <b>SHRUBS</b>                                |                |
| <i>Euonymus japonicus</i> (Boxleaf Euonymus) | Excellent      |
| <i>Aucuba japonica</i> (Japanese laurel)     | Excellent      |

#### ZONE 7 TREE/ SHRUB/ MEADOW

| SPECIES NAME                                       | WILDLIFE INDEX |
|----------------------------------------------------|----------------|
| <b>TREES</b>                                       |                |
| <i>Quercus falcata</i> (Southern Red Oak)          | Excellent      |
| <i>Ilex opaca</i> (American Holly)                 | Excellent      |
| <b>SHRUBS</b>                                      |                |
| <i>Euonymus alatus</i> (Burning Bush)              | Good           |
| <i>Ligustrum sinense</i> (Chinese Privet)          | Excellent      |
| <b>FORBS</b>                                       |                |
| <i>Hibiscus coccineus</i> (Scarlet Rose-mallow)    | Excellent      |
| <i>Hymenocallis littoralis</i> (Texas Spider Lily) | Good           |
| <b>GRASSES</b>                                     |                |
| <i>Phyla nodiflora</i> (Frogfruit)                 | Good           |
| <i>Calyptocarpus vialis</i> (Horseherb)            | Good           |

#### SOURCE:

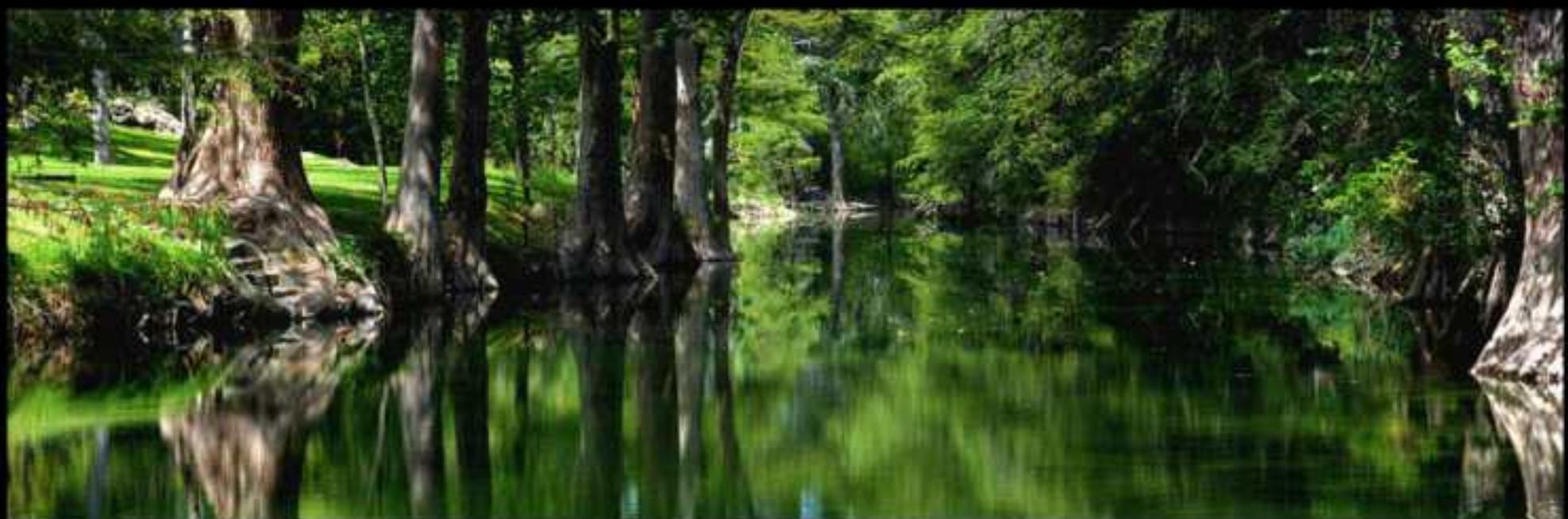
<https://www.wildflower.org/plants/>  
<http://www.hicksenviplantdatabase.com>  
<https://www.blgextrees.com/plants/vines>  
<https://www.hcfcd.org/media/1974/wetland-guide-final.pdf>  
<http://counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf>  
<http://www.houstongardencenters.com/whattoplant.php?idCat=5>  
<http://hpsot.org/wp/Houston/files/2015/02/NPSOT-Houston-Information-Pages-2015.pdf>

## II. Site #2-3

### Reference, Plant List, 1 Acre

1. [https://www.har.com/carydietzmann/constructed-wetland---a-country-life-ranch-/pg\\_200](https://www.har.com/carydietzmann/constructed-wetland---a-country-life-ranch-/pg_200)
2. [https://en.wikipedia.org/wiki/Harris\\_County,\\_Texas#/media/File:Map\\_of\\_Texas\\_highlighting\\_Harris\\_County.svg](https://en.wikipedia.org/wiki/Harris_County,_Texas#/media/File:Map_of_Texas_highlighting_Harris_County.svg)
3. <https://www.google.com/maps/search/cypress+creek+park/@30.021184,-95.375176,10601m/data=!3m1!1e3>
4. <https://www.wildflower.org/plants/>
5. <http://www.hicksenvplantdatabase.com>
6. <https://www.bigtextrées.com/plants/vines>
7. <https://www.hcfcd.org/media/1974/wetland-guide-final.pdf>
8. <http://counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf>
9. <http://www.houstongardencenters.com/whattoplant.php?idCat=5>
10. <http://npsot.org/wp/Houston/files/2015/02/NPSOT-Houston-Information-Pages-2015.pdf>

## II. Site #2-4



Nicha Umnuaywatthanakul  
April, 2018

## II. Site #2-4

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## II. Site #2-4

### Site Selection



Site 2

## II. Site #2-4

### Property Boundary

#### Cypress Creek Park at Timberland

Final Study - Site Selection - Analysis



#### Aerial Photo



Total Area: 325 Acres, Area of Site 2: 192 Acres

#### Legend

- Site 2
- Cypress Creek

#### Habitat Zones of Site 2



#### Legend

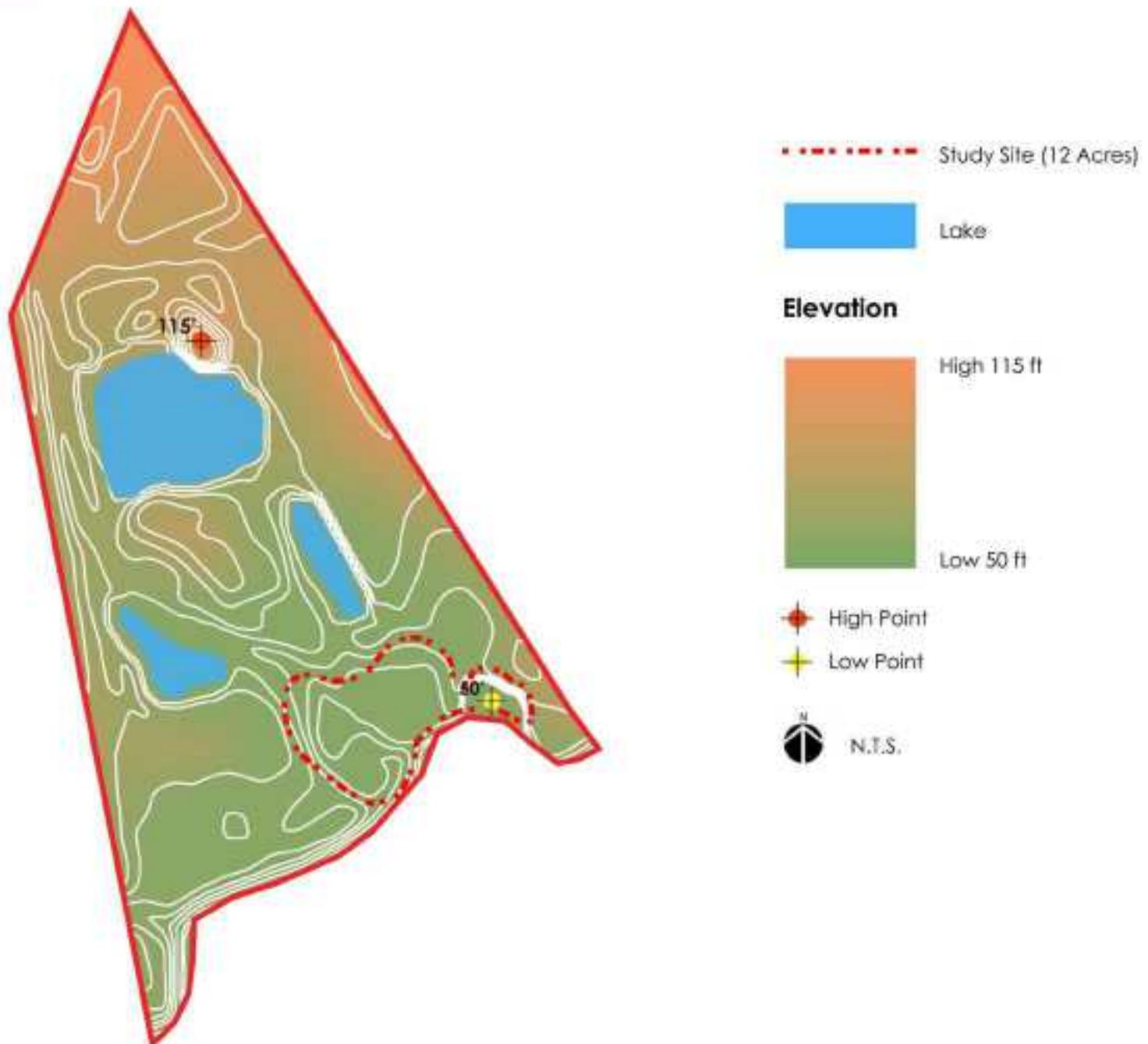
|                        |                      |                   |                            |                             |
|------------------------|----------------------|-------------------|----------------------------|-----------------------------|
| 1. Shaped Site + Roads | 2. High/Low Point    | 3. Existing Water | 4. Contour                 | 5. Habitats and Patches     |
| • — • Site Boundary    | • 115 ft. High Point | Creek             | — Contour<br>(5' Interval) | 1 Recreation                |
| — Main Road            | 50 ft. Low Point     |                   |                            | 2 Human Access              |
|                        |                      |                   |                            | 3 Human-Ecotone             |
|                        |                      |                   |                            | 4 Welland-Ecotone           |
|                        |                      |                   |                            | 5 Lake                      |
|                        |                      |                   |                            | 6 Habitat Island            |
|                        |                      |                   |                            | 7 Meadow-Forest             |
|                        |                      |                   |                            | 8 Wildlife Corridor-Ecotone |
|                        |                      |                   |                            | 9 Riparian Buffer           |
|                        |                      |                   |                            | 10 Forest Buffer            |

#### Description

1. **Vegetation:** There are many types of vegetation: forest, shrub, wetland plant, riparian plant and etc.
2. **Access:** There is a highway and railway on the East and North sides of the site. There are three possible accesses: east side connecting to site 1 north east side connecting to one neighborhood, and south side connecting to site 3.
3. **Water:** There are three existing lakes, and five existing wetlands.
4. **Area:** Team site is 192 acres and study site is 12 acres.

## II. Site #2-4

### Elevation Zones Map



## II. Site #2-4

### Land Use Strategic Plan, 10 Acres

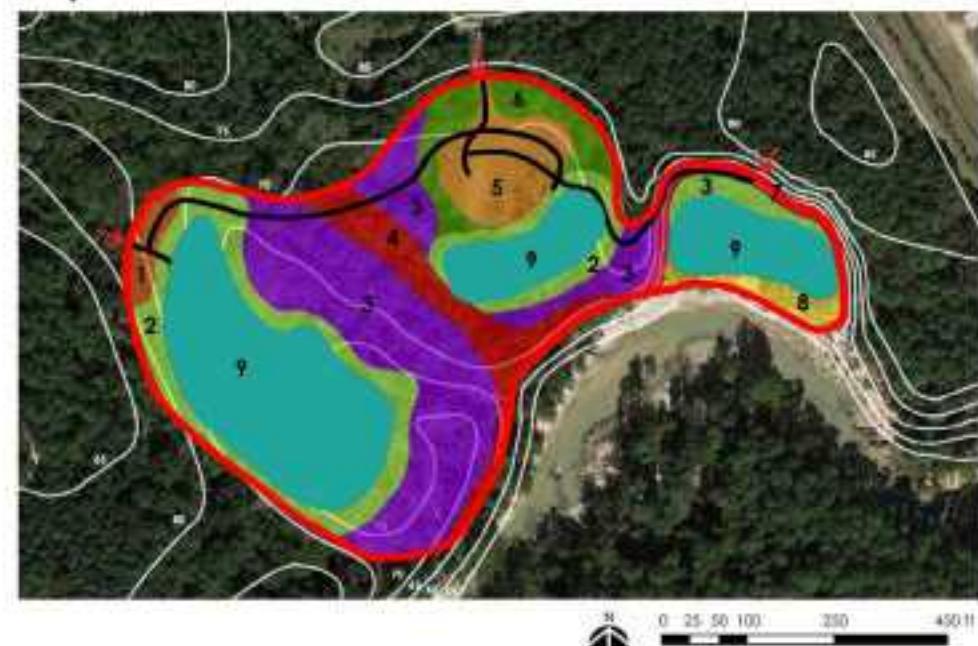
#### Proposed Site Selection: 12 Acres



#### Legend

- 1. Shape Site + Access
  - Site Boundary
  - Access
  - Trail
- 2. High/Low Point
  - ◆ 85' High Point
  - ◆ 50' Low Point
- 3. Existing Wetland
  - Freshwater Forest/Shrub Wetland
  - Freshwater Emergent Wetland
  - Freshwater Pond
- 4. Existing Contour
  - Contour (5 ft interval)
- 5. Proposed 1-Acre Site
  - Site Boundary

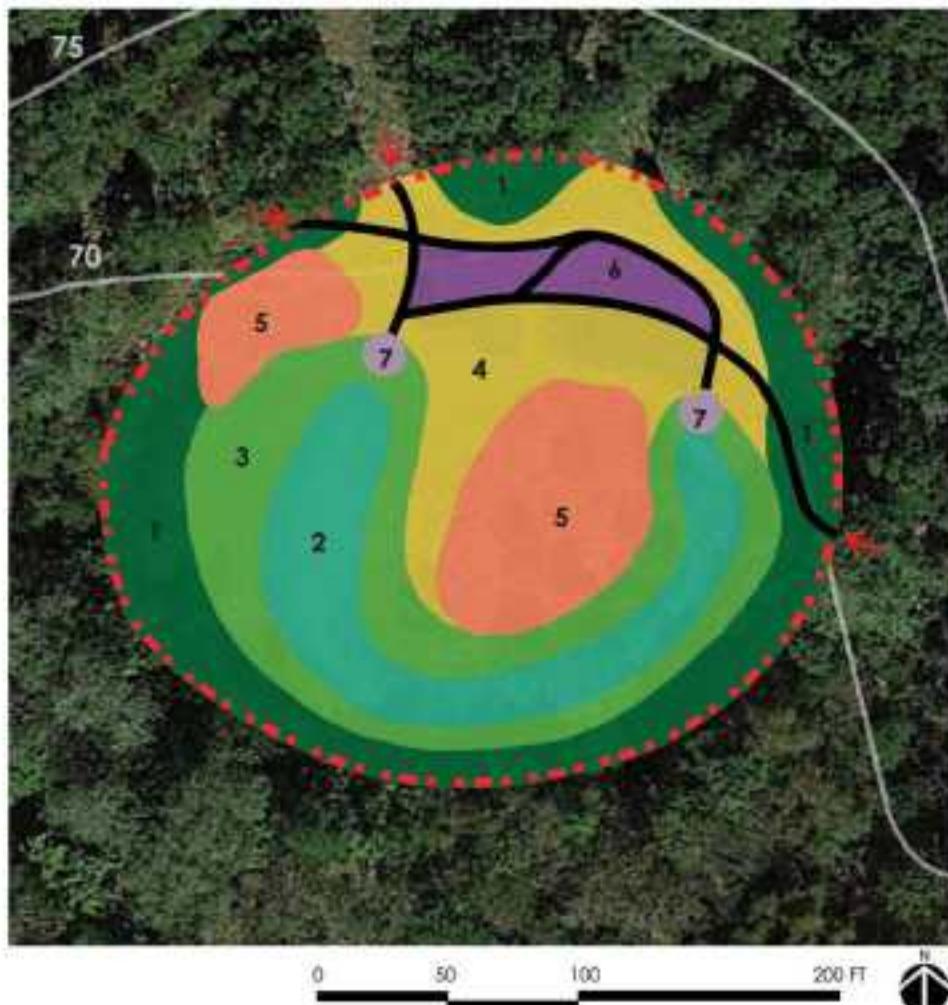
#### Proposed Habitat Zones: 12 Acres



| Habitats           | Featured Wildlife               | Treatments                                 | Plant Life Forms                   |
|--------------------|---------------------------------|--------------------------------------------|------------------------------------|
| 1 Human/Wildlife   | • Bird<br>• Small mammal        | • Wetland buffer<br>• Habitat              | • Shrub<br>• Canopy                |
| 2 Ecotone          | • Bird<br>• Small mammal        | • Wetland buffer<br>• Habitat              | • Aquatic plant<br>• Wetland plant |
| 3 Forest-Ecotone   | • Bird<br>• Small mammal / deer | • Wetland buffer<br>• Habitat/Forage       | • Canopy<br>• Wetland plant        |
| 4 Drainage Channel | • Bird<br>• Reptile             | • Bank stabilization<br>• Erosion control  | • Shrub/tree<br>• Groundcover      |
| 5 Human/Wildlife   | • Bird<br>• Small mammal/ deer  | • Habitat<br>• Natural wetland             | • Wetland plant<br>• Shrub/canopy  |
| 6 Forest Buffer    | • Bird<br>• Small mammal        | • Habitat<br>• Buffer                      | • Shrub<br>• Tree canopy           |
| 7 Steep Slope Edge | • Bird                          | • Bank stabilization<br>• Erosion control  | • Shrub<br>• Groundcover           |
| 8 Riparian Edge    | • Bird<br>• Small mammals       | • Nutrient filtration<br>• Erosion control | • Shrub/tree<br>• Groundcover      |
| 9 Wetland          | • Song bird<br>• Shore bird     | • Habitat                                  | • Wetland plant<br>• Aquatic plant |

## II. Site #2-4

### Land Use Zoning Plan, Zoom in, 1 Acre



#### Legend

- Recreation Zone
- View Point
- Hiking Trail (250ft)
- Access Point

- Protection Zone
- Forest
- Wetland
- Ecotone

- Special Features
- Meadow
- Habitat Island
- Wildflower Garden

|   | Habitats          | Featured Wildlife                                              | Treatments                                                        | Plant Life Forms                                       |
|---|-------------------|----------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------|
| 1 | Forest            | • Deer<br>• Small mammal<br>• Cover/corridor                   | • Canopy thinning<br>• Stem thinning                              | • Forest<br>• Canopy                                   |
| 2 | Wetland           | • Fish<br>• Song Birds<br>• Shore Birds                        | • Fresh water wetland<br>• Habitats<br>• Food source              | • Aquatic plants<br>• Wetland plants                   |
| 3 | Ecotone           | • Song Birds<br>• Shore birds<br>• Small mammal                | • Wetland buffer<br>• Habitats<br>• Food source                   | • Aquatic plants<br>• Wetland plants<br>• Shrubs/trees |
| 4 | Meadow            | • Small mammals<br>• Forage/browses<br>• Butterflies/bees/bats | • Seed source<br>• Nectar/pollen/flower<br>• Forage/browses/cover | • Scrubs/trees<br>• Ground cover                       |
| 5 | Habitat Island    | • Small mammals<br>• Deer<br>• Amphibians                      | • Habitats<br>• Forage/browses/cover<br>• Seed source             | • Scrubs/trees<br>• Ground cover<br>• Wetland plants   |
| 6 | Wildflower Garden | • Butterflies/bees/bats<br>• Song birds<br>• Small mammals     | • Habitats<br>• Seed source<br>• Nectar/pollen/flower             | • Flower<br>• Ground cover<br>• Shrubs                 |
| 7 | View Point        | • Butterflies/bees/bats<br>• Song birds<br>• Small mammals     | • Human access/trails<br>• Nectar/pollen/flower                   | • Flower<br>• Ground cover<br>• Canopy                 |

#### Index Map



## II. Site #2-4

### Master Plan, Zoom in, 1 Acre

#### Legend



#### Existing Site



#### Section A-A'



## II. Site #2-4

### Plant List, Zoom in, 1 Acre

#### Habitat Island

| Tree                                         | Fruit Season     | Ref. |
|----------------------------------------------|------------------|------|
| Flowering Dogwood ( <i>Cornus florida</i> )  | Spring to Fall   | 1    |
| Eastern Redbud ( <i>Cercis canadensis</i> )  | Spring           | 1    |
| Green Hawthorn ( <i>Crataegus viridis</i> )  | Spring           | 1    |
| Mexican Plum ( <i>Prunus Mexicana</i> )      | Fall to Spring   | 1    |
| Red Buckeye ( <i>Aesculus pavia</i> )        | Spring           | 1    |
| Red Mulberry ( <i>Morus rubra</i> )          | Spring to Summer | 1    |
| Sweetgum ( <i>Liquidambar styraciflua</i> )  | Spring           | 1    |
| Wild Black Cherry ( <i>Prunus serotina</i> ) | Spring to Summer | 1    |

| Shrub                                            | Fruit Season   | Ref. |
|--------------------------------------------------|----------------|------|
| Texas Lantana ( <i>Lantana urticoides</i> )      | Spring to Fall | 1    |
| Indigo Bush ( <i>Amorpha fruticosa</i> )         | Spring         | 1    |
| Eastern Coral Bean ( <i>Erythrina herbacea</i> ) | Spring to Fall | 1    |

| F forb                                        | Fruit Season   | Ref. |
|-----------------------------------------------|----------------|------|
| Cardinal Flower ( <i>Lobelia cardinalis</i> ) | Summer to Fall | 1    |
| Blue Sage ( <i>Salvia azurea</i> )            | Fall           | 4    |
| Arkansas Yucca ( <i>Yucca arkansana</i> )     | Summer to Fall | 4    |

| Vine                                        | Fruit Season | Ref. |
|---------------------------------------------|--------------|------|
| Croavine ( <i>Bignonia capreolata</i> )     | Winter       | 1    |
| Trumpet Creeper ( <i>Campsis radicans</i> ) | Spring       | 1    |



#### Riparian Wetland

| Tree                                       | Ref. |
|--------------------------------------------|------|
| Black Willow ( <i>Salix nigra</i> )        | 2    |
| Bald Cypress ( <i>Taxodium distichum</i> ) | 2    |
| River Birch ( <i>Betula nigra</i> )        | 2    |
| Laurel Oak ( <i>Quercus laurifolia</i> )   | 2    |

| Shrub                                         | Ref. |
|-----------------------------------------------|------|
| Virginia Sweetspire ( <i>Itea virginica</i> ) | 2    |
| Leucothoe ( <i>Leucothoe racemosa</i> )       | 2    |
| Dwarf Palmetto ( <i>Sabal minor</i> )         | 2    |
| Rattlebox ( <i>Sesbania drummondii</i> )      | 2    |

| Grass                                             | Ref. |
|---------------------------------------------------|------|
| Inland Sea Oak ( <i>Chasmanthium latifolium</i> ) | 2    |
| Gulf Muhly ( <i>Muhlenbergia capillaris</i> )     | 2    |
| Switchgrass ( <i>Panicum virgatum</i> )           | 2    |

| Forb                                             | Ref. |
|--------------------------------------------------|------|
| Lowland Rotala ( <i>Rotala ramosior</i> )        | 2    |
| Swamp Rose Mallow ( <i>Hibiscus moscheutos</i> ) | 2    |
| Winged Loosestrife ( <i>Lythrum alatum</i> )     | 2    |
| Shiny Coneflower ( <i>Rudbeckia nitida</i> )     | 2    |
| Plains coreopsis ( <i>Coreopsis tinctoria</i> )  | 2    |

#### Native Meadow & Wildflower Garden

| Tree                                              | Ref. |
|---------------------------------------------------|------|
| Sweetbay Magnolia ( <i>Magnolia virginiana</i> )  | 3    |
| Green Ash ( <i>Fraxinus pennsylvanica</i> )       | 3    |
| Sugar Hackberry ( <i>Celtis laevigata</i> )       | 3    |
| Eastern Cottonwood ( <i>Populus deltoides</i> )   | 4    |
| Eastern Red Cedar ( <i>Juniperus virginiana</i> ) | 4    |
| Mexican Buckeye ( <i>Ungnadia speciosa</i> )      | 4    |
| Western Soapberry ( <i>Sapindus Saponaria</i> )   | 4    |
| Sassafra ( <i>Sassafras albidum</i> )             | 4    |
| Black Walnut ( <i>Juglans microcarpa</i> )        | 4    |

| Shrub/ Herb                                       | Ref. |
|---------------------------------------------------|------|
| Texas Frogfruit ( <i>Phyla nodiflora</i> )        | 3    |
| Parsley Hawthorn ( <i>Crataegus marshattii</i> )  | 3    |
| Rattlebush ( <i>Sesbania drummondii</i> )         | 4    |
| Eastern Cottonwood ( <i>Populus deltoides</i> )   | 4    |
| Butterflyweed ( <i>Asclepias tuberosa</i> )       | 4    |
| False Nettle ( <i>Boehmeria cylindrica</i> )      | 4    |
| Heartleaf Hibiscus ( <i>Hibiscus moscheutos</i> ) | 4    |
| Blue Wild Indigo ( <i>Baptisia austrofl</i> )     | 4    |
| Purple Coneflower ( <i>Echinacea purpurea</i> )   | 4    |

| Grass                                              | Ref. |
|----------------------------------------------------|------|
| Big Bluestem ( <i>Andropogon gerardii</i> )        | 3    |
| Little Bluestem ( <i>Schizachyrium scoparium</i> ) | 3    |
| Texas Sedge ( <i>Carex texensis</i> )              | 3    |
| Wild Millet ( <i>Echinochloa murinica</i> )        | 4    |
| Sideoats Grama ( <i>Bouteloua curtipendula</i> )   | 4    |

- <http://www.wildflower.org>
- <http://npot.org/wp/Houston/PDF/2015/02/NPSOT-Houston-Information-Pages-2015.pdf>
- <https://www.hcio.org/media/1974/wetland-guide-final.pdf>

## **II. Site #2-4**

### **Reference, Plant List, 1 Acre**

#### **Cover Page**

<https://fineartamerica.com/featured/cypress-creek-texas-steve-snyder.html>

#### **Plant List**

1. <http://npsot.org/wp/houston/files/2015/02/NPSOT-Houston-Information-Pages-2015.pdf>
2. <https://www.hctcd.org/media/1974/wetland-guide-final.pdf>
3. <http://www.txsmartscape.com>
4. <https://www.wildflower.org>

### III. Site #3-1



Chenjun Su  
April, 2018

### III. Site #3-1

#### Table of Contents

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| Blow Up 1 Acre Zone Plan..... | 5 |                                 |   |

### III. Site #3-1

#### Site Selection



Site 3

### III. Site #3-1

#### Property Boundary

Site Selection - Harris County, TX



Site 3

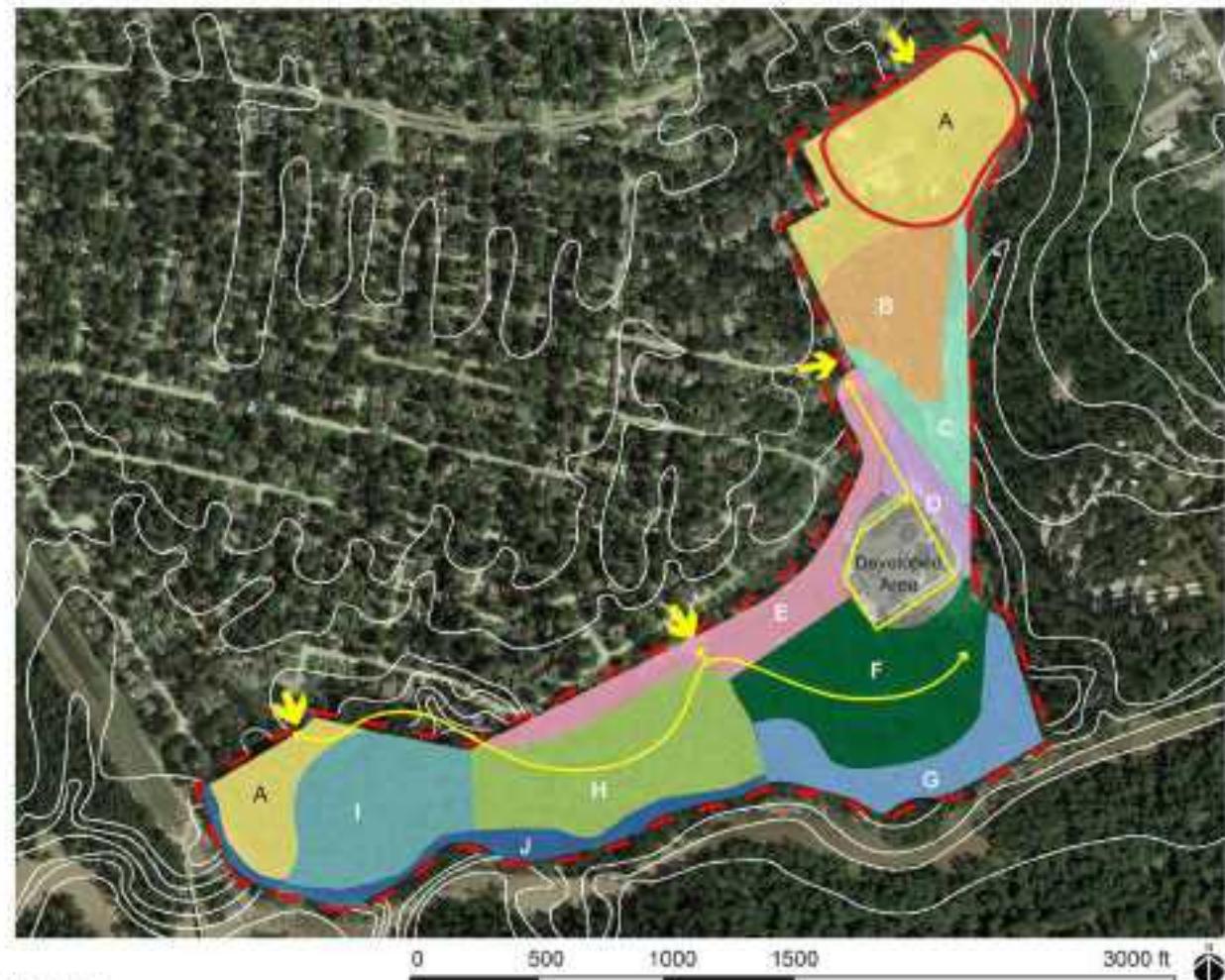


Total Area: 325 acres

Site 3 Area: 85 acres

Resource: Google Map: <https://www.google.com>

#### Habitat Zone Map



#### Legend

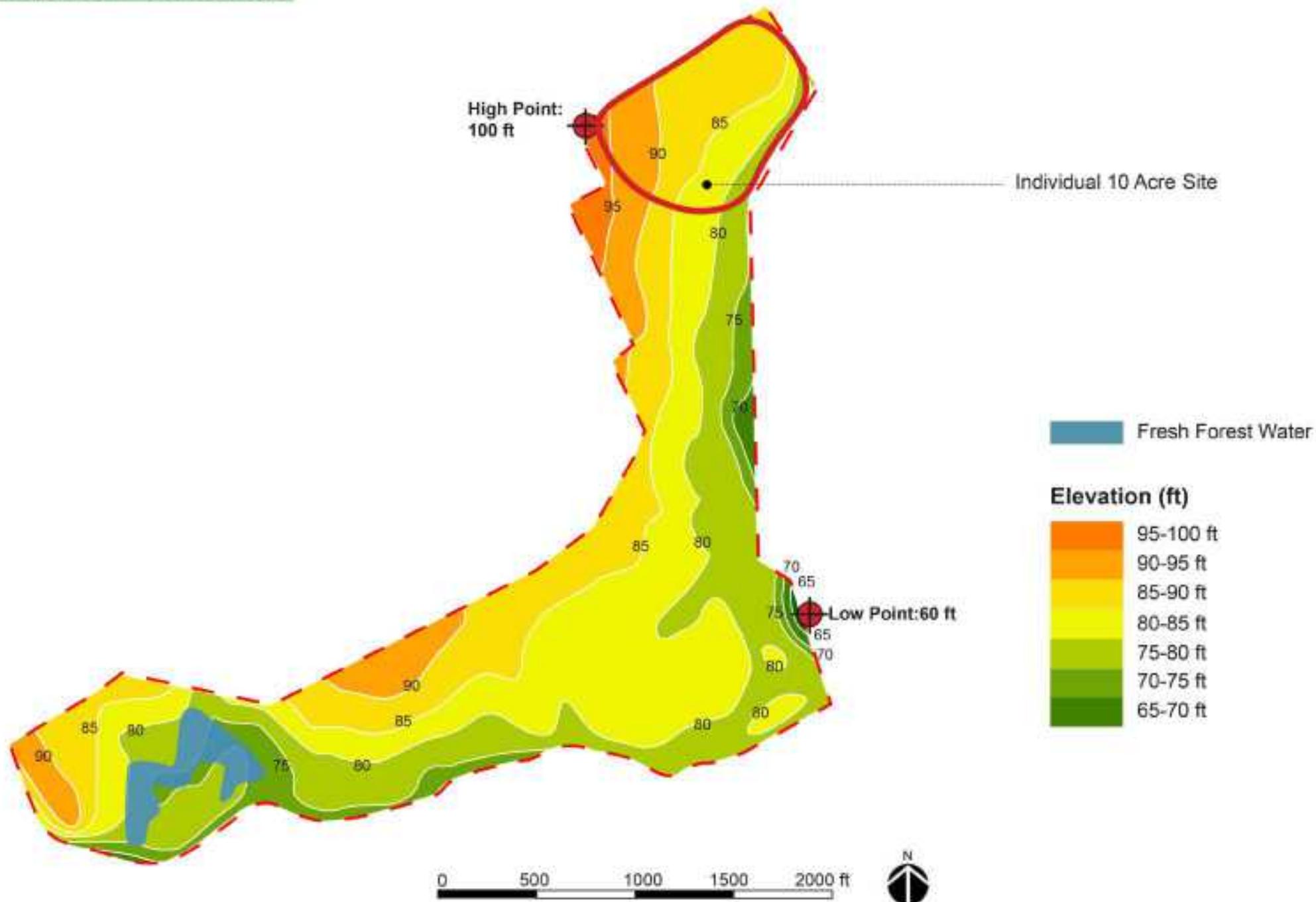
|   |                    |   |                |   |                  |   |                |
|---|--------------------|---|----------------|---|------------------|---|----------------|
| A | Human Activity     | B | Visual Screen  | C | Aquatic Habitat  | D | Creek Side     |
| E | Pollinator Habitat | F | Corridor       | G | Riparian Habitat | H | Trails         |
| I | Channel            | J | Forest Habitat | K | Wetland          | L | Trail Entrance |

#### Description:

1. Vegetation: The 10-acre site is covered by meadow, forage and forest. The forage area is along the existing channel.
2. Access: There is one main entrance at the northern part, which connects the site with surrounding communities.
3. Water: There is no fresh water in the 10-acre site, only the existing channel will capture water in rain season.
4. Area: The 9.6 acre site is located at the northern part. It's within the human activity zone, surrounded by the residential areas.

### III. Site #3-1

#### Elevation Zones Map



### III. Site #3-1

#### Land Use Strategic Plan, 10 Acres

Existing Aerial Photo



#### Legend

- A Existing Channel
- B Selected 1 Acre Site
- C 10-Acre Site Boundary
- D High Point in Selected Site
- E Driveway
- F Driveway Entrance
- G Trail Entrance
- H Low Point in Selected Site

Proposed Habitat Plan



#### Legend

- A Existing Channel
- B Forage Habitat
- C Riparian Habitat
- D Forest Habitat
- E Botanic Gardens
- F Meadow
- G Developed Area
- H Existing House
- I Driveway
- J Trails
- K Trail Entrance
- L Driveway Entrance

### III. Site #3-1

#### Land Use Zoning Plan, Zoom in, 1 Acre



#### Legend

|                    |                      |                          |            |
|--------------------|----------------------|--------------------------|------------|
| 1 Existing Channel | 4 Riparian Habitat   | 7 Platform               | Pedestrian |
| 2 Forage Habitat   | 5 Pollinator Habitat | 8 Tree House / Cabin     | Bikeway    |
| 3 Forest Habitat   | 6 Native Meadow      | 9 Rest Area with Benches |            |

|   | Habitat            | Featured Wildlife                                                                      | Treatments                                                    | Plant Life Form                                 |
|---|--------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------|
| 1 | Channel            | - Turtles<br>- Dragonflies<br>- River Fishes                                           | - Erosion Control<br>- Drainage Control                       | - Grass<br>- Aquatic Plants                     |
| 2 | Forage Habitat     | - White Tail Deers<br>- Wild Rabbits<br>- Mice<br>- Squirrels                          | - Grass Maintenance<br>- Trails<br>- Rest Platform            | - Grass<br>- Browse<br>- Forage Crop<br>- Trees |
| 3 | Forest Habitat     | - White Tail Deers<br>- Squirrels<br>- Bats<br>- Birds                                 | - Trails<br>- Tree House<br>- Cabins<br>- Bikeway             | - Grass<br>- Shrubs<br>- Trees                  |
| 4 | Ecotone            | - Squirrels<br>- Shore Birds<br>- Song Birds                                           | - Trails<br>- Bikeway<br>- Benches                            | - Grass<br>- Shrubs<br>- Trees                  |
| 5 | Pollinator Habitat | - Song Birds<br>- Hummingbirds<br>- Caterpillars<br>- Butterflies<br>- Moths<br>- Bees | - Trails<br>- Rest Areas<br>- Benches<br>- Irrigation Control | - Grass<br>- Shrubs<br>- Flowers<br>- Trees     |
| 6 | Native Meadow      | - Humanbeings<br>- Birds                                                               | - Trails<br>- Bikeway<br>- Open Lawn                          | - Grass<br>- Trees                              |

#### Index Map



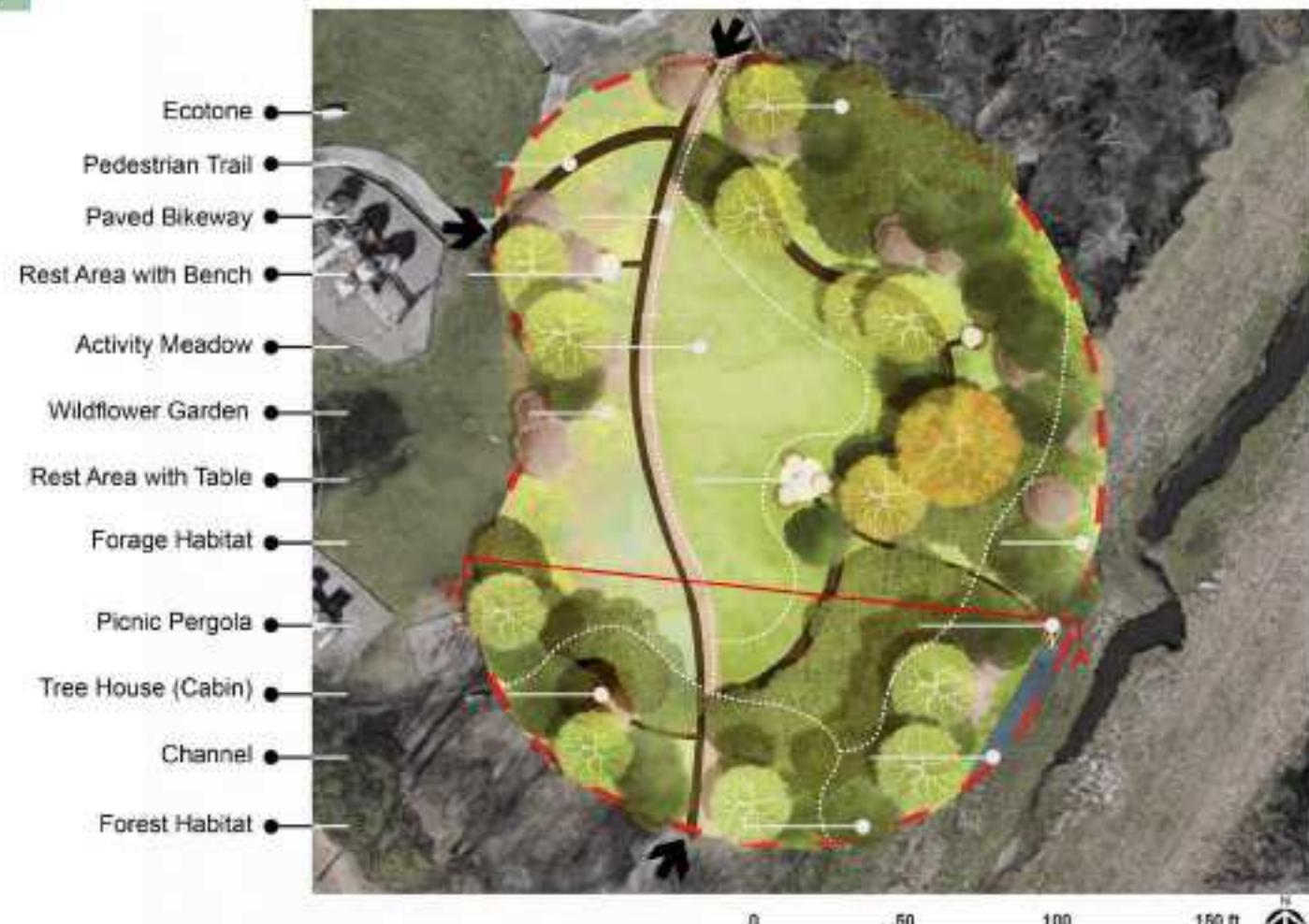
10 Acres Site Location

1 Acre Site Location

### III. Site #3-1

#### Master Plan, Zoom in, 1 Acre

##### Legend



0 50 100 150 ft N

##### Site Index



##### A-A' Section



### III. Site #3-1

#### Plant List, Zoom in, 1 Acre

##### Forage Habitat

| Trees                                       |   |
|---------------------------------------------|---|
| Cedar Elm ( <i>Ulmus crassifolia</i> )      | 1 |
| Sugar Hackberry ( <i>Celtis laevigata</i> ) | 1 |
| Black Walnut ( <i>Juglans nigra</i> )       | 1 |
| Pecan ( <i>Carya illinoiensis</i> )         | 1 |

| Shrub                                           |   |
|-------------------------------------------------|---|
| Beauty Berry ( <i>Callicarpa americana</i> )    | 7 |
| Texas Kidneywood ( <i>Eysenhardtia texana</i> ) | 8 |
| Texas Sage ( <i>Leucophyllum frutescens</i> )   | 8 |
| Yaupon ( <i>Ilex vomitoria</i> )                | 7 |
| Little Leaf Sumac ( <i>Rhus microphylla</i> )   | 7 |

| Groundcover                                      |   |
|--------------------------------------------------|---|
| Coralberry ( <i>Symphoricarpos orbiculatus</i> ) | 7 |
| Horseherb ( <i>Calyptocarpus vialis</i> )        | 1 |

| Vines                                    |   |
|------------------------------------------|---|
| Riverbank Grape ( <i>Vitis riparia</i> ) | 5 |

##### Ecotone & Forest Habitat

| Trees                                            |   |
|--------------------------------------------------|---|
| Live Oak ( <i>Quercus virginiana</i> )           | 1 |
| Texas Red Oak ( <i>Quercus buckleyi</i> )        | 1 |
| Western Soapberry ( <i>Sapindus drummondii</i> ) | 1 |
| Cherry Laurel ( <i>Prunus caroliniana</i> )      | 1 |
| Palmetto Palm ( <i>Sabal spp.</i> )              | 1 |
| Mexican Fan Palm ( <i>Washingtonia robusta</i> ) | 1 |
| Lacebark Elm ( <i>Ulmus parvifolia</i> )         | 1 |

| Shrub                                            |   |
|--------------------------------------------------|---|
| Japanese Barberry ( <i>Berberis thunbergii</i> ) | 7 |
| Nandina ( <i>Nandina domestica</i> )             | 7 |
| Texas Sage ( <i>Leucophyllum frutescens</i> )    | 8 |
| Thorny Elaeagnus ( <i>Elaeagnus pungens</i> )    | 7 |
| Rose of Sharon ( <i>Hibiscus syriacus</i> )      | 8 |
| Waxleaf Ligustrum ( <i>Ligustrum Japonica</i> )  | 7 |

| Groundcover                                                |   |
|------------------------------------------------------------|---|
| Pink Muhly Grass ( <i>Muhlenbergia capillaris</i> )        | 6 |
| Bracken Fern ( <i>Pteridium aquilinum</i> )                | 6 |
| Maidenhair Fern ( <i>Adiantum Pedatum</i> )                | 5 |
| Ivory Feathers Pampas Grass ( <i>Cortaderia selloana</i> ) | 6 |

##### Meadow & Pollinator Habitat

| Trees                                              |   |
|----------------------------------------------------|---|
| Mexican Orchid Tree ( <i>Bauhinia mexicana</i> )   | 4 |
| Red Maple ( <i>Acer rubrum</i> )                   | 1 |
| Common Crapemyrtle ( <i>Lagerstroemia indica</i> ) | 1 |
| Pomegranate ( <i>Punica granatum</i> )             | 1 |
| Cherry Laurel ( <i>Prunus caroliniana</i> )        | 1 |

| Shrub                                                 |   |
|-------------------------------------------------------|---|
| Tree Yellow Bell ( <i>Tecoma stans</i> )              | 2 |
| Camellia ( <i>Camellia spp.</i> )                     | 2 |
| Chinese Fringe Flower ( <i>Loropetalum chinense</i> ) | 1 |
| Glossy Abelia ( <i>Abelia x grandiflora</i> )         | 2 |

| Groundcover                                            |   |
|--------------------------------------------------------|---|
| Bee Balm ( <i>Monarda spp.</i> )                       | 3 |
| Bluebonnet ( <i>Lupinus texensis</i> )                 | 3 |
| Indian Blanket ( <i>Gaillardia pulchella</i> )         | 3 |
| Mexican Blanket ( <i>Gaillardia pulcherrima</i> )      | 4 |
| Butterfly Bush ( <i>Buddleia davidii</i> )             | 4 |
| Cigar Plant / Firecracker Plant ( <i>Cuphea spp.</i> ) | 4 |
| Summer Phlox ( <i>Phlox Paniculata</i> )               | 4 |
| Yellow Senna ( <i>Senna Corymbosa</i> )                | 4 |
| Gulf Muhly ( <i>Muhlenbergia capillaris</i> )          | 4 |

### **III. Site #3-1**

#### **Reference, Plant List, 1 Acre**

1. <https://aggie-horticulture.tamu.edu/syllabi/308/Home/Frameset.htm>
2. <https://buchanansplants.com/garden-center/availabilities/pollinator-plants/>
3. [https://tpwd.texas.gov/publications/pwdpubs/media/pwd\\_bk\\_w7000\\_1675\\_07\\_11.pdf](https://tpwd.texas.gov/publications/pwdpubs/media/pwd_bk_w7000_1675_07_11.pdf)
4. <http://counties.agrilife.org/harris/files/2011/05/bflygrdn.pdf>
5. <http://www.hicksenveplantdatabase.com>
6. <http://www.calloways.com/plant-flower/grass>
7. <http://www.houstongardencenters.com/whattoplant>
8. <http://www.wildflower.org/>
9. Cover image: <https://www.google.com>

### III. Site #3-2



Baolige  
April 2018

### III. Site #3-2

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### III. Site #3-2

#### Site Selection

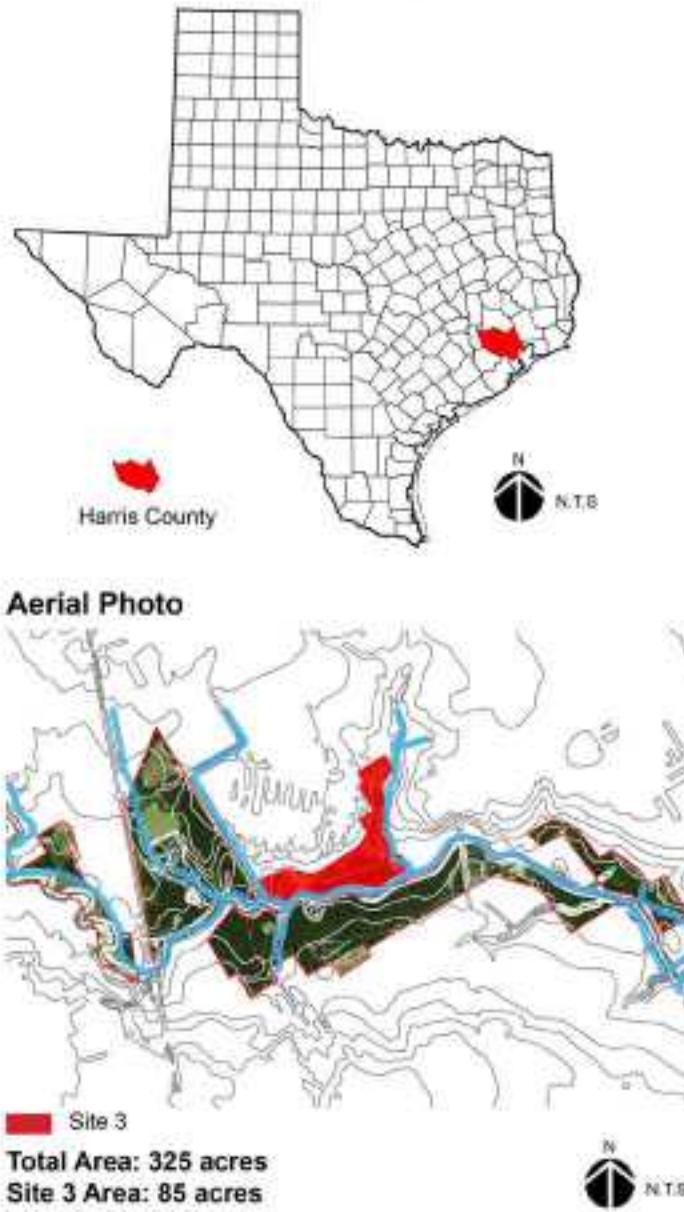


Site # 3

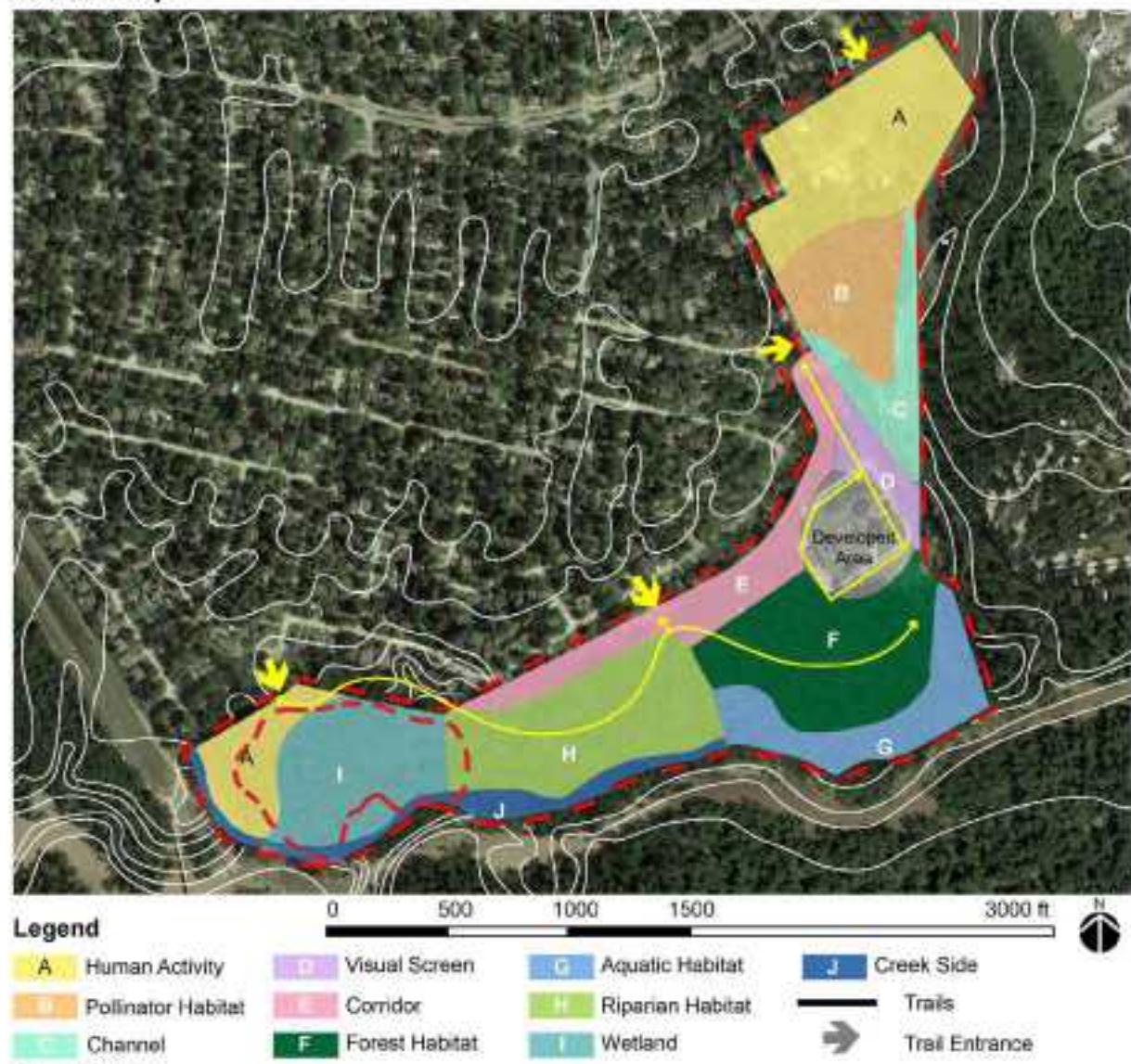
### III. Site #3-2

#### Property Boundary

Site Selection - Harris County, TX



Habitat Map

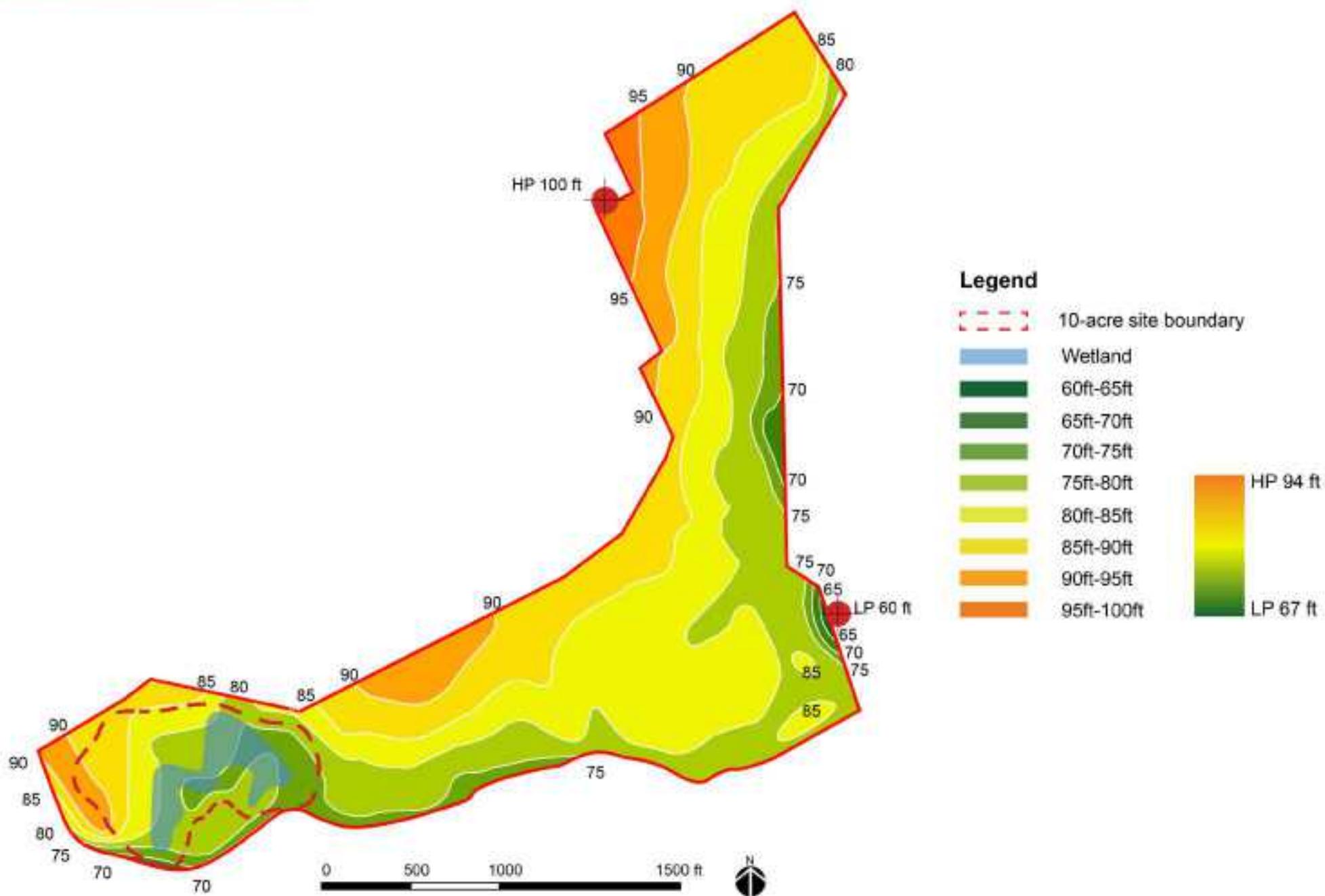


#### Description

1. Vegetation: The site is all covered by forest. Also, palustrine forest in this site that should be preserved.
2. Access: An existing road and residential area are near the north side of the site. Moreover, the forest wetland would be a great destination for visitors and wildlives.
3. Water: The Cypress Creek is on the south side of the site. Moreover, there is a forest wetland in the site.
4. Area: Generally, the slope in the south is much steeper than that in the north. The High point is in the west and the low point is in the south side of site. The site is 10.3 acres.

### III. Site #3-2

#### Elevation Zones Map



### III. Site #3-2

#### Land Use Strategic Plan, 10 Acres

Existing Aerial



Legend



0 100 200 300 600 ft

1. Shaped boundary + Road

— Site Boundary

— Existing Road

→ Entrance

3. Existing Water

Creek

2. High/ Low Point

★ High Point (94 ft)

◆ Low Point (63 ft)

4. Contours

Contour (5ft interval)

Proposed Habitat Plan



Legend



0 100 200 300 600 ft

1. Shaped boundary + Road

— Site Boundary

— Existing Road

→ Entrance

2. High/ Low Point

★ High Point (94 ft)

◆ Low Point (63 ft)

3. Existing Water

Creek

4. Contours

Contour (5ft interval)

5. Habitats

1 Forest Human Area

2 Forest/ Shrub/ Wetland

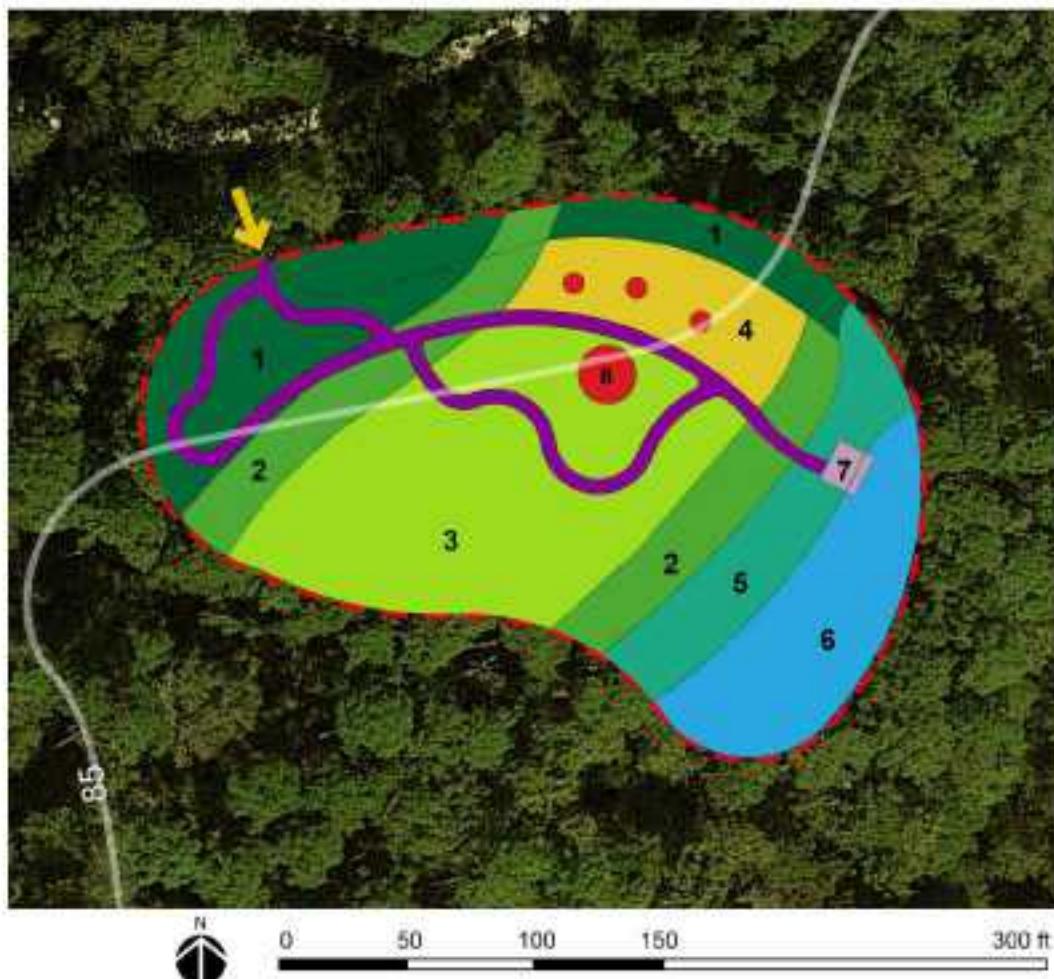
3 Wetland

4 Forest Wildlife Area

5 Steep Slope

### III. Site #3-2

#### Land Use Zoning Plan, Zoom in, 1 Acre



#### Legend

|    |              |    |                   |       |               |
|----|--------------|----|-------------------|-------|---------------|
| 1- | Forest Patch | 5- | Palustrine Forest | - - - | Site Boundary |
| 2- | Ecotone      | 6- | Wetland           | —     | Trails        |
| 3- | Shrub Patch  | 7- | Blind             | —     |               |
| 4- | Meadow       | 8- | Picnic Site       | →     | Entrance      |

| Habitats                       | Featured Wildlife                                | Treatments                                      | Plant Life Forms                           |
|--------------------------------|--------------------------------------------------|-------------------------------------------------|--------------------------------------------|
| Zone 1<br>Forest Patch         | - Song birds<br>- Small Mammals                  | - Canopy Thinning<br>- Stem Thinning            | - Existing Forest<br>- Buffer              |
| Zone 2<br>Ecotone              | - Song birds<br>- Small Mammals<br>- Butterflies | - Forest / Shrub<br>- Shrub / Wetland           | - Large Shrub<br>- Small Shrub<br>- Forest |
| Zone 3<br>Shrub Patch          | - Small Mammals<br>- Butterflies<br>- Bees       | - Visual Screen<br>- Bird Watching              | - Large Shrub<br>- Small Shrub             |
| Zone 4<br>Meadow               | - Butterflies<br>- Bees                          | - Covers<br>- Pollen Flowers                    | - Land Cover<br>- Flowers<br>- Grass       |
| Zone 5<br>Palustrine<br>Forest | - Song Birds<br>- Amphibians                     | - Large Shrub<br>- Arbors<br>- Wetland Addition | - Large Arbor<br>- Aquatic Plants          |
| Zone 6<br>Wetland              | - Fish<br>- Song Birds<br>- Amphibians           | - Local Wetland<br>- Water Pond                 | - Aquatic Plants                           |
| Zone 7<br>Blind                | None                                             | - Elevated Platform                             |                                            |
| Zone 8<br>Picnic Area          | None                                             | - Pavilion                                      |                                            |

#### Index Map



10-acre site Location NTS

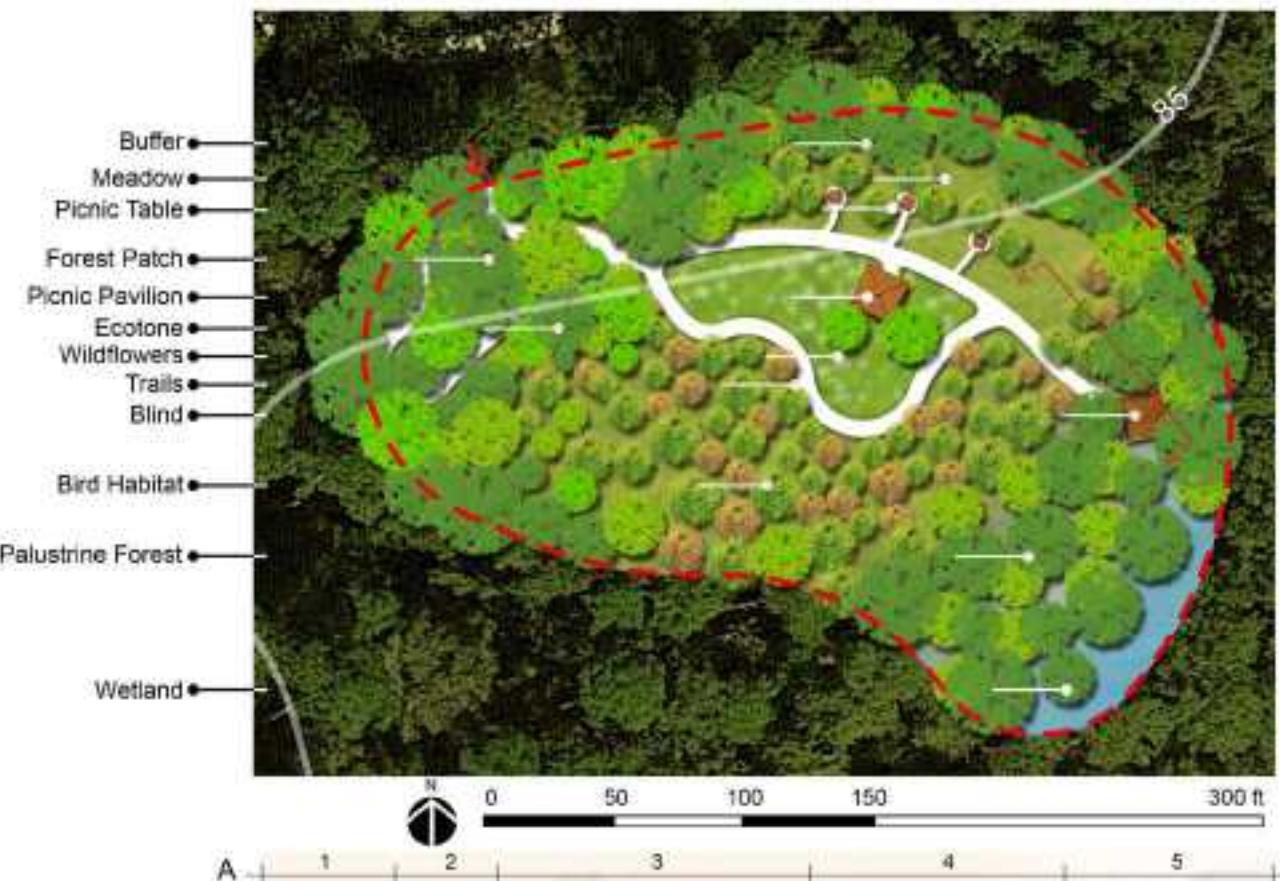
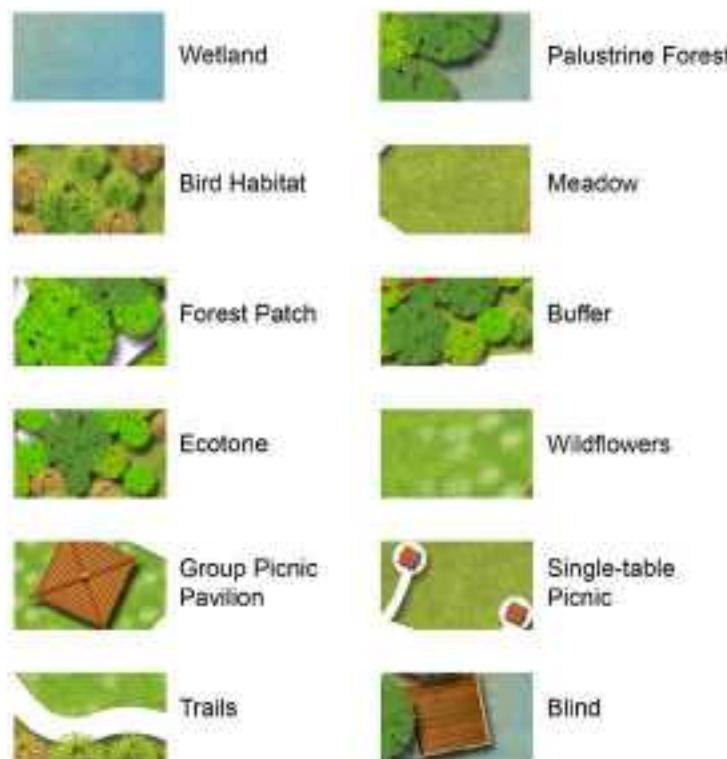


1-acre site Location NTS

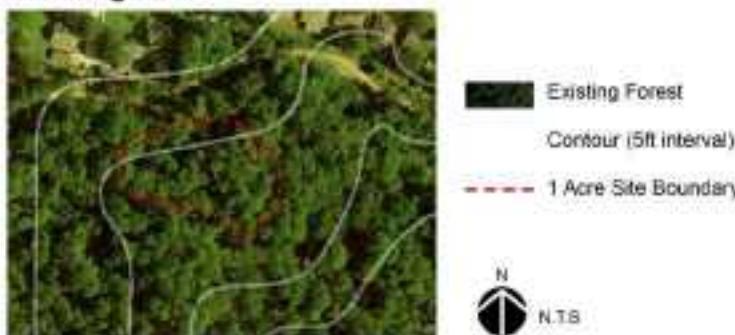
### III. Site #3-2

#### Master Plan, Zoom in, 1 Acre

##### Legend



##### Existing Site



### III. Site #3-2

#### Plant List, Zoom in, 1 Acre

##### Forest Human Area

| Tree                      |                |   |
|---------------------------|----------------|---|
| Scientific Name           | Common Name    |   |
| <i>Taxodium distichum</i> | Bald Cypress   | 1 |
| <i>Ulmus americana</i>    | American Elm   | 1 |
| <i>Populus deltoides</i>  | Cottonwood     | 1 |
| <i>Quercus macrocarpa</i> | Bur Oak        | 1 |
| <i>Ilex opaca</i>         | American Holly | 2 |
| <i>Ilex vomitoria</i>     | Yaupon         | 3 |
| <i>Aesculus glabra</i>    | Texas Buckeye  | 3 |
| <i>Pyrus calleryana</i>   | Callery Pear   | 3 |

##### Shrub

| Scientific Name           | Common Name   |   |
|---------------------------|---------------|---|
| <i>Punica granatum</i>    | Pomegranate   | 2 |
| <i>Myrica cerifera</i>    | Wax Myrtle    | 2 |
| <i>Ilex decidua</i>       | Possumhaw     | 3 |
| <i>Osmanthus fragrans</i> | Sweet Olive   | 3 |
| <i>Prunus caroliniana</i> | Cherry Laurel | 3 |

##### Ground Cover

| Scientific Name            | Common Name       |   |
|----------------------------|-------------------|---|
| <i>Calypocarpus vialis</i> | Horseherb         | 4 |
| <i>Commelinina erecta</i>  | Widow's Tears     | 4 |
| <i>Adiantum pedatum</i>    | Maidenhair Fern   | 4 |
| <i>Isolepis cernua</i>     | Fiber-optic Grass | 5 |

#### Key Species



*Ulmus americana*  
American Elm



*Quercus macrocarpa*  
Bur Oak



*Nerium oleander*  
Oleander



*Punica granatum*  
Pomegranate



*Quercus nigra*  
Water Oak



*Taxodium distichum*  
Bald Cypress



*Isolepis cernua*  
Fiber-optic Grass



*Asclepias tuberosa*  
Butterflyweed



*Ilex vomitoria*  
Yaupon



*Osmanthus fragrans*  
Sweet Olive



*Myrica cerifera*  
Wax Myrtle



*Prunus serotina*  
Black Cherry



*Eichhornia crassipes*  
Water Hyacinth



*Iris spp.*  
Iris



*Ipomopsis rubra*  
Standing Cypress



*Eragrostis spectabilis*  
Purple lovegrass

##### Bird Habitat

| Tree                           |                    |   |
|--------------------------------|--------------------|---|
| Scientific Name                | Common Name        |   |
| <i>Prunus serotina</i>         | Black Cherry       | 1 |
| <i>Rhamnus caroliniana</i>     | Carolina Buckthorn | 1 |
| <i>Liquidambar styraciflua</i> | Sweetgum           | 1 |
| <i>Sapindus drummondii</i>     | Western Soapberry  | 2 |

##### Shrub

| Scientific Name             | Common Name           |   |
|-----------------------------|-----------------------|---|
| <i>Nerium oleander</i>      | Oleander              | 1 |
| <i>Juniperus chinensis</i>  | Chinese Juniper       | 1 |
| <i>Myrica cerifera</i>      | Wax Myrtle            | 2 |
| <i>Lagerstroemia indica</i> | Common Myrtle         | 2 |
| <i>Buxus microphylla</i>    | Littleleaf Boxwood    | 3 |
| <i>Sophora secundiflora</i> | Texas Mountain Laurel | 3 |
| <i>Pittosporum tobira</i>   | Green Pittosporum     | 3 |
| <i>Crataegus marshallii</i> | Parsley Hawthorn      | 3 |

##### Forbs

| Scientific Name               | Common Name          |   |
|-------------------------------|----------------------|---|
| <i>Geum canadense</i>         | White Avens          | 4 |
| <i>Lobelia cardinalis</i>     | Cardinal flower      | 4 |
| <i>Monarda punctata</i>       | Spotted Beebalm      | 5 |
| <i>Calypocarpus vialis</i>    | Prostrate lawnflower | 5 |
| <i>Physostegia virginiana</i> | Obedient Plant       | 5 |

##### Wetland

| Tree | Scientific Name            | Common Name     |   |
|------|----------------------------|-----------------|---|
|      | <i>Tsuga canadensis</i>    | Eastern hemlock | 1 |
|      | <i>Acer rubrum</i>         | Red maple       | 1 |
|      | <i>Taxodium distichum</i>  | Bald Cypress    | 1 |
|      | <i>Quercus nigra</i>       | Water Oak       | 1 |
|      | <i>Quercus shumardii</i>   | Shumard Oak     | 1 |
|      | <i>Sesbania drummondii</i> | Rattle Rush     | 1 |
|      | <i>Ulmus crassifolia</i>   | Cedar Elm       | 2 |
|      | <i>Salix nigra</i>         | Black Willow    | 2 |

##### Wetland Plant

| Scientific Name             | Common Name         |   |
|-----------------------------|---------------------|---|
| <i>Eichhornia crassipes</i> | Water Hyacinth      | 3 |
| <i>Nymphaea mexicana</i>    | Banana Water-lily   | 3 |
| <i>Leptochloa dubia</i>     | Green Sprengeltop   | 3 |
| <i>Typha domingensis</i>    | Southern Cattail    | 3 |
| <i>Panicum virgatum</i>     | Switchgrass         | 3 |
| <i>Sabal minor</i>          | Dwarf Palmetto      | 3 |
| <i>Eichhornia crassipes</i> | Water Hyacinth      | 3 |
| <i>Asclepias rubra</i>      | Red Milkweed        | 4 |
| <i>Coreopsis tinctoria</i>  | Plains Coreopsis    | 4 |
| <i>Iris spp.</i>            | Iris                | 4 |
| <i>Phyla nodiflora</i>      | Frog Fruit          | 4 |
| <i>Rudbeckia maxima</i>     | Great Coneflower    | 5 |
| <i>Itea virginica</i>       | Virginia Sweetspire | 5 |

##### Meadow & Wildflowers Area

| Grass | Scientific Name                | Common Name       |   |
|-------|--------------------------------|-------------------|---|
|       | <i>Isolepis cernua</i>         | Fiber-optic Grass | 3 |
|       | <i>Muhlenbergia capillaris</i> | Gulf Muhi         | 3 |
|       | <i>Carex oshimensis</i>        | Japanese Sedge    | 4 |
|       | <i>Phyla incisa</i>            | Frogfruit         | 4 |

##### Forb

| Scientific Name               | Common Name      |   |
|-------------------------------|------------------|---|
| <i>Asclepias tuberosa</i>     | Butterflyweed    | 3 |
| <i>Glandularia canadensis</i> | Rose Vervain     | 3 |
| <i>Ruellia humilis</i>        | Wild Petunia     | 3 |
| <i>Physostegia virginiana</i> | Obedient Plant   | 3 |
| <i>Gaillardia pulchella</i>   | Indian Blanket   | 4 |
| <i>Ipomopsis rubra</i>        | Standing Cypress | 4 |

##### Wildflower

| Scientific Name               | Common Name      |   |
|-------------------------------|------------------|---|
| <i>Andropogon gerardii</i>    | Big Bluestem     | 5 |
| <i>Andropogon glomeratus</i>  | Bushy Bluestem   | 5 |
| <i>Bouteloua curtipendula</i> | Sideoats Gram    | 5 |
| <i>Eragrostis spectabilis</i> | Purple lovegrass | 5 |
| <i>Nolina texana</i>          | Texas beargrass  | 5 |
| <i>Amblyolepis setigera</i>   | Huisache Daisy   | 5 |
| <i>Callirhoe involucrata</i>  | Winecup          | 5 |
| <i>Castilleja indivisa</i>    | Paintbrush       | 5 |

### **III. Site #3-2**

#### **Reference, Plant List, 1 Acre**

##### **References for photo**

1. [www.google.com](http://www.google.com)
2. <https://www.wildflower.org/plants/>

##### **References for plant list**

1. <https://www.wildflower.org/plants/>
2. <http://counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf>
3. <http://aggie-horticulture.tamu.edu/ornamentals>
4. <http://www.houstongardencenters.com/>
5. <https://npsot.org/wp/>

#### IV. Site #4-1



Lingshuang Meng  
April, 2018

## IV. Site #4-1

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## IV. Site #4-1

### Site Selection



Site 4

## IV. Site #4-1

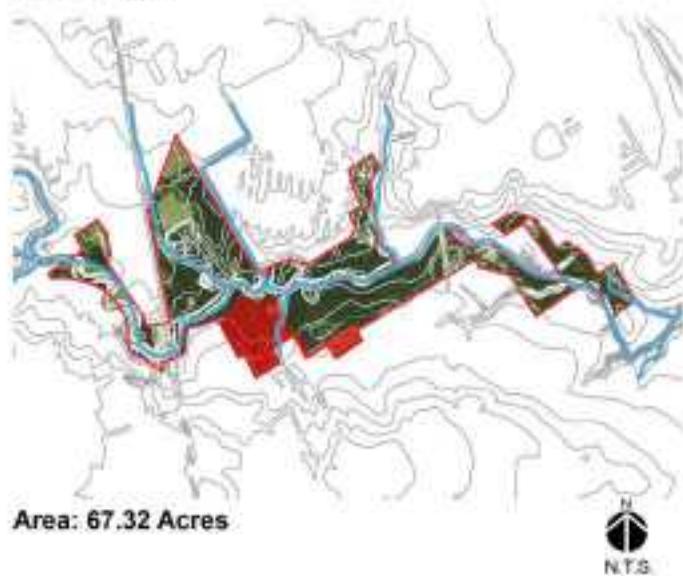
### Property Boundary

#### Site 4

Final Study- Site Selection- Analysis Final



#### Aerial Photo



Area: 67.32 Acres

#### Habitat Map



#### Legend

- |                        |                                 |
|------------------------|---------------------------------|
| 1. Shaped Site + Roads | 3. Existing Water               |
| — Site Boundary        | — Contours<br>— (5 ft interval) |
| → Access Point         |                                 |
| 2. High/Low Point      | 5. Land Types                   |
| ■ 88ft, High Point     | 1. Drainage                     |
| ■ 55ft, Low Point      | 2. Corridor/ Patch              |
|                        | 3. Human Area                   |
|                        | 4. Buffer                       |
|                        | 5. Wildlife Habitat             |

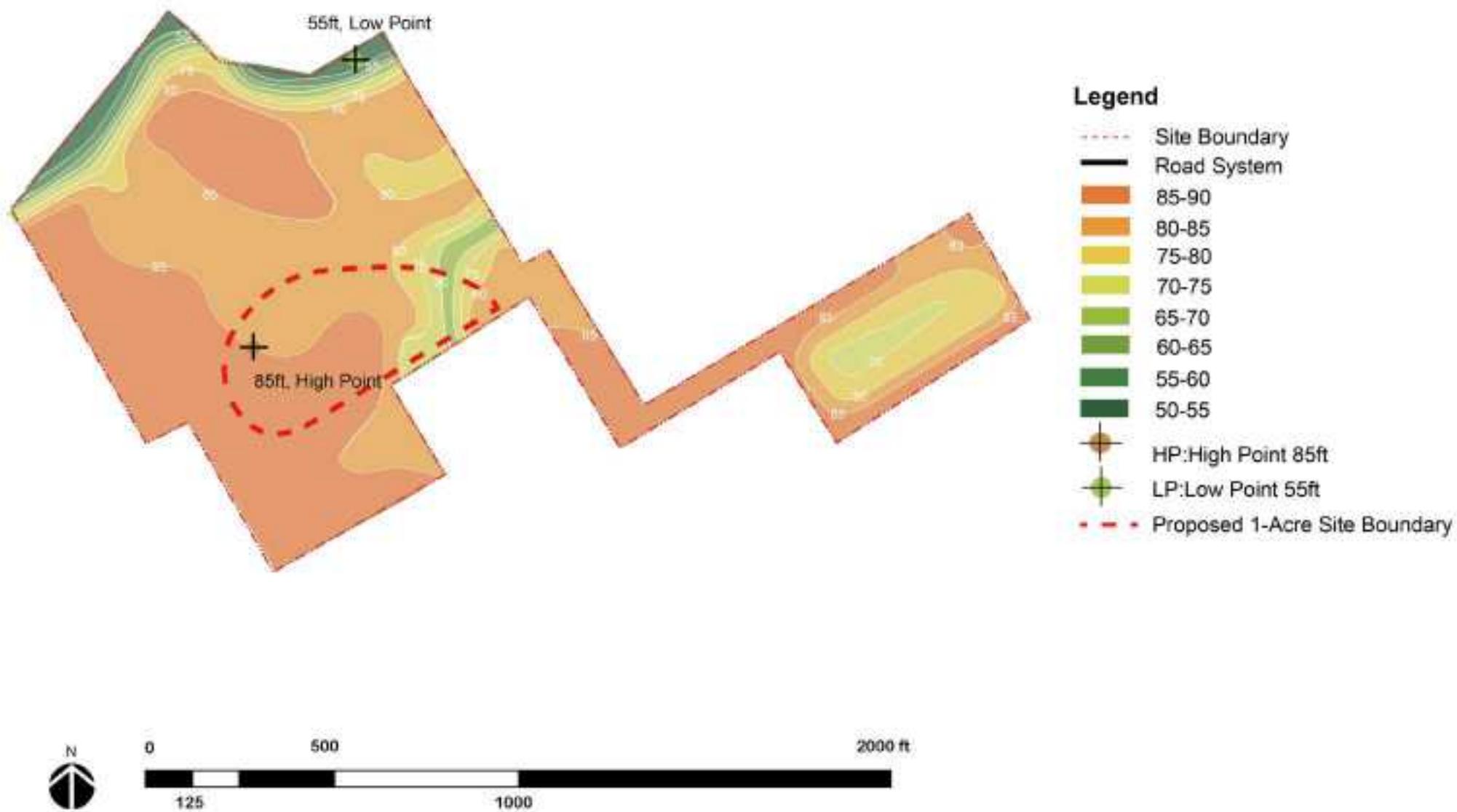


#### Description

1. Vegetation: The site is all covered by canopy. It is very important to preserve the forest patch and the existing forest area so that they can provide a very good potential for wildlife habitat.
2. Access: There are two existing roads that connect the residential area and the bridge on the north side. There are three entrances along the residential side that provide access for residents.
3. Water: There is one drainage channel in the deep slope area that allows water to go down to the creek.
4. Area: Generally, the site is very flat. The slope is 0-4 % in most area. South is higher than north. The site is 10 acres.

## IV. Site #4-1

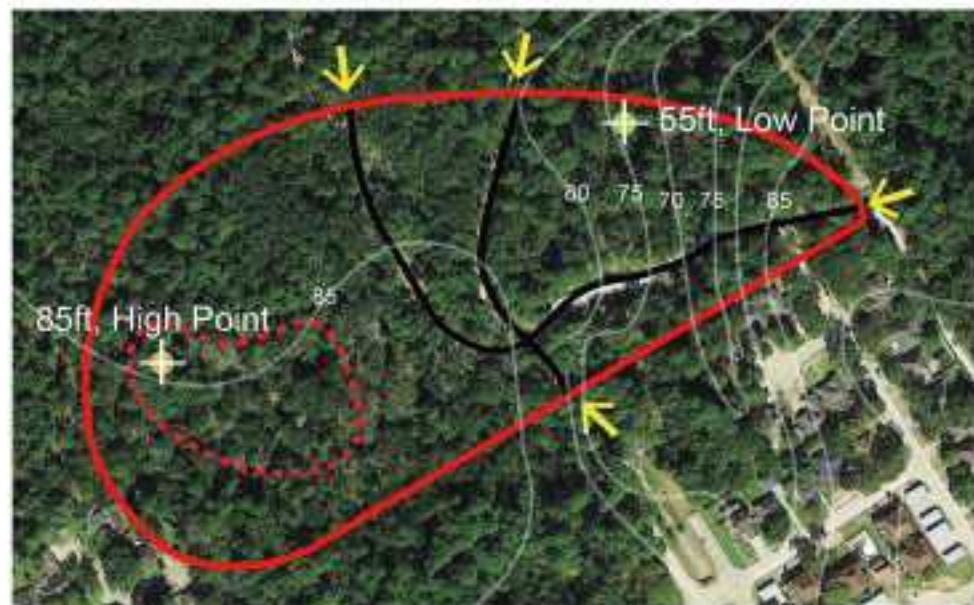
### Elevation Zones Map



## IV. Site #4-1

### Land Use Strategic Plan, 10 Acres

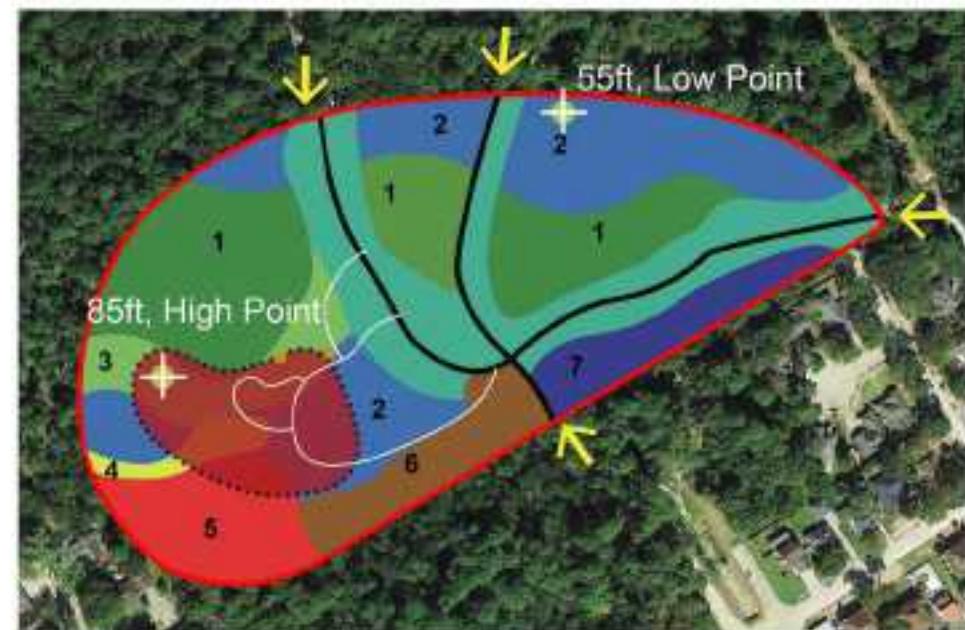
#### Proposed Site Selection: 10 Acre



#### Legend



#### Proposed Habitat Zoning



#### Legend



## IV. Site #4-1

### Land Use Zoning Plan, Zoom in, 1 Acre

1 Acre Site Plan



#### Legend

- Site Boundary
- Proposed Trails
- Wildlife Blind
- ◆ Access Point

- Contour  
(5 ft interval)
- Forest Patch

Reference: Google Map

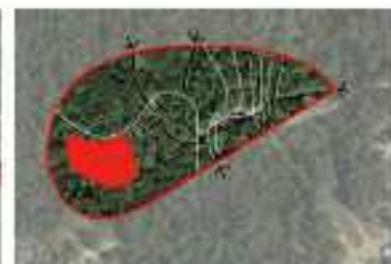
### Habitat Design

| HABITAT             | FEATURED WILDLIFE                | TREATMENTS                                                               | PLANT LIFE FORMS                  |
|---------------------|----------------------------------|--------------------------------------------------------------------------|-----------------------------------|
| 1 Forest            | Song birds, small mammals, deers | Keep existing canopy, wildlife blind                                     | Tree                              |
| 2 Stem Thinning     | Song birds                       | Canopy thinning, stem thinning                                           | Tree                              |
| 3 Ecotone           | Deers, small mammals, rodents    | Existing forest, small and large shrubs                                  | Shrub                             |
| 4 Wildflower Garden | Butterflies, bees                | Nectar, pollen, flower, seed source                                      | Wildflower                        |
| 5 Human Area        | Song birds, butterflies, bees    | Picnic tables and pavilion, large shade trees and shrubs and wildflowers | Tree, shrub, grass and wildflower |

### Index Map



10 Acre Site



1 Acre Site



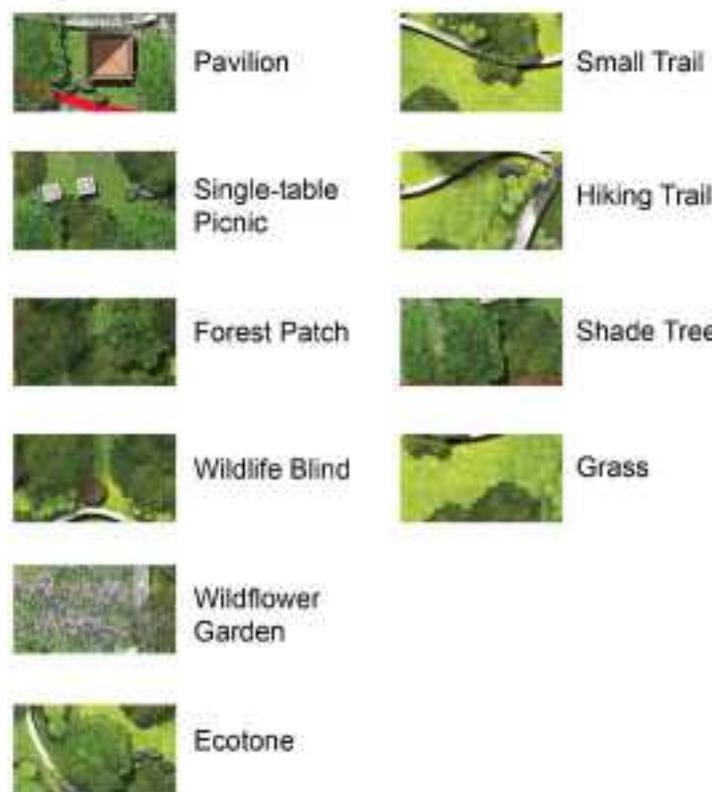
N.T.S.



## IV. Site #4-1

### Master Plan, Zoom in, 1 Acre

#### Legend

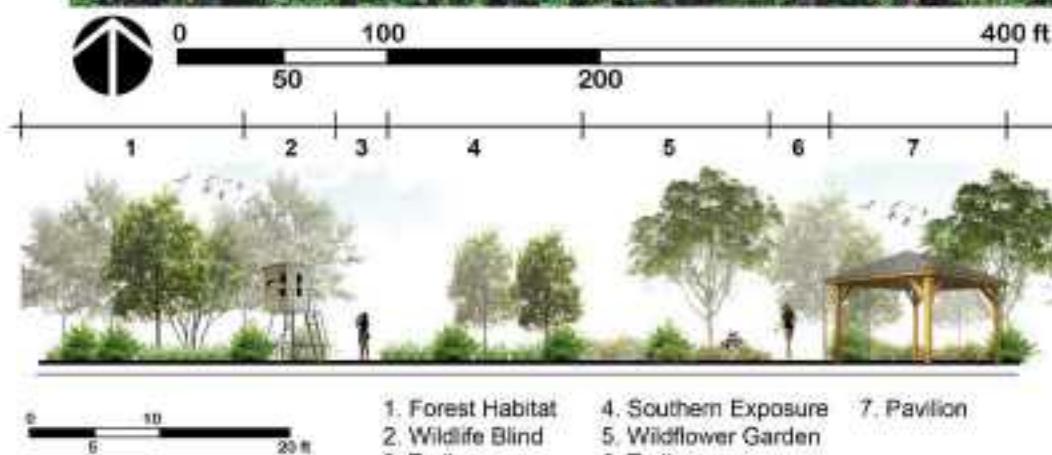


#### Existing Site



Reference: Google Map

#### Section A-A'



# IV. Site #4-1

## Plant List, Zoom in, 1 Acre

### Forest Habitat

| Tree                                              |   |
|---------------------------------------------------|---|
| Eastern Black Walnut ( <i>Juglans nigra</i> )     | 1 |
| Eastern Red Cedar ( <i>Juniperus virginiana</i> ) | 1 |
| Carolina Buckthorn ( <i>Rhamnus caroliniana</i> ) | 1 |
| Common Chokecherry ( <i>Prunus virginiana</i> )   | 2 |
| Yaupon ( <i>Ilex vomitoria</i> )                  | 1 |
| Western Soapberry ( <i>Sapindus drummondii</i> )  | 1 |
| Lime Prickly-Ash ( <i>Zanthoxylum fagara</i> )    | 1 |
| Mayhaw ( <i>Craibegus opaca</i> )                 | 2 |
| Carolina Buckthorn ( <i>Rhamnus caroliniana</i> ) | 1 |
| American Holly ( <i>Ilex opaca</i> )              | 2 |
| Texas Persimmon ( <i>Diospyros texana</i> )       | 2 |

### Shrub

|                                                      |   |
|------------------------------------------------------|---|
| American Beautyberry ( <i>Callicarpa americana</i> ) | 3 |
| Pyracantha ( <i>Pyracantha coccinea</i> )            | 3 |
| Natal Plum ( <i>Carissa macrocarpa</i> )             | 4 |
| Japanese Laurel ( <i>Aucuba japonica</i> )           | 3 |
| Spirea ( <i>Spirea japonica</i> )                    | 3 |
| Virginia Sweetspire ( <i>Itea Virginica</i> )        | 3 |
| Japanese Barberry ( <i>Berberis thunbergii</i> )     | 1 |
| Red yucca ( <i>Hesperaloe parviflora</i> )           | 1 |
| Possumhaw ( <i>Ilex decidua</i> )                    | 3 |



American Beautyberry



Common Chokecherry

### Human Area

| Tree                                        |   |
|---------------------------------------------|---|
| American Beech ( <i>Fagus grandifolia</i> ) | 1 |
| Pecan ( <i>Carya illinoensis</i> )          | 2 |
| Shumard Oak ( <i>Quercus Shumardii</i> )    | 1 |
| White Oak ( <i>Quercus alba</i> )           | 2 |
| American Elm ( <i>Ulmus americana</i> )     | 2 |
| Red Bay ( <i>Pereae borbonia</i> )          | 2 |
| Pawpaw ( <i>Asimina triloba</i> )           | 1 |
| Live Oak ( <i>Quercus virginiana</i> )      | 2 |

### Forbs

|                                                |   |
|------------------------------------------------|---|
| Rose Vervain ( <i>Glandularia canadensis</i> ) | 6 |
| Standing Cypress ( <i>Lycopodium rubra</i> )   | 5 |
| Rivina humilis (Pigeonberry)                   | 6 |
| Indian Blanket ( <i>Gaillardia pulchella</i> ) | 5 |
| Walter's Violet ( <i>Viola walteri</i> )       | 5 |
| Scarlet Sage ( <i>Salvia coccinea</i> )        | 6 |
| Pigeonberry ( <i>Rivina humilis</i> )          | 5 |
| Cardinal flower ( <i>Lobelia cardinalis</i> )  | 6 |

### Vines

|                                             |    |
|---------------------------------------------|----|
| Bougainvillea ( <i>Bougainvillea sp.</i> )  | 9  |
| Cape Honeysuckle ( <i>Tecoma capensis</i> ) | 10 |
| Blackberries ( <i>Rubus spp.</i> )          | 9  |



Prairie Verbena

### Wildflower Garden

| Tree                                                |   |
|-----------------------------------------------------|---|
| Red Bud ( <i>Cercis canadensis</i> )                | 1 |
| Necklace Tree ( <i>Sophora affinis</i> )            | 2 |
| Golden Rain Tree ( <i>Koelreuteria bipinnata</i> )  | 1 |
| Mexican Olive ( <i>Cordia boissieri</i> )           | 1 |
| Common Crape Myrtle ( <i>Lagerstroemia indica</i> ) | 2 |
| Red Buckeye ( <i>Aesculus pavia</i> )               | 2 |
| Texas Buckeye ( <i>Aesculus glabra</i> )            | 2 |
| Callery Pear ( <i>Pyrus calleryana</i> )            | 2 |
| Southern Magnolia ( <i>Magnolia grandiflora</i> )   | 1 |

### Shrub

|                                                     |   |
|-----------------------------------------------------|---|
| Tea Rose ( <i>Rosa rugosa</i> )                     | 4 |
| Red Tip Photinia ( <i>Photinia x fraseri</i> )      | 3 |
| Bigleaf Hydrangea ( <i>Hydrangea macrophylla</i> )  | 1 |
| Crimson Bottlebrush ( <i>Callistemon citrinus</i> ) | 1 |
| Oleander ( <i>Nerium oleander</i> )                 | 4 |
| Camelia ( <i>Camellia sasanqua</i> )                | 3 |
| Spirea ( <i>Spiraea japonica</i> )                  | 1 |
| Texas Sage ( <i>Leucophyllum frutescens</i> )       | 1 |
| Suspensum Viburnum ( <i>Viburnum suspensum</i> )    | 3 |

### Grasses

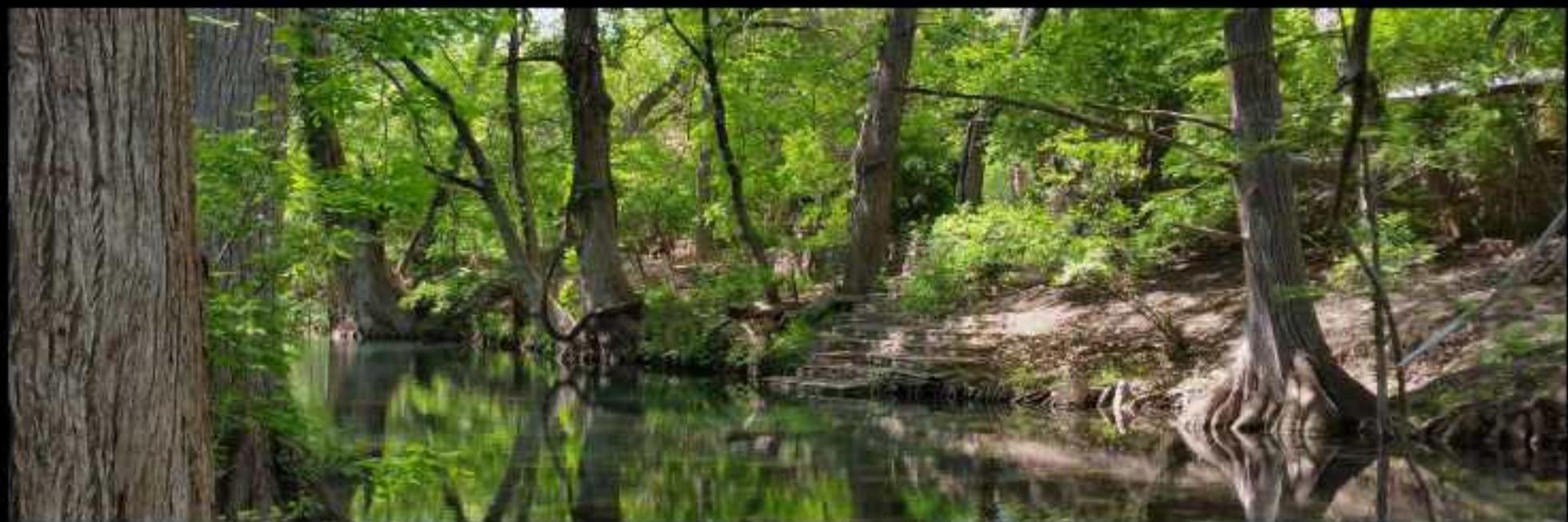
|                                                      |   |
|------------------------------------------------------|---|
| Widow's Tears ( <i>Commelinia erecta</i> )           | 7 |
| Sweet William ( <i>Dianthus barbatus</i> )           | 8 |
| Prairie Verbena ( <i>Glandularia bipinnatifida</i> ) | 7 |
| Winecups ( <i>Callirhoe spp.</i> )                   | 8 |
| Purple Groundcherry ( <i>Quincula lobata</i> )       | 7 |
| Missouri Violet ( <i>Viola sororia</i> )             | 7 |
| Indian Blanket ( <i>Gaillardia pulchella</i> )       | 7 |
| Fern Acacia ( <i>Acacia farnesiana</i> )             | 8 |
| Frogfruit ( <i>Phyla nodosa</i> )                    | 8 |

## IV. Site #4-1

### Reference, Plant List, 1 Acre

- 1.<https://www.wildflower.org/plants/>
- 2.<https://counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf>
- 3.<http://www.houstongardencenter.com/whattoplant.php?idCat=5>
- 4.<http://npsot.org/wp/>
- 5.<https://thegrassoutlet.com/houston-sod-grass/spring/>
- 6.<http://npspot.org/wp/houston/files/2015/02/NPSOT-Houston-Information-Pages-2015.pdf>
- 7.<http://www.hicksenvplantdatabase.com>
- 8.<http://www.calloways.com/plants-flowers/grasses>
- 9.<http://www.calloways.com/plants-flowers/vines/>
- 10.<http://www.bigtextrées.com/plants/vines>
11. Cover Picture: <https://listings.texas-landman.com/texas-landmen/cypress-springs-ranch/>

#### IV. Site #4-2



Anyi Qu  
April, 2018

## IV. Site #4-2

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| Plant List, Zoom In, 1 Acre<br>Cypress Creek Landscape - Spring - Texas .....           | 7 |
| Reference, Plant List,<br>Cypress Creek Landscape - Spring - Texas .....                | 8 |

## IV. Site #4-2

### Site Selection



Site 4

## IV. Site #4-2

### Property Boundary

Cypress Creek Landscape - Spring, Texas  
Final Study - Site Selection - Analysis Final



### Aerial Photo



Area: 325 acres

### Habitat Design - 67.32 acre site



### Legend

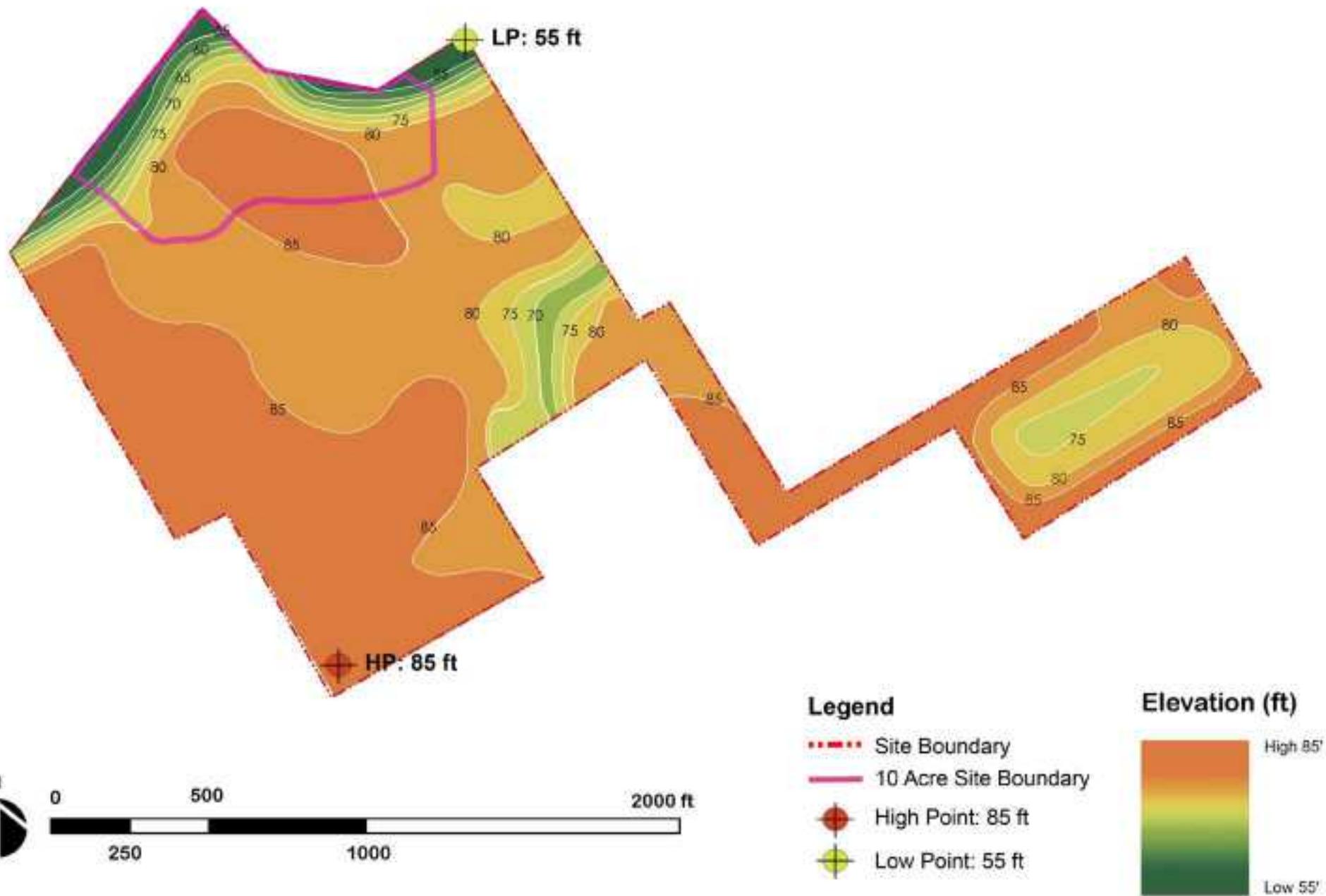
- |                               |                            |                            |
|-------------------------------|----------------------------|----------------------------|
| <b>1. Shaped Site + Roads</b> | <b>2. High / Low Point</b> | <b>4. Proposed Habitat</b> |
| Site Boundary                 | High Point: 85ft           | Human Activity Zone        |
| Community Road                | Low Point: 55ft            | Preserved Area             |
| Primary Trails                |                            | Eco Zone                   |
| Secondary Trails              |                            | Patch & Corridor           |
| Existing Contour              |                            | Drainage Zone              |
| Access Point                  |                            | Buffer Zone                |
|                               | 10 Acre Target Site        |                            |

### Description

1. Vegetation: Most of the site 4 is covered by existing forest, only one part is bare land with public amenities.
2. Access: The accesses from south are community roads. There is an entrance in the center to Mercer botanicalgarden. A bridge connect the site to the north shore of Cypress Creek.
3. Water: Cypress Creek is in the north of the site, several drainage ways connect the residential area to the water body.
4. Area: The 10 acre-target site is located in the north side of the group site, south side of the Cypress Creek and existing bridge. It is a connection for of the park system and important linkage to Mercer Arboretum. It has the possibility to develop natural habitats, migrating corridors and human activity areas.

## IV. Site #4-2

### Elevation Zones Map



## IV. Site #4-2

### Land Use Strategic Plan, 10 Acres

Proposed Site Election: 10 acre



Proposed Habitat Zoning



#### Legend

- 1. Shaped Site + Roads
  - Site Boundary - 10 acre
  - - - Site Boundary - 1 acre
  - Community Road
  - Primary Trails
  - Secondary Trails
  - Existing Bridge
  - Access Point
- 2. High / Low Point
  - ◆ High Point: 85ft
  - ◆ Low Point: 55ft
- 3. Existing Water
  - Cypress Creek

- 4. Recreational Zone
  - Wildlife-viewing Spot
  - Observation Platform
- 5. Protected Zones
  - 1 Ecotone Area
  - 5 Stem Thinning
  - 4 Corridor Patches
  - 7 Wildflower Patch
  - 2 Forest Patches
  - 3 Riparian Area

## IV. Site #4-2

### Land Use Zoning Plan, Zoom in, 1 Acre

Site 4 - 1 Acre



#### Legend

| Recreation Zone |                     | Protection Zone |                    | Special Feature |                    |
|-----------------|---------------------|-----------------|--------------------|-----------------|--------------------|
| —               | Site Boundary       | 1-              | Ecotone Area       | 4-              | Wildflower Garden  |
| —               | Bicycle Trail       | 2-              | Forest Patch       | 5-              | Stem-thinning Area |
| —               | Pedestrian Trails   | 3-              | Semi-hydric Forest | 7-              | Habitat Island     |
| →               | Access Point        | 6-              | Corridor Patch     |                 |                    |
| 9-              | Paved Activity Area |                 |                    |                 |                    |

| Habitat Zone                 | Target Animals               | Treatments                                 |
|------------------------------|------------------------------|--------------------------------------------|
| ZONE 1<br>Ecotone Area       | Small Mammals                | Native Grass<br>Shrub                      |
| ZONE 2<br>Forest Patch       | Deers, Mammals<br>Song Birds | Existing forest path<br>Buffer             |
| ZONE 3<br>Palustrine Forest  | Song Birds<br>Amphibians     | Palustrine plants<br>Riparian plants       |
| ZONE 4<br>Bank Stabilization | Amphibians                   | Buffer stabilization<br>Riparian plants    |
| ZONE 5<br>Wildflower Garden  | Pollinators                  | Native wildflowers                         |
| ZONE 6<br>Stem-Thinning Area | Rodents<br>Small Animals     | Ground surface diversity<br>South exposure |
| ZONE 7<br>Corridor Patch     | Migrating Animals            | 6.1 Mammal Corridor<br>6.2 Migrating Node  |
| ZONE 8<br>Habitat Island     | Pollinators<br>Small Mammels | Food source plants<br>Food source grasses  |
| ZONE 9<br>Blind              | Bird-watching                | Accessible to wildlife                     |
| ZONE 10<br>Activity Area     | Animal-viewing               | 9.1 Paved platform<br>9.2 Seating area     |

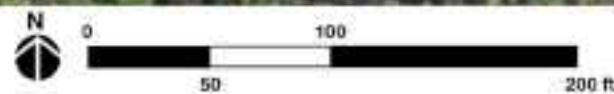
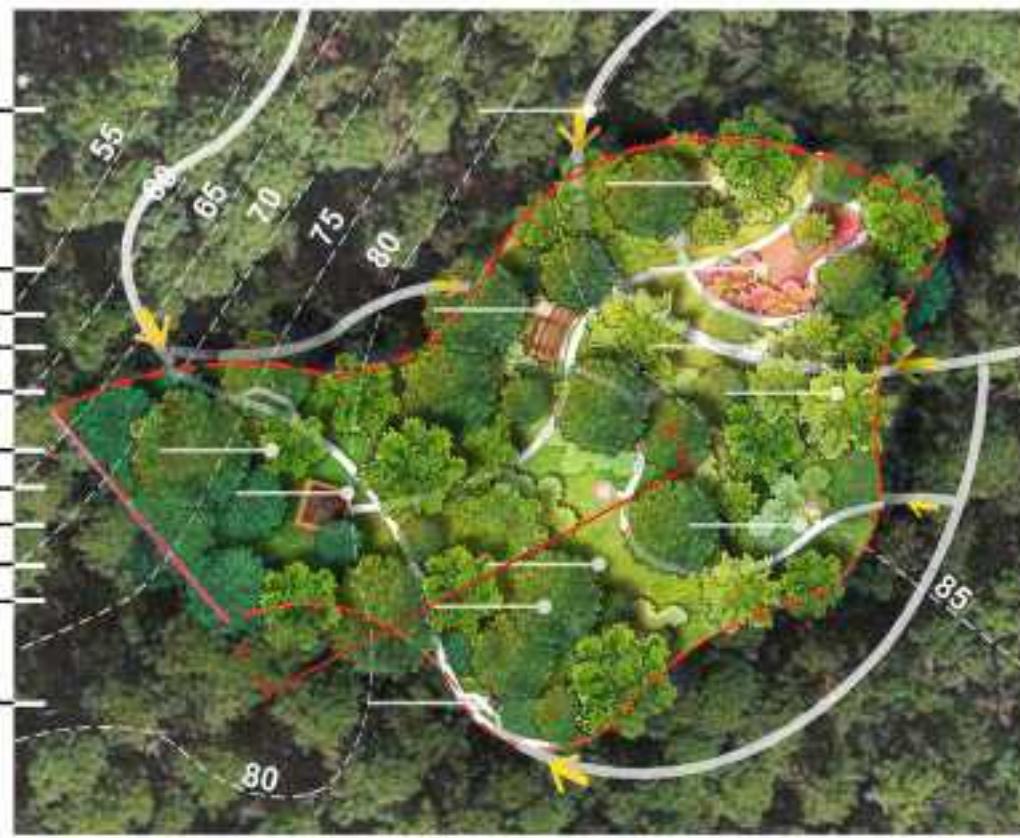
#### Index Map



## IV. Site #4-2

### Master Plan, Zoom in, 1 Acre

#### Legend



#### Existing Site



N.T.S.

#### Section A-A'



## IV. Site #4-2

### Plant List, Zoom in, 1 Acre

#### Habitat Island

| Tree                                        | Fruit Season                |   |
|---------------------------------------------|-----------------------------|---|
| American Beech ( <i>Fagus grandifolia</i> ) | Fall to Winter              | 1 |
| Callery Pear ( <i>Pyrus calleryana</i> )    | Summer to Fall              | 3 |
| Huisache ( <i>Acacia farnesiana</i> )       | Late Winter to Early Spring | 2 |
| Yaupon ( <i>Ilex vomitoria</i> )            | Spring                      | 1 |
| Shumard Oak ( <i>Quercus shumardii</i> )    | Fall to Winter              | 1 |
| Ashe Juniper ( <i>Juniperus ashei</i> )     | Fall                        | 4 |
| Blackgum ( <i>Nyssa sylvatica</i> )         | Summer                      | 3 |
| American Elm ( <i>Ulmus americana</i> )     | Summer                      | 3 |

| Shrub                                            | Fruit Season           |   |
|--------------------------------------------------|------------------------|---|
| Rose of Sharon ( <i>Hibiscus syriacus</i> )      | Fall to Winter         | 4 |
| Nandina ( <i>Nandina domestica</i> )             | Late Autumn to Winter  | 3 |
| Waxleaf Ligustrum ( <i>Ligustrum japonicum</i> ) | Early Winter           | 3 |
| Forsythia ( <i>Forsythia intermedia</i> )        | Early Summer to Fall   | 5 |
| Camellia ( <i>Camellia sasanqua</i> )            | Summer to early Spring | 3 |
| Thorny Eleagnus ( <i>Elaeagnus pungens</i> )     | Spring                 | 5 |
| Texas Sage ( <i>Leucophyllum frutescens</i> )    | Summer and Fall        | 1 |
| Possomhaw ( <i>Ilex decidua</i> )                | Fall to Spring         | 1 |

| Vine                                 | Fruit Season          |   |
|--------------------------------------|-----------------------|---|
| Blackberries ( <i>Rubus spp.</i> )   | Various Seasons       | 4 |
| Creeping Fig ( <i>Ficus pumila</i> ) | Spring to Late Summer | 6 |

*Pyrus calleryana*



*Nandina domestica*



#### Palustrine Forest

| Tree                                          |   |  |
|-----------------------------------------------|---|--|
| Cottonwood ( <i>Populus deltoides</i> )       | 7 |  |
| Water Oak ( <i>Quercus nigra</i> )            | 7 |  |
| Loblolly Pine ( <i>Pinus taeda</i> )          | 7 |  |
| Texas Persimmon ( <i>Diospyros texana</i> )   | 7 |  |
| Southern Waxmyrtle ( <i>Myrica cerifera</i> ) | 3 |  |

| Shrub                                                   |   |  |
|---------------------------------------------------------|---|--|
| American Beautyberry ( <i>Callicarpa americana</i> )    | 3 |  |
| Common Buttonbush ( <i>Cephaelanthus occidentalis</i> ) | 7 |  |
| Tea Rose ( <i>Rosa odorata</i> )                        | 7 |  |
| Green Pittosporum ( <i>Pittosporum tobira</i> )         | 8 |  |

| Wetland Plants                                 |   |  |
|------------------------------------------------|---|--|
| Virginia sweetspire ( <i>Itea virginica</i> )  | 1 |  |
| Thin-fruit sedge ( <i>Carex flaccosperma</i> ) | 3 |  |
| Horsetail ( <i>Equisetum hyemale</i> )         | 3 |  |

| Forb                                          |   |  |
|-----------------------------------------------|---|--|
| Spotted Beebalm ( <i>Monarda punctata</i> )   | 7 |  |
| Walter's Violet ( <i>Biola walteri</i> )      | 7 |  |
| White Avens ( <i>Geum canadense</i> )         | 7 |  |
| Cardinal flower ( <i>Lobelia cardinalis</i> ) | 3 |  |

*Carax flaccosperma*



#### Ecotone Area & Wildflower Garden

| Tree                                                |   |  |
|-----------------------------------------------------|---|--|
| Fringe Tree ( <i>Chionanthus virginicus</i> )       | 3 |  |
| Common Crape Myrtle ( <i>Lagerstroemia indica</i> ) | 8 |  |
| Texas Buckeye ( <i>Aesculus pavia</i> )             | 1 |  |
| Yaupon ( <i>Ilex vomitoria</i> )                    | 1 |  |
| Flameleaf Sumac ( <i>Rhus copallina</i> )           | 7 |  |
| American Holly ( <i>Ilex opaca</i> )                | 3 |  |
| White Oak ( <i>Quercus alba</i> )                   | 3 |  |
| Eastern Red Cedar ( <i>Juniperus virginiana</i> )   | 3 |  |
| Chaste Tree ( <i>Vitex agnus-castus</i> )           | 3 |  |

| Shrub                                                 |   |  |
|-------------------------------------------------------|---|--|
| Cherry Laurel ( <i>Prunus caroliniana</i> )           | 1 |  |
| Oleander ( <i>Nerium oleander</i> )                   | 3 |  |
| Pomegranate ( <i>Punica granatum</i> )                | 3 |  |
| Littleleaf Boxwood ( <i>Buxus microphylla</i> )       | 4 |  |
| Chinese Juniper ( <i>Juniperus chinensis</i> )        | 4 |  |
| Firecracker ( <i>Jatropha integerrima</i> )           | 4 |  |
| Spiraea ( <i>Spiraea japonica</i> )                   | 3 |  |
| Chinese Fringe Flower ( <i>Loropetalum chinense</i> ) | 3 |  |
| Texas Sage ( <i>Leucophyllum frutescens</i> )         | 1 |  |

| Groundcover                                     |   |  |
|-------------------------------------------------|---|--|
| Big Bluestem ( <i>Andropogon gerardii</i> )     | 7 |  |
| Coralberry ( <i>Symporicarpos orbiculatus</i> ) | 3 |  |
| Frogfruit ( <i>Phyla incisa</i> )               | 7 |  |
| Sweet William ( <i>Dianthus barbatus</i> )      | 3 |  |
| Indian Blanket ( <i>Gaillardia pulchella</i> )  | 7 |  |

[https://commons.wikimedia.org/wiki/File:Callery\\_pear\\_2.jpg](https://commons.wikimedia.org/wiki/File:Callery_pear_2.jpg)  
<http://www.turrit-tropical.co.uk/product/nandina-domestica-10l/>  
<http://fieldbounchao.blogspot.com/2014/08/native-sedges-part-1-big-and-showy.html>

## IV. Site #4-2

### Reference, Plant List, 1 Acre

1. <https://www.wildflower.org/>
2. <https://aggie-horticulture.tamu.edu/ornamentals/>
3. <http://www.missouribotanicalgarden.org/>
4. <https://en.wikipedia.org/>
5. <http://en.hortipedia.com/wiki/>
6. <https://www.logees.com/sunrequirement/shade/creeping-fig-ficus-pumila.html>
7. <https://plants.usda.gov/>
8. <https://plants.ces.ncsu.edu/plants/>
9. <https://wimberleyinn.com/city-culture/>

## V. Site #5-1



Weiyi Zhou  
April, 2018

## V. Site #5-1

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| Land Use Zoning Plan, 1 Acre<br>Sustainable Wildlife Management        | 5 |                                                          |   |

## V. Site #5-1

### Site Selection



Site #5

# V. Site #5-1

## Property Boundary

### Final Study Site Selection



### Aerial Photo

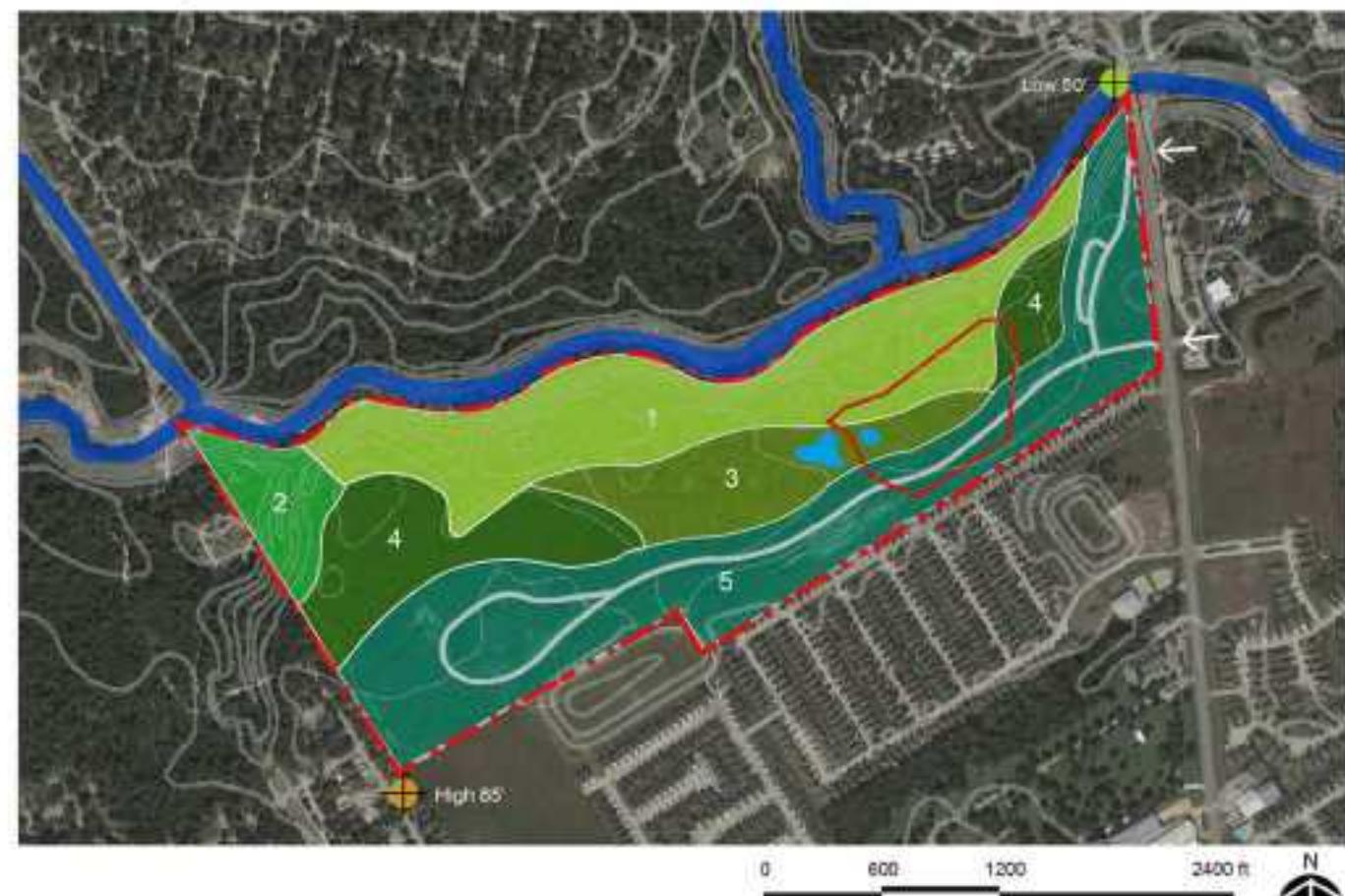
Total Area: 325 acres



Site #5 Area: 130 acres



### Habitat Map



#### Legend

|                        |                    |                   |                         |                    |
|------------------------|--------------------|-------------------|-------------------------|--------------------|
| 1. Shaped Site + Roads | 2. High/Low Points | 3. Existing Water | 4. Contour              | 6. Habitat Zones   |
| — 10 Acre Site         | ▲ 85ft, High Point | ■ Wetlands        | — Contour (ft interval) | 1 Corridor         |
| — Existing Driveway    | ● 50ft, Low Point  | ■ Tributary       | — Sub-site              | 2 Wildlife Habitat |
| ← Access Points        |                    |                   |                         | 3 Wetland Habitat  |
|                        |                    |                   |                         | 4 Forest Habitat   |
|                        |                    |                   |                         | 5 Forest Buffer    |

#### Description

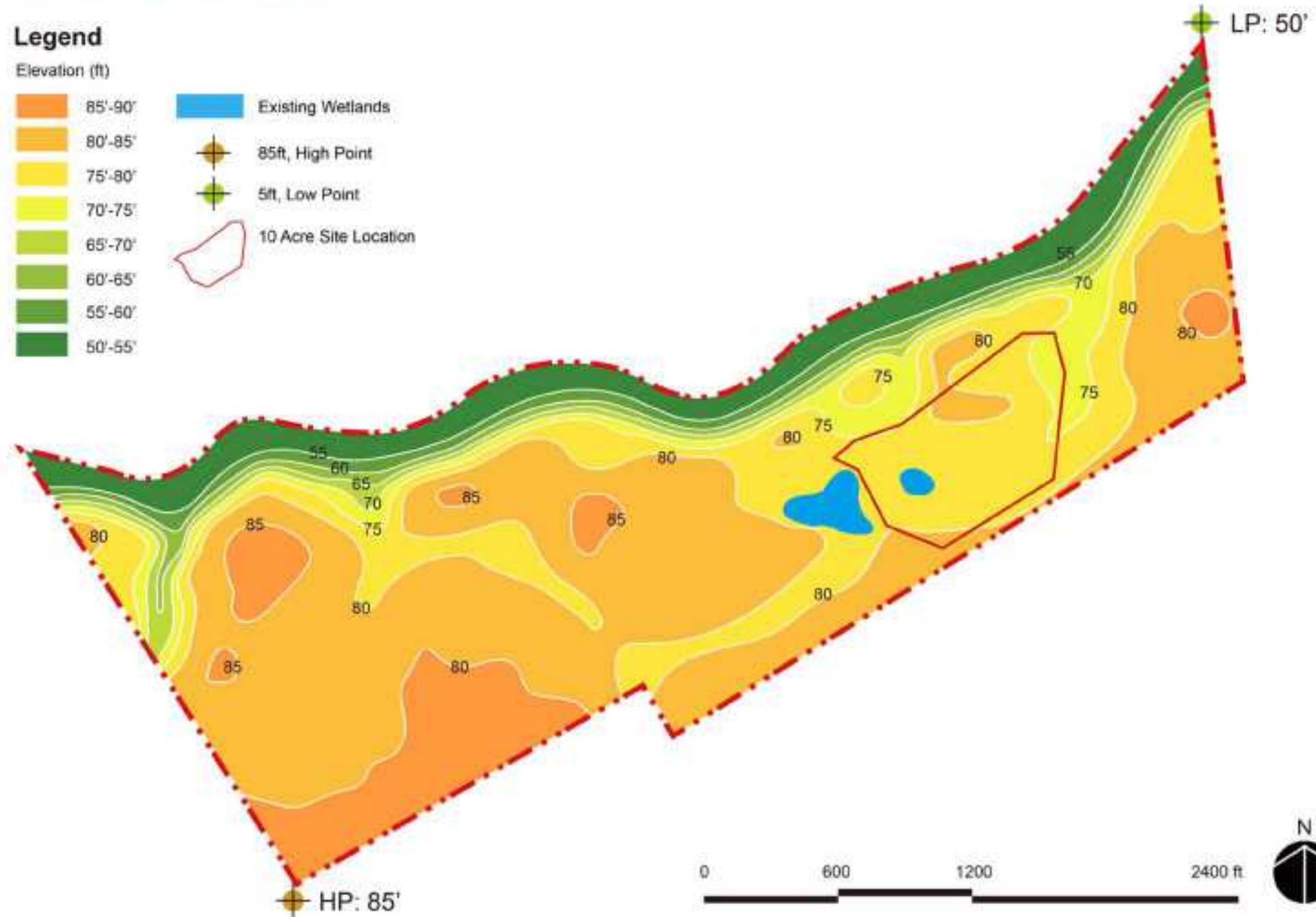
1. Vegetation: After careful aerial photo interpretation, overall, most of the site is covered by forest patches.
2. Access: There is an existing trail going through the site so that visitors can enter the site from parking lots easily.
3. Water: There is an existing wetland in the 10 acre site, which would be a great destination for visitors.
4. Area: The sub-site is 10.2 acres in total, which locates at the middle-east of the site.

## V. Site #5-1

### Elevation Zones Map

#### Legend

Elevation (ft)



# V. Site #5-1

## Land Use Strategic Plan, 10 Acres

### 10 Acre Site Conditions



### Legend

- |                        |                    |                        |
|------------------------|--------------------|------------------------|
| 1. Shaped Site + Roads | 2. High/Low Points | 3. Existing Water      |
| Existing Driveway      | 81ft, High Point   | Wetlands               |
| Existing Trails        | 75ft, Low Point    | Contour (5ft Interval) |
| Site Boundary          |                    |                        |
| Access Points          |                    |                        |

Reference: Google Map Pro

### Proposed Habitat Zones

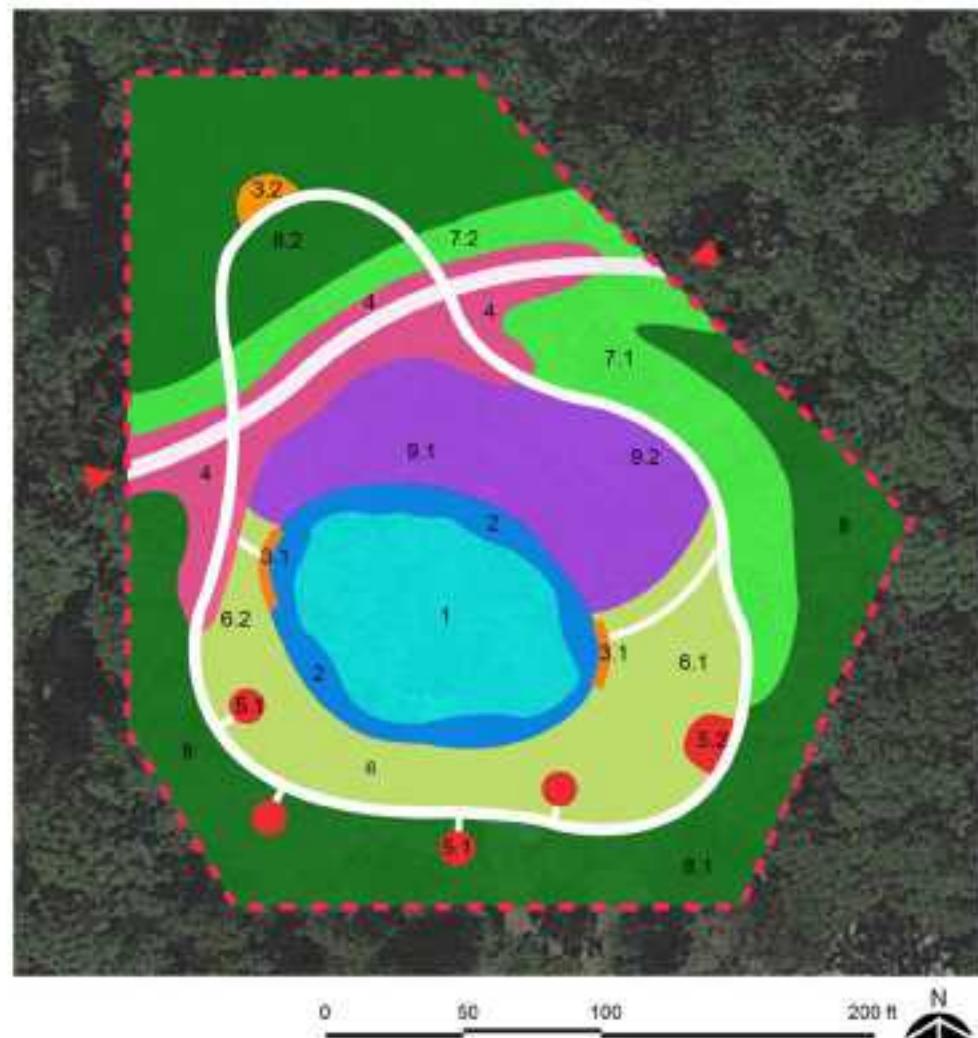


### Legend

- |                        |                         |
|------------------------|-------------------------|
| 1. Shaped Site + Roads | 3. Contour              |
| Existing Driveway      | Contour (5ft Interval)  |
| Existing Trails        |                         |
| Site Boundary          |                         |
| 1 Acre Site            |                         |
| Access Points          |                         |
| 2. High/Low Points:    |                         |
| 81ft, High Point       |                         |
| 75ft, Low Point        |                         |
| 4. Proposed Habitats:  |                         |
| 1 Ecotone              | 7 Aquatic Edge          |
| 2 Meadow               | 8 Observation Decks     |
| 3 Shrub Patches        | 9 Bird Blind            |
| 4 Forest Patches       | 10 Wildflower Arboretum |
| 5 Forest Buffer        | 11 Picnic Areas         |
| 6 Wetland              |                         |

## V. Site #5-1

### Land Use Zoning Plan, Zoom in, 1 Acre



#### Legend

| Recreational Zone      | Protection Zone  | Special Features       | Urban    |
|------------------------|------------------|------------------------|----------|
| Picnic Areas           | 1 Wetland        | 4 Wildflower Arboretum | Boundary |
| Observation Decks      | 2 Wetland Edges  | 5 Meadow               | Access   |
| Primary Hiking Trail   | 7 Ecotone/Shrub  | 6 Habitat Island       |          |
| Secondary Hiking Trail | 8 Forest Patches |                        |          |

Reference: Google Map Pro

| Habitats                       | Featured Wildlife                 | Treatments                                  | Plant Life Forms      |
|--------------------------------|-----------------------------------|---------------------------------------------|-----------------------|
| Zone 1<br>Wetland              | Fish<br>Shore Birds<br>Amphibians | Existing Wetland                            | Wetland Plants        |
| Zone 2<br>Wetland Edge         | Amphibians<br>Small Mammals       | Emergent Wetland                            | Wetland Plants        |
| Zone 3<br>Observation Stops    | N/A                               | 3.1 Waterproofing Decks<br>3.2 Bird Blind   | N/A                   |
| Zone 4<br>Wildflower Arboretum | Butterfly, Bee, Bat<br>Song Birds | Wildflower, Nectar,<br>Seed source          | Wildflowers           |
| Zone 5<br>Picnic Areas         | N/A                               | 5.1 Single Table Picnic<br>5.2 Group Picnic | N/A                   |
| Zone 6<br>Meadow               | Butterfly, Bee, Bat<br>Song Birds | 6.1 Native Meadow<br>6.2 Flower, Nectar     | - Grasses<br>- Shrubs |
| Zone 7<br>Ecotone/Shrub        | Song Birds,<br>Small Mammals      | 7.1 Large shrub<br>7.2 Visual Screen        | - Shrubs<br>- Trees   |
| Zone 8<br>Forest Patches       | Deer, Birds,<br>Small Mammals     | 8.1 Canopy Thinning<br>8.2 Stem Thinning    | - Shrubs<br>- Trees   |
| Zone 9<br>Habitat Island       | Deer, Birds,<br>Small Mammals     | 9.1 Native Forest<br>9.2 Large Shrub        | - Shrubs<br>- Trees   |

#### Index Map



10-acre Site

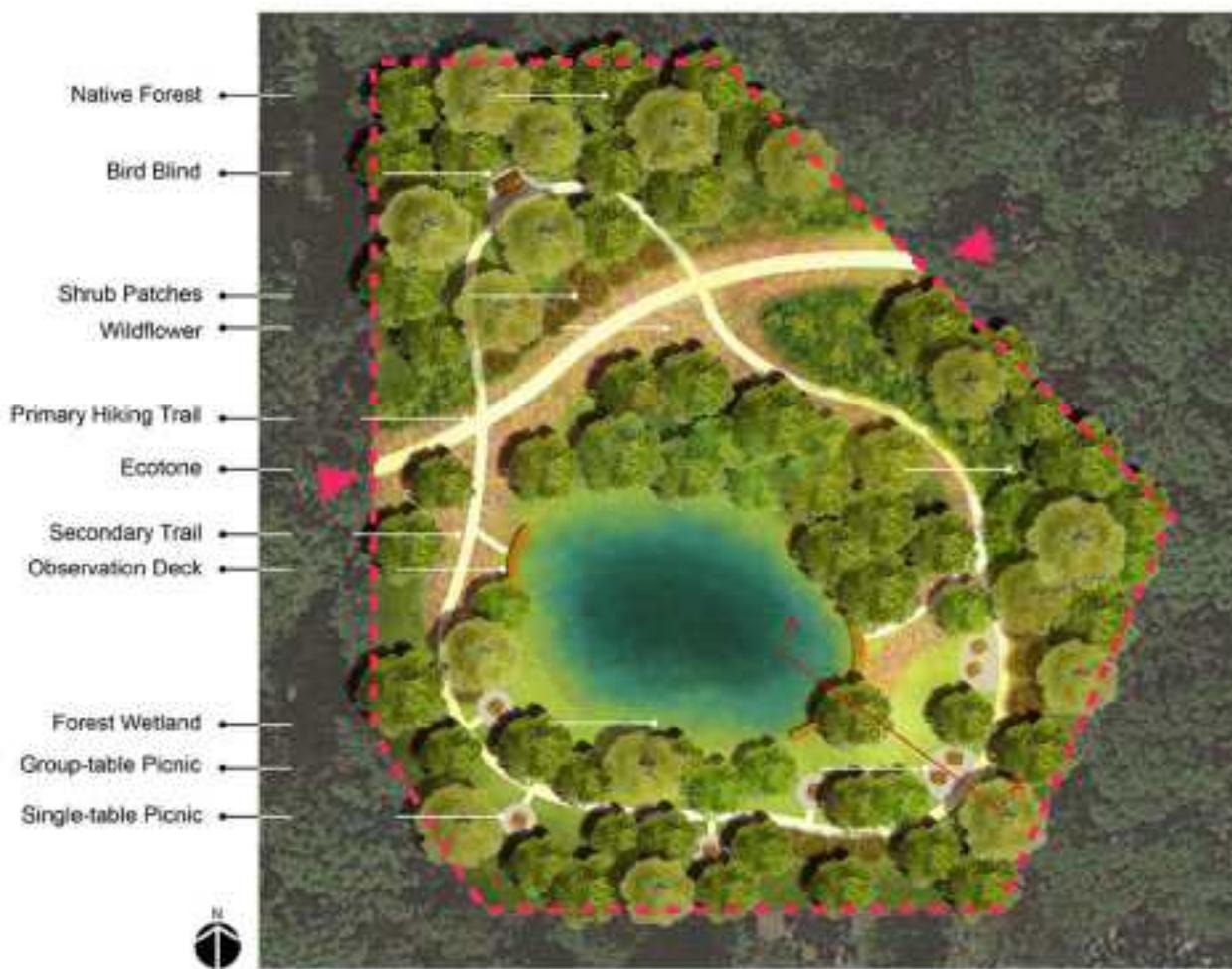
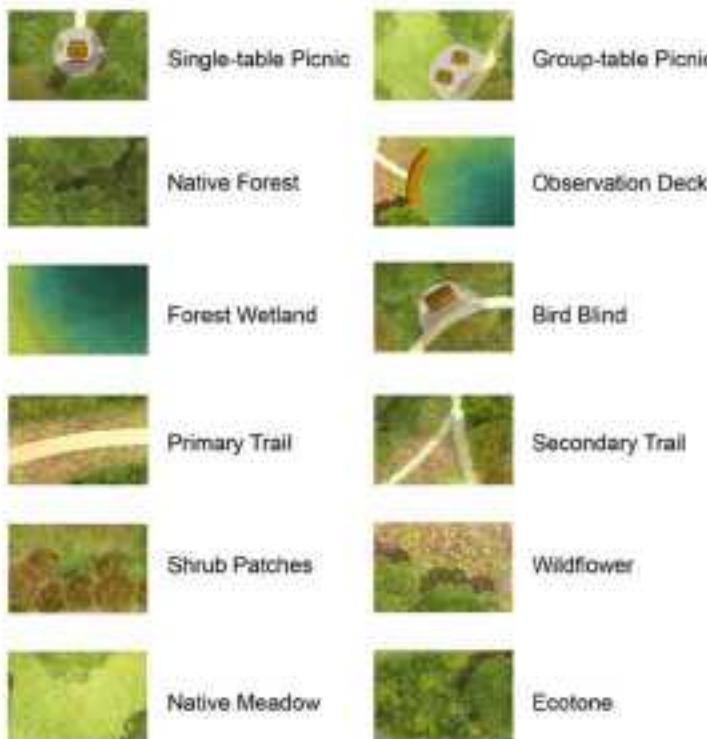


1-acre Site

## V. Site #5-1

### Master Plan, Zoom in, 1 Acre

#### Legend



#### Existing Site



# V. Site #5-1

## Plant List, Zoom in, 1 Acre

### Forest Patches

| Tree                                               | Fruit Season     |   |
|----------------------------------------------------|------------------|---|
| Bald Cypress ( <i>Taxodium distichum</i> )         | Fall             | 2 |
| Red Maple ( <i>Acer rubrum</i> )                   | Late Fall        | 5 |
| Eastern Redbud ( <i>Cercis canadensis</i> )        | Late Summer      | 1 |
| Southern Wax-Myrtle ( <i>Myrta cerifera</i> )      | Summer to Winter | 1 |
| Longleaf Pine ( <i>Pinus palustris</i> )           | Summer to Winter | 5 |
| Sweet Bay Magnolia ( <i>Magnolia virginiana</i> )  | Fall             | 1 |
| Mexican Buckeye ( <i>Liquidambar styraciflua</i> ) | Fall             | 4 |
| Live Oak ( <i>Quercus virginiana</i> )             | Summer to Fall   | 3 |
| Texas Red Oak ( <i>Quercus rubra</i> )             | Summer to Fall   | 3 |
| American Beech ( <i>Fagus grandifolia</i> )        | Fall             | 3 |

| Shrub                                                 | Fruit Season   |   |
|-------------------------------------------------------|----------------|---|
| American Beautyberry ( <i>Callicarpa americana</i> )  | Fall to Winter | 1 |
| Yaupon Holly ( <i>Ilex vomitoria</i> )                | Fall           | 1 |
| Sweetspire ( <i>Itea virginica</i> )                  | Fall           | 1 |
| Coral Bean ( <i>Erythrina herbacea</i> )              | Fall to Winter | 1 |
| Indian Pink ( <i>Spigelia marilandica</i> )           | Late Summer    | 1 |
| Texas Mountain Laurel ( <i>Sophora secundiflora</i> ) | Late Spring    | 5 |
| Oakleaf Hydrangea ( <i>Hydrangea quercifolia</i> )    | Summer to Fall | 6 |
| Common Viburnum ( <i>Viburnum ellipticum</i> )        | Fall to Spring | 3 |

| Fern                                          | Fruit Season     |   |
|-----------------------------------------------|------------------|---|
| Cardinal Flower ( <i>Lobelia cardinalis</i> ) | Fall             | 4 |
| Standing Cypress ( <i>Ipomoea rubra</i> )     | Spring to Summer | 4 |



### Wetland

| Tree                                       |   |
|--------------------------------------------|---|
| River Birch ( <i>Betula nigra</i> )        | 7 |
| Water Oak ( <i>Quercus nigra</i> )         | 3 |
| Shumard Oak ( <i>Quercus shumardii</i> )   | 1 |
| Black Willow ( <i>Salix nigra</i> )        | 7 |
| White Poplar ( <i>Populus alba</i> )       | 7 |
| Bald Cypress ( <i>Taxodium distichum</i> ) | 3 |

| Shrub                                         |   |
|-----------------------------------------------|---|
| Swamp Cyrilla ( <i>Cyrilla racemiflora</i> )  | 1 |
| Swamp Azalea ( <i>Rhododendron viscosum</i> ) | 1 |
| Prairie Iris ( <i>Iris pseudacorus</i> )      | 1 |

| Fern                                            |   |
|-------------------------------------------------|---|
| Water Horsetail ( <i>Equisetum fluviatile</i> ) | 9 |
| Maidenhair Fern ( <i>Adiantum pedatum</i> )     | 4 |

| Ferb                                                    |   |
|---------------------------------------------------------|---|
| Eastern Purple Coneflower ( <i>Echinacea purpurea</i> ) | 8 |
| White Avens ( <i>Geum canadense</i> )                   | 8 |
| Spotted Beebalm ( <i>Monarda punctata</i> )             | 8 |



### Native Meadow & Wildflower

| Tree                                                           |   |
|----------------------------------------------------------------|---|
| Southern Magnolia ( <i>Magnolia grandiflora</i> )              | 1 |
| Texas Redbud ( <i>Cercis canadensis</i> var. <i>texensis</i> ) | 3 |
| Japanese Maple ( <i>Acer palmatum</i> )                        | 1 |
| Texas Ebony ( <i>Ebenopsis ebano</i> )                         | 1 |
| Sassafras ( <i>Sassafras albidum</i> )                         | 4 |
| Green Ash ( <i>Fraxinus pennsylvanica</i> )                    | 4 |
| American Sweetgum ( <i>Liquidambar styraciflua</i> )           | 1 |
| Shortleaf Pine ( <i>Pinus echinata</i> )                       | 6 |
| Cherry-laurel ( <i>Prunus caroliniana</i> )                    | 3 |
| Bur Oak ( <i>Quercus macrocarpa</i> )                          | 3 |
| White Fringetree ( <i>Chionanthus virginicus</i> )             | 6 |

| Shrub                                                |   |
|------------------------------------------------------|---|
| Texas Azalea ( <i>Rhododendron oblongifolium</i> )   | 2 |
| Fragrant Sumac ( <i>Rhus aromatica</i> )             | 6 |
| Coralberry ( <i>Symporicarpos orbiculatus</i> )      | 6 |
| Texas Sage ( <i>Leucophyllum frutescens</i> )        | 4 |
| Possomhaw ( <i>Ilex decidua</i> )                    | 1 |
| American Beautyberry ( <i>Callicarpa americana</i> ) | 1 |
| Parsley Hawthorn ( <i>Crataegus marshallii</i> )     | 1 |
| Calliandra ( <i>Calliandra calothyrsus</i> )         | 2 |
| Camellia ( <i>Camellia japonica</i> )                | 1 |
| Wild Crapemyrtle ( <i>Myophea glabra</i> )           | 4 |
| Texas Bluebonnet ( <i>Lupinus texensis</i> )         | 1 |

| Groundcover                                      |   |
|--------------------------------------------------|---|
| Texas Windmill Grass ( <i>Chloris texensis</i> ) | 5 |
| Bushy Bluestem ( <i>Andropogon glomeratus</i> )  | 2 |
| Switchgrass ( <i>Panicum virgatum</i> )          | 2 |
| Broomsedge ( <i>Andropogon virginicus</i> )      | 2 |

Source: <https://www.facebook.com/MercerBotanicGardens/photos/>  
<https://www.facebook.com/pg/MercerBotanicGardens/photos/>

## V. Site #5-1

### Reference, Plant List, 1 Acre

1. <https://houstonarboretum.org/visit/plants/>
2. <https://www.wildflower.org/plants/>
3. <http://counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf>
4. <https://npsot.org/wp/>
5. [https://www.facebook.com/pg/MercerBotanicGardens/photos/?ref=page\\_internal](https://www.facebook.com/pg/MercerBotanicGardens/photos/?ref=page_internal)
6. <https://plants.usda.gov/java/>
7. <https://www.landscapingnetwork.com/plants/wetland-trees.html>
8. <https://www.hcfcd.org/media/1974/wetland-guide-final.pdf>
9. [https://en.wikipedia.org/wiki/List\\_of\\_fern\\_families](https://en.wikipedia.org/wiki/List_of_fern_families)

Cover Photo Copyright:

<https://pixabay.com/en/sunset-moor-venn-belgium-eifel-2847548/>

## V. Site #5-2



Yinghui Chen  
April, 2018

## V. Site #5-2

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## V. Site #5-2

### Site Selection



Site 5

# V. Site #5-2

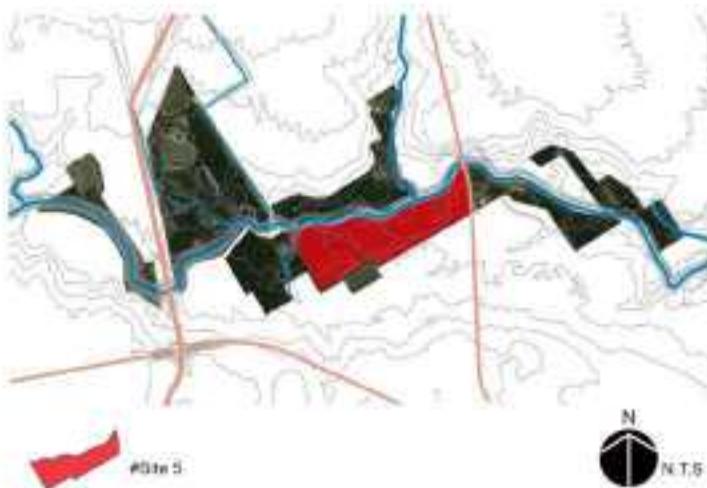
## Property Boundary

Final Study Site Selection



Aerial Photo

Area: 125 acres



Reference: Google Map

Habitat Map



### Legend

#### 1 Shaped Site+Roads

- Site Boundary (dashed red line)
- Main Road (red line)
- Existing Road (black line)
- Access Point (arrow)
- Tributary (blue line)

#### 2 High/Low Point

- 85 ft., High point (purple dot)
- 50 ft., Low point (yellow dot)

#### 4 Habitat Types

- Habitat I: 1. Bird Habitat  
2. Human Access

- 1. Forage  
2. Wetland  
3. Nectar Patches

- 1. Wildlife Habitat  
2. Drainage

- Corridor: 1. Wildlife Habitat  
2. Riparian Buffer  
3. Forage

#### Buffer

- 5 Subsite Area

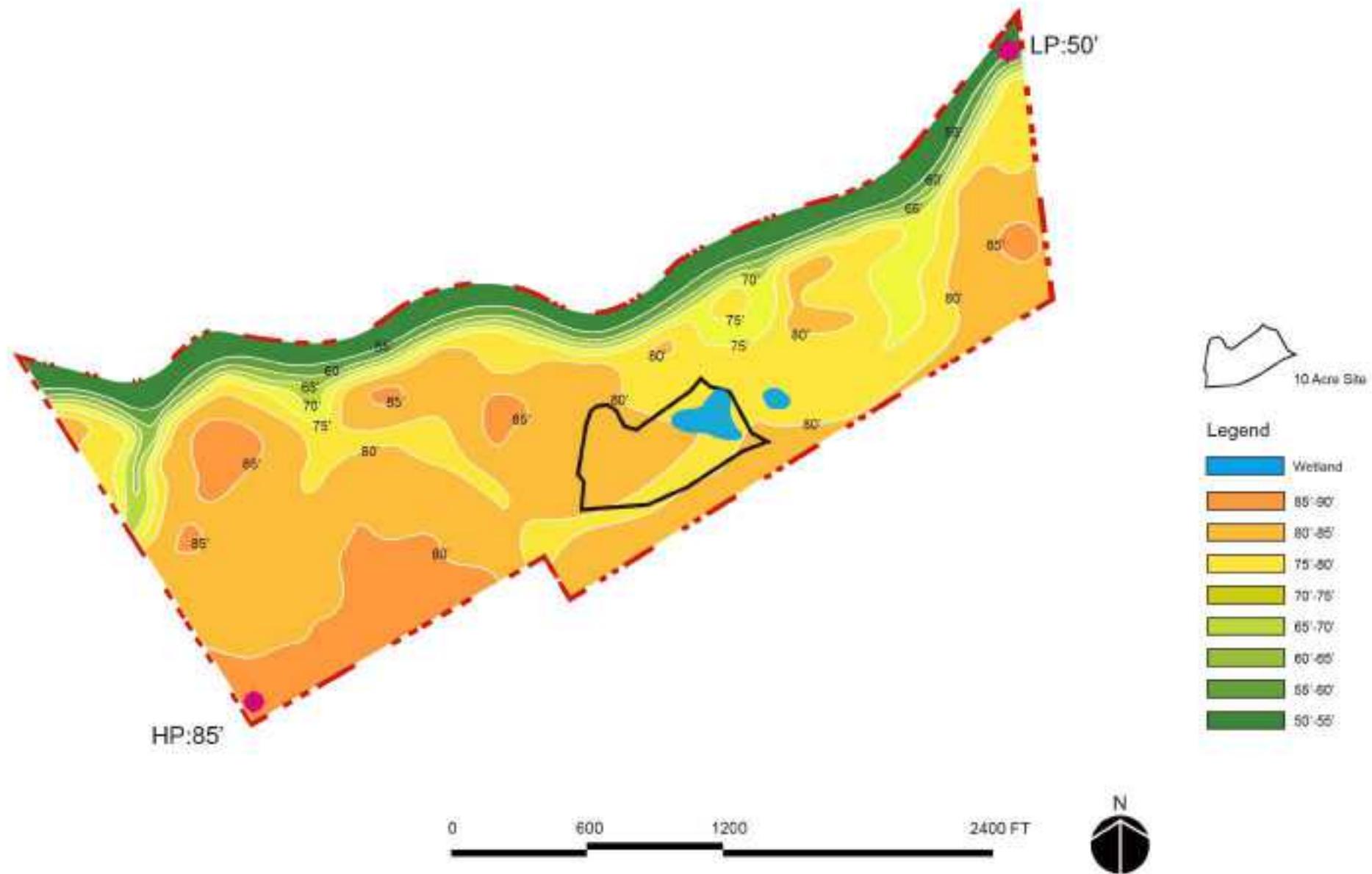
- 10 Acre Site

### Description

- Vegetation:** The coverage of the trees in the site is up to 95 percent. In the planning, we will thin some trees for southern exposure and more various ecosystem like meadow and wetland.
- Access:** There are some existing trails surrounding the 10 acre site, which provides a great opportunity for visitors to come to experience this place. In the planning, we may add some connections between two parallel trails.
- Water:** There is a freshwater emergent wetland in the 10 acre site, which can be considered as hotspot both for human and wildlife. However, since it is covered by a lot of trees, how to preserve this wetland will be the focus in the following planning.
- Area:** The landform in the 10 acre site is pretty flat, which provides easier access for disabled person.

## V. Site #5-2

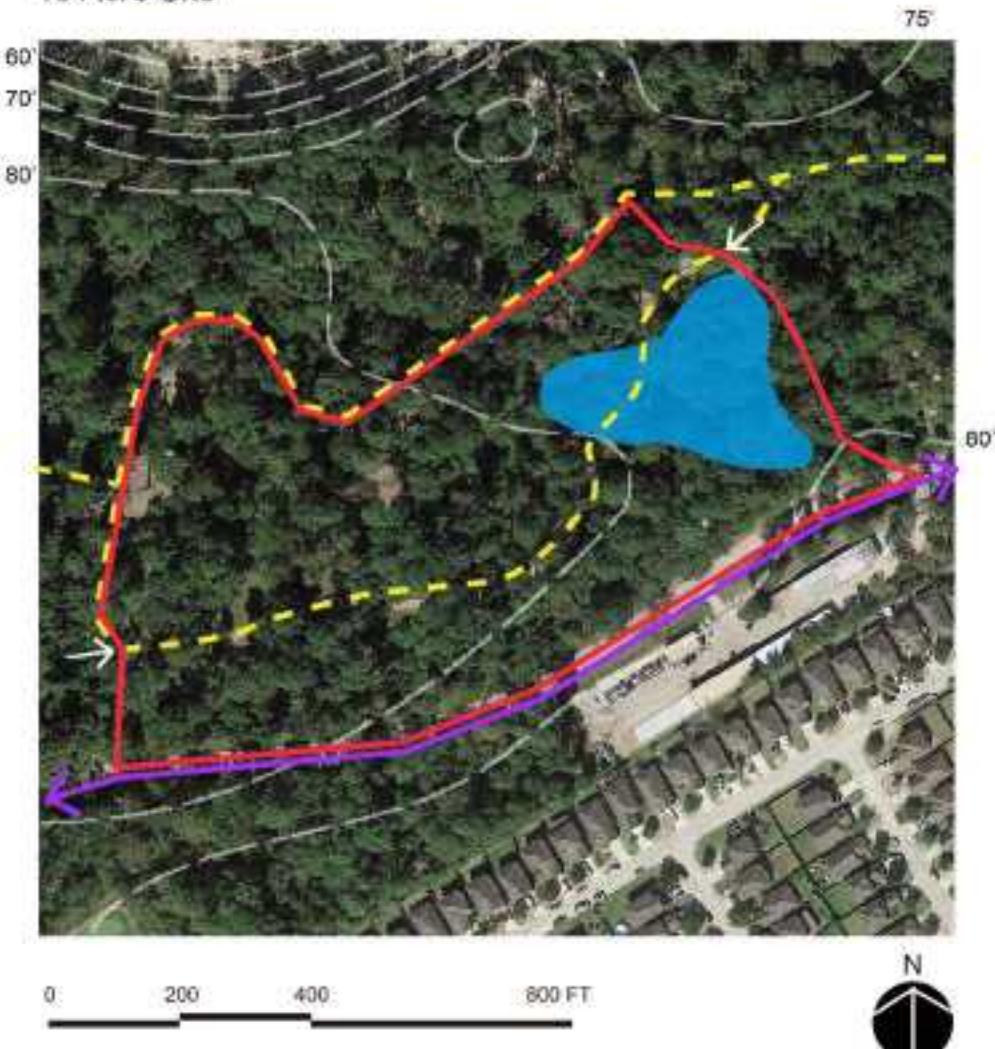
### Elevation Zones



# V. Site #5-2

## Land Use Strategic Plan

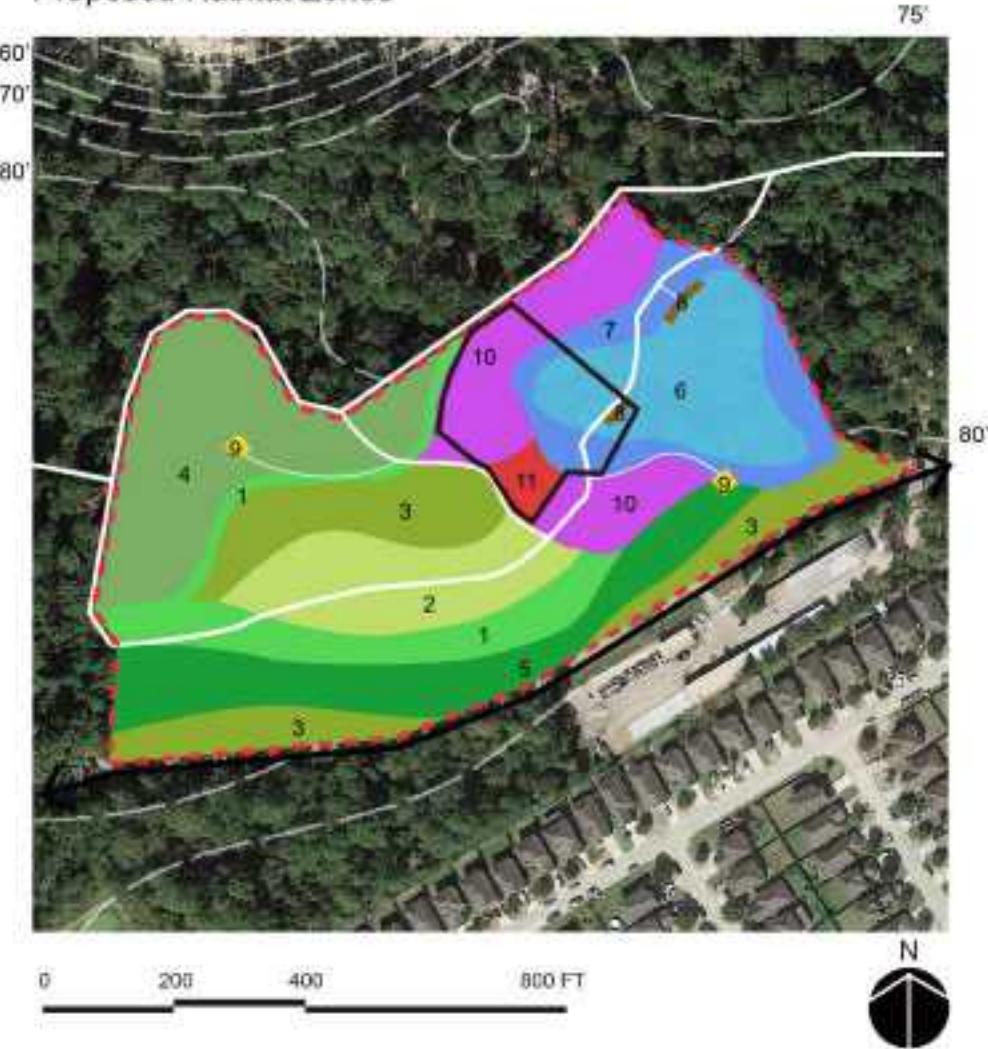
10 Acre Site



### Legend

- |                   |                  |               |
|-------------------|------------------|---------------|
| Existing Driveway | Site Boundary    | Access Points |
| Existing Trails   | Existing Wetland |               |

Proposed Habitat Zones

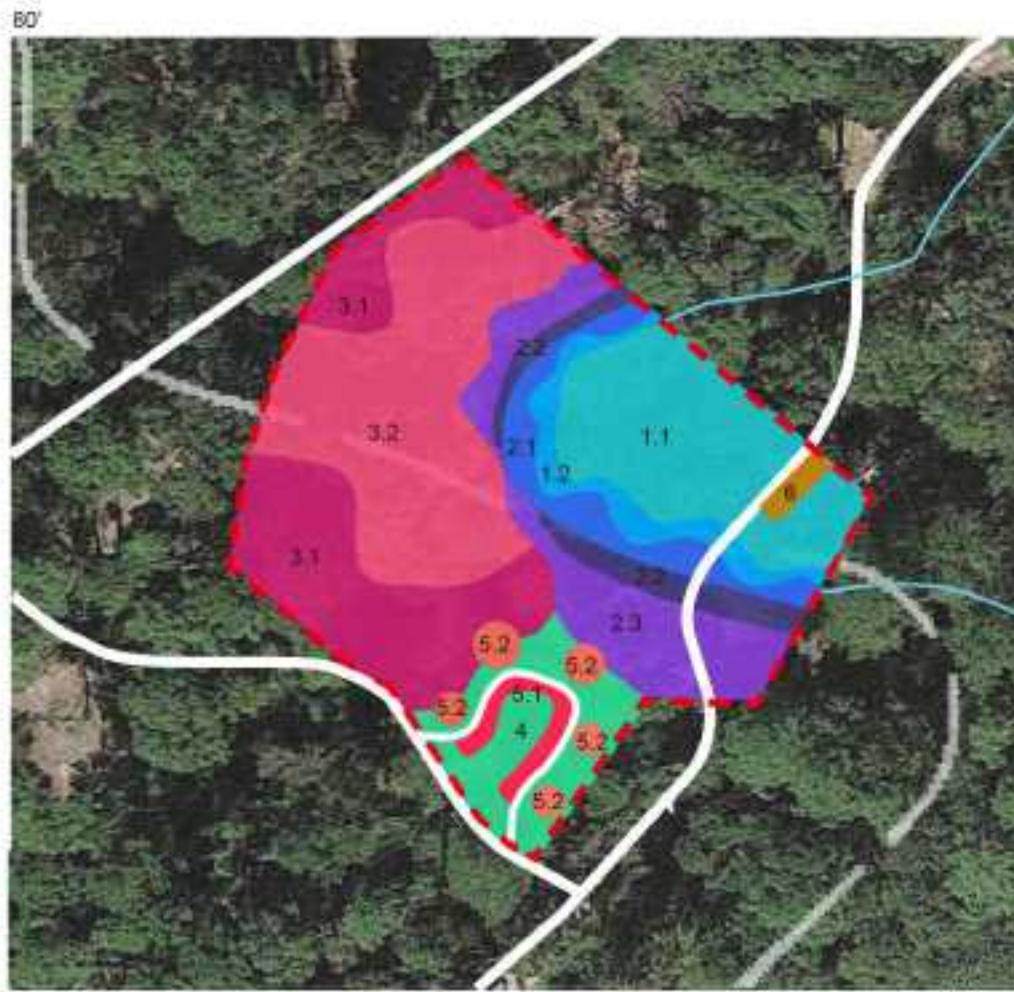


### Legend

- |                   |               |                 |                      |
|-------------------|---------------|-----------------|----------------------|
| Existing Driveway | Access Points | Forest Patches  | Observation Decks    |
| Primary Trails    | Ecotone       | Forest Buffer   | Bird Blind           |
| Secondary Trails  | Meadow        | Wetland Edge    | Wildflower Arboretum |
| Site Boundary     | Shrub Patches | Wetland Ecotone | Picnic Areas         |

## V. Site #5-2

### Land Use Zoning, Zoom In, 1 Acre



#### Legend

|                  |                    |                              |                           |
|------------------|--------------------|------------------------------|---------------------------|
| Primary Trails   | 1.2 Emergent Zones | 3.1 Nectar Patches           | 5.2 Group Picnic Pavilion |
| Secondary Trails | 2.1 Wet Meadow     | 3.2 Forest/Shrubs            | 6 Observation Deck        |
| Site Boundary    | 2.2 Shrub          | 4 Forest                     |                           |
| 1.1 Deep Water   | 2.3 Upland         | 5.1 Single-table Picnic Area |                           |

| Habitat                                                        | Featured Wildlife                     | Treatments                                                | Plant Life Forms                                 |
|----------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------|--------------------------------------------------|
| 1 Wetland Edge<br>1.1 Deep Water<br>1.2 Emergent Zone          | Shorebird<br>Amphibians               | Local Wetland<br>Lake Shore                               | Grasses<br>Sedges<br>Shrubs<br>Herbaceous Plants |
| 2 Wetland Ecotone<br>2.1 Wet Meadow<br>2.2 Shrub<br>2.3 Upland | Shorebird<br>Songbird<br>Small Mammal | Meadow Wetland<br>Riparian Buffer                         | Grasses<br>Shrubs<br>Trees                       |
| 3 Wildflower Forest<br>3.1 Nectar Patches<br>3.2 Forest/Shrub  | Butterflies<br>Bees<br>Small Mammal   | Stem Thinning<br>Layer Additions                          | Grasses<br>Vines<br>Trees                        |
| 4 Forest                                                       | Songbirds<br>Small Mammal             | Canopy Thinning                                           | Grasses<br>Trees                                 |
| Human Space                                                    |                                       |                                                           |                                                  |
| 5 Picnic Areas                                                 |                                       | 5.1 Single-table Picnic Area<br>5.2 Group Picnic Pavilion |                                                  |
| 6 Observation Deck                                             |                                       |                                                           |                                                  |

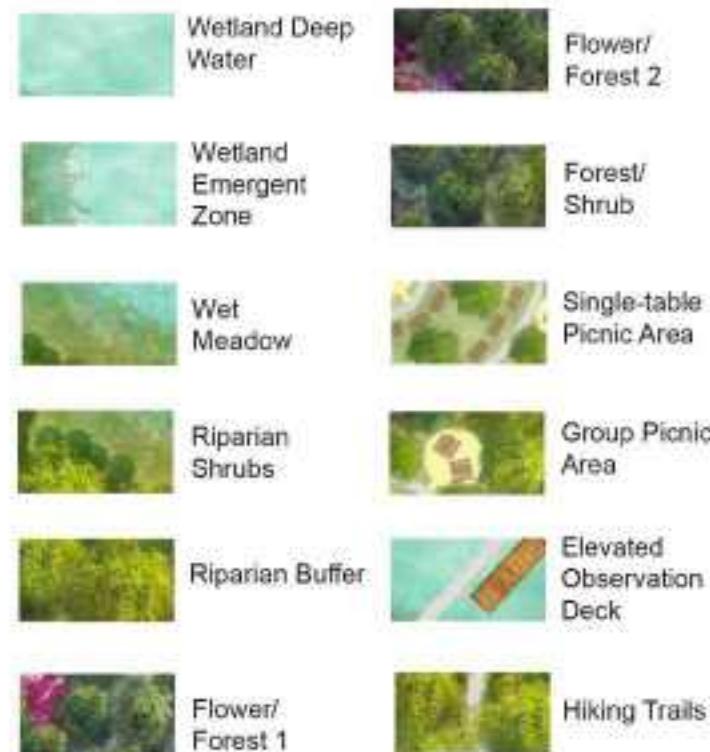
#### Index Map



## V. Site #5-2

### Master Plan, Zoom In, 1 Acre

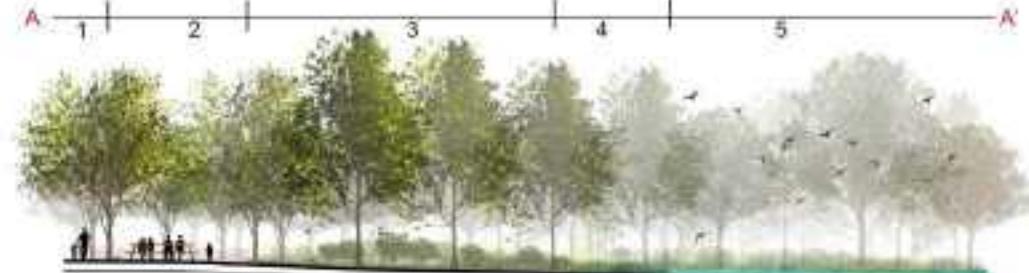
#### Legend



#### Existing Site



#### Section A-A'



NTS

1 Trails  
2 Group Picnic Area  
3 Riparian Buffer  
4 Wet Meadow  
5 Emergent Wetland

# V. Site #5-2

## Plant List, Zoom In, 1 Acre

### Forest/Flower

| Tree                                     | Fruit Season        |   |
|------------------------------------------|---------------------|---|
| Blackgum ( <i>Nyssa sylvatica</i> )      | Fall                | 2 |
| Shumard Oak ( <i>Quercus shumardii</i> ) | Fall                | 2 |
| Pecan ( <i>Carya illinoensis</i> )       | Early Fall          | 3 |
| Anaqua ( <i>Ebretia anacua</i> )         | Late Summer to Fall | 3 |

| Shrub                                              | Flowering Season    |   |
|----------------------------------------------------|---------------------|---|
| Shrimp Plant ( <i>Justicia brandegeana</i> )       | Seasonal/All year   | 4 |
| Firecracker Plant ( <i>Cuphea spp.</i> )           | Summer              | 4 |
| Ruellia ( <i>Ruellia spp.</i> )                    | Spring to Fall      | 4 |
| Yellow bells ( <i>Tecoma stans</i> )               | Spring till frost   | 4 |
| Spiraea ( <i>Spiraea japonica</i> )                | Summer              | 4 |
| Turk's cap ( <i>Malvaviscus arboreus</i> )         | Late Summer to Fall | 4 |
| Cockcomb ( <i>Celosia argentea var. cristata</i> ) | Summer to Fall      | 4 |
| Pentas ( <i>Pentas lanceolata</i> )                | Seasonal/All year   | 4 |
| Floss flower ( <i>Ageratum houstonianum</i> )      | Late Summer to Fall | 4 |

| Vines                                            | Fruit Season        |   |
|--------------------------------------------------|---------------------|---|
| Passionflower ( <i>Passiflora incarnata</i> )    | Summer              | 4 |
| Morning Glory Vine ( <i>Pomoea coccinea</i> )    | Late Spring to Fall | 4 |
| Cat's Claw Vine ( <i>Millettia unguis-cati</i> ) | Spring to Summer    | 7 |
| Orange Jubilee ( <i>Tecoma x hybrid</i> )        | Spring to Fall      | 8 |



Blackgum



Shrimp Plant

### Forest/Shrub

| Tree                                          |   |
|-----------------------------------------------|---|
| Rusty Blackhaw ( <i>Viburnum rufidulum</i> )  | 2 |
| Redbud ( <i>Cercis canadensis</i> )           | 2 |
| Dogwood ( <i>Cornus florida</i> )             | 3 |
| Southern Waxmyrtle ( <i>Myrica cerifera</i> ) | 3 |

| Shrub                                                  |   |
|--------------------------------------------------------|---|
| Yaupon Holly ( <i>Ilex vomitoria</i> )                 | 5 |
| Chinese Juniper ( <i>Juniperus chinensis</i> )         | 5 |
| Boxleaf Euonymus ( <i>Euonymus japonicus</i> )         | 6 |
| Possumhaw ( <i>Ilex decidua</i> )                      | 5 |
| Pomegranate ( <i>Punica granatum</i> )                 | 5 |
| Forsythia ( <i>Forsythia intermedia</i> )              | 6 |
| Dwarf Chinese Holly ( <i>Ilex cornuta</i> )            | 5 |
| Littleleaf Boxwood ( <i>Buxus microphylla</i> )        | 5 |
| Blue Italian Cypress ( <i>Cupressus sempervirens</i> ) | 5 |

| Grass                                          |   |
|------------------------------------------------|---|
| Blue Dart Juncus ( <i>Juncus tenuis</i> )      | 2 |
| Bracken Fern ( <i>Pteridium aquilinum</i> )    | 2 |
| Fiber-optic Grass ( <i>Ischaemum cernuum</i> ) | 2 |
| Gulf Muhly ( <i>Muhlenbergia capillaris</i> )  | 2 |



Wetland Plants

### Riparian Wetland

| Tree                                          |   |
|-----------------------------------------------|---|
| Water Oak ( <i>Quercus nigra</i> )            | 1 |
| Black Willow ( <i>Salix nigra</i> )           | 1 |
| Red Maple ( <i>Acer rubrum</i> )              | 1 |
| Eastern Black Walnut ( <i>Juglans nigra</i> ) | 1 |

| Shrub                                            |   |
|--------------------------------------------------|---|
| Virginia Sweetspire ( <i>Itea virginica</i> )    | 1 |
| Leucothoe ( <i>Leucothoe racemosa</i> )          | 1 |
| Dwarf palmetto ( <i>Sabal minor</i> )            | 1 |
| Buttonbush ( <i>Cephaelanthus occidentalis</i> ) | 1 |

| Grass                                                     |   |
|-----------------------------------------------------------|---|
| Iris ( <i>Iris spp.</i> )                                 | 1 |
| Leucothoe ( <i>Leucothoe racemosa</i> )                   | 1 |
| Oney bulrush ( <i>Schoenoplectus americanus</i> )         | 1 |
| California bulrush ( <i>Schoenoplectus californicus</i> ) | 1 |
| Soft bulrush ( <i>Schoenoplectus tabernaemontani</i> )    | 1 |
| Woolgrass ( <i>Scirpus cyperinus</i> )                    | 1 |
| Smooth cordgrass ( <i>Spartina alterniflora</i> )         | 1 |
| Giant cutgrass ( <i>Zizaniopsis miliacea</i> )            | 1 |
| Big carpetgrass ( <i>Axonopus furcatus</i> )              | 1 |

| Forbs                                               |   |
|-----------------------------------------------------|---|
| Carolina ( <i>Cabomba caroliniana</i> )             | 1 |
| Hornwort ( <i>Ceratophyllum demersum</i> )          | 1 |
| Burhead ( <i>Echinodorus cordifolius</i> )          | 1 |
| Blue medplantain ( <i>Heteranthera limosa</i> )     | 1 |
| Guadalupe waternymph ( <i>Najas guadalupensis</i> ) | 1 |
| Big floatingheart ( <i>Nymphoides aquatica</i> )    | 1 |
| Pondweed ( <i>Potamogeton spp.</i> )                | 1 |
| Beaked ditch-grass ( <i>Ruppia maritima</i> )       | 1 |
| Floating bladderwort ( <i>Utricularia gibba</i> )   | 1 |

<https://greatplainsnursery.com/product/black-gum/>

<http://aggie-horticulture.tamu.edu/databases/butterflies/butterfly-gallery/pages/RedShrimpPlant-No31.html>

<https://www.houstonchronicle.com/news/houston-texas/houston/article/Review-Developers-failing-to-follow-wetlands-6417918.php>

## V. Site #5-2

### Reference, Plant List, 1 Acre

1. Field Guide for Plant Identification Volume Two: Wetlands (Rep.). (2015, April).  
Retrieve from:<https://www.hcfcd.org/media/1974/wetland-guide-final.pdf>
2. <http://www.wildflower.org/>
3. <http://counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf>
4. A Guide to Butterfly Gardening in Harris County.(2006, Oct).  
Retrieve from: <http://counties.agrilife.org/harris/files/2011/05/bflygrdn.pdf>
5. <http://npsot.org/wp/>
6. <https://garden.orgn.org>
7. <http://www.hicksenvplantdatabase.com/PlantFind.asp>
8. <https://www.bigtextrues.com/plants/vines>

Cover Page:<https://www.trover.com/d/1WR1I-mercier-botanic-gardens-harris-county-texas>

## V. Site #5-3



Kshitija Karmarkar  
April, 2018

## V. Site #5-3

### Table of Contents

|                                          |   |                                             |   |
|------------------------------------------|---|---------------------------------------------|---|
| Site Selection .....                     | 1 | Land Use Zoning Plan, Zoom in, 1 acre ..... | 5 |
| Property Boundary .....                  | 2 | Master Plan, Zoom in, 1 acre .....          | 6 |
| Elevation Zones Map .....                | 3 | Plant List, Zoom in, 1 acre .....           | 7 |
| Land Use Strategic Plan (10 acres) ..... | 4 | References, Plant List .....                | 8 |

## V. Site #5-3

### Site Selection

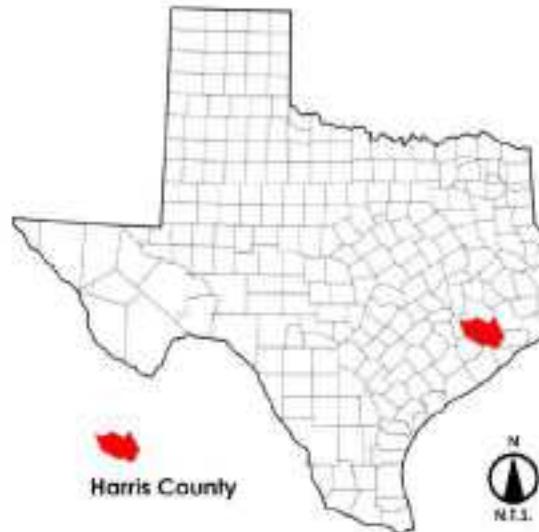


Site #5

# V. Site #5-3

## Property Boundary

Final Study- Site Selection- Final Analysis



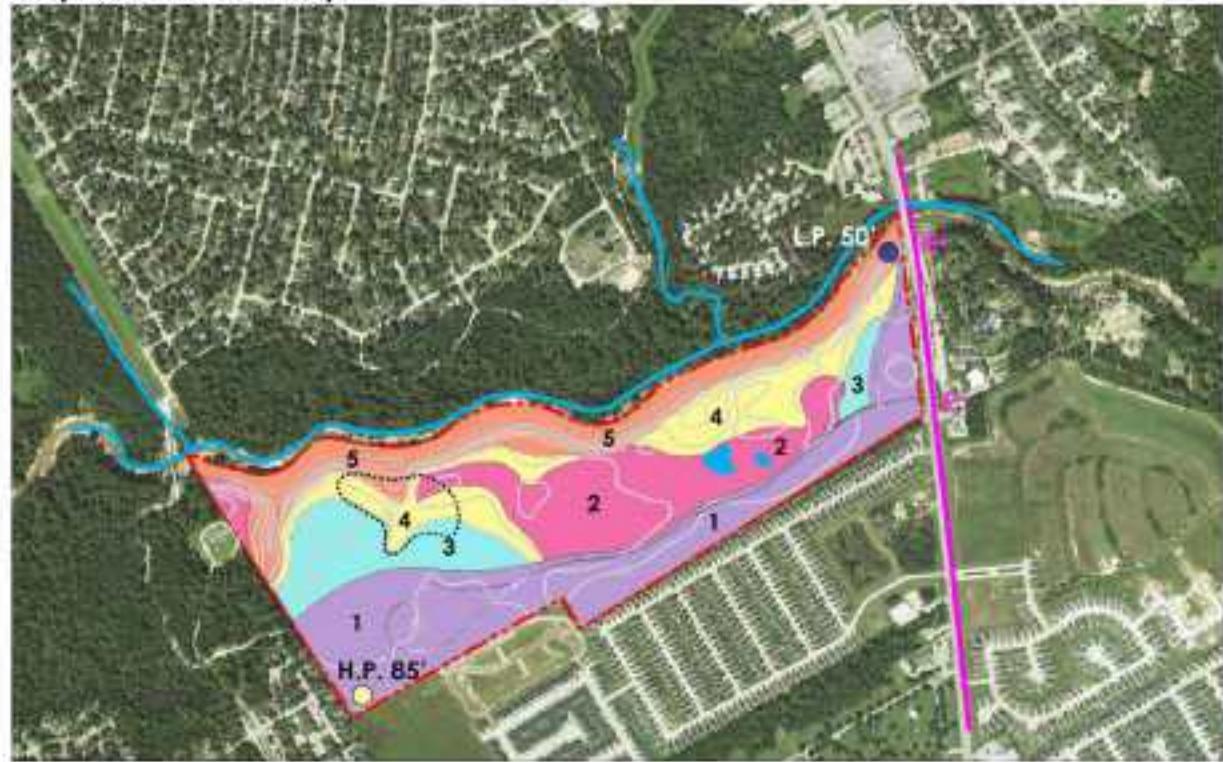
Aerial Photo



Area: 325 acres

Source: <https://www.google.com/maps>

Proposed Habitat map



### Legend

|                       |                        |                              |
|-----------------------|------------------------|------------------------------|
| 1. Shaped Site + Road | 3. Existing Water      | 5. Habitats proposed         |
| — Site Boundary       | — Water Channel        | 1 Landscaped Areas           |
| — Main Road           | — Contours             | 2 Understory                 |
| 2. High/Low Point     | — 5' Interval Contours | 3 Human-wildlife Interaction |
| □ High Point: 85'     | 5. Access              | 4 Stem Thinning              |
| ● Low Point 50'       | Entry Points           | 5 Riparian                   |
|                       | 6. 10 acre site        | Existing Wetlands            |

### Description

**Vegetation:** The existing vegetation includes Pine and Red Cedar plantations toward the creek while the rest of the site vegetation is deciduous forest.

**Access:** There is an existing main road to the east of the site which makes the site easily accessible yet separates the conserved and human activity areas. There are two entry points along this road.

**Water Area:** There are two existing wetlands toward the west of the site. The selected site area is 9.88 acres.

## V. Site #5-3

### Elevation Zones



## V. Site #5-3

### Land Use Strategic Plan, 10 Acres

Proposed Site Selection: 10 acres



10 acre Boundary

Existing Primary Trails

Proposed Secondary Trails

Access Points

Proposed Rest Stops

Cypress Creek

Proposed Habitat Map: 10 acres



1. Riparian

2. Deer Forage

3. Aquatic

4. Pollinator 1

5. Pollinator 2

6. Human Areas

7. Habitat Buffers

Contours

## V. Site #5-3

### Land Use Zoning, Zoom In, 1 Acre



0 50 100 200



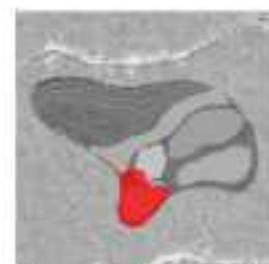
10 acre Boundary  
 1 acre Boundary

View Points/Rest Stops  
 Blinds

| Habitats                                              | Treatments                                                              | Wildlife                   |
|-------------------------------------------------------|-------------------------------------------------------------------------|----------------------------|
| <b>Zone 1<br/>Ecotone</b>                             | Meadow Wetlands                                                         | Seasonal Aquatic Species   |
| <b>Zone 2<br/>Buffer Shrubs</b>                       | Physical/Visual Buffer Plants<br>Food Source Shrubs                     | Humming Birds, Butterflies |
| <b>Zone 3<br/>Meadows with Pollinator Host Plants</b> | Small to Medium Flowering Shrubs, Grass, Groundcovers<br>Nectar Sources | Butterflies, Bees          |
| <b>Zone 4<br/>Understory Forest</b>                   | Stem Thinning<br>Exposure to Filtered Southern Light                    | Small Mammals, Birds       |
| <b>Zone 5<br/>Existing Forest</b>                     | Existing Forest Edge<br>Canopy Thinning<br>Visual/Physical Buffer       |                            |

#### Legend

- |                   |                       |
|-------------------|-----------------------|
| 1.  Ecotone       | 4.  Understory Forest |
| 2.  Buffer Shrubs | 5.  Existing Forest   |
| 3.  Meadows       |                       |



## V. Site #5-3

### Master Plan, Zoom In, 1 Acre



Existing Forest



Understory Forest



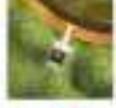
Ecotone  
(Meadow Wetlands)



Pollinator Meadows



Buffer Shrub Area



View Points/ Rest Stops

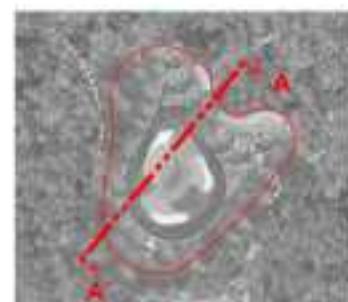


Trails

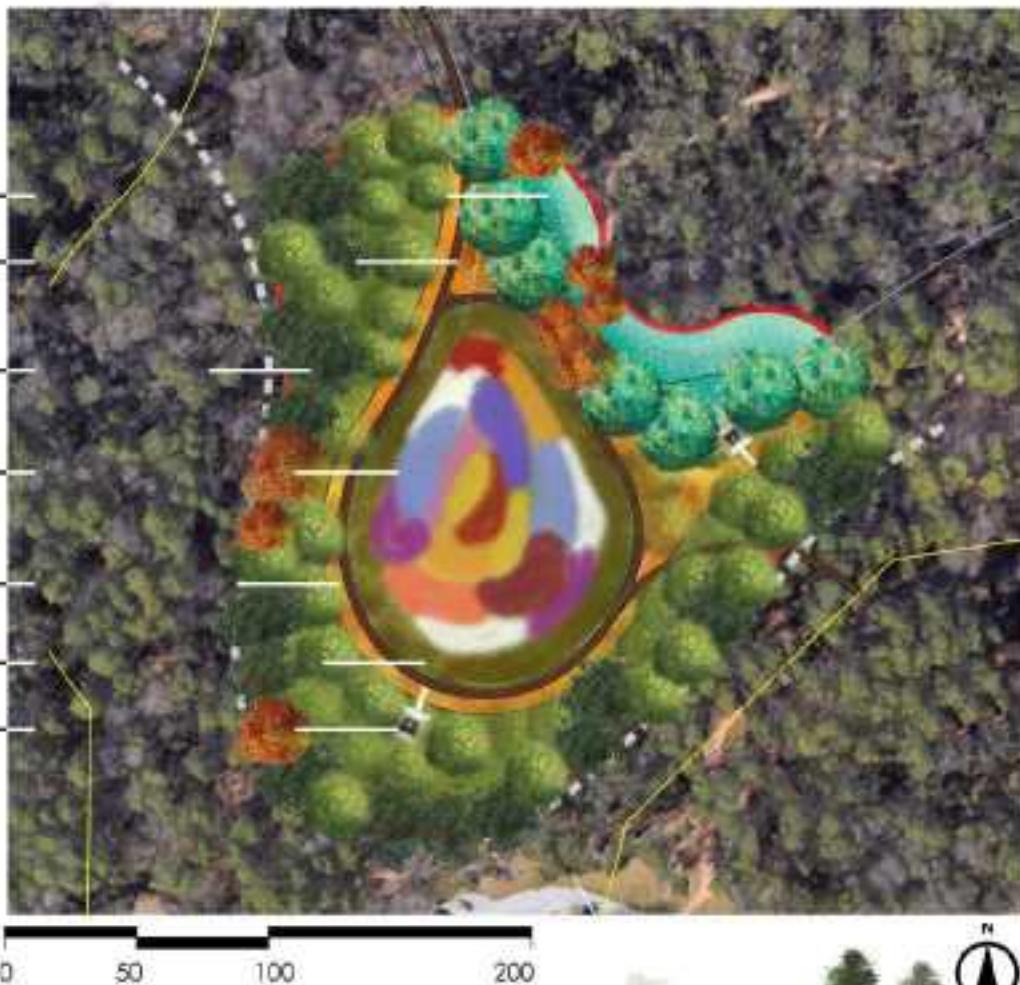
Site Surrounding: 1 acre



Section Key: 1 acre



Section Key: 1 acre



# V. Site #5-3

## Plant List, Zoom In, 1 Acre

### Existing Forest and Understory

| Scientific Name               | Common Name         |
|-------------------------------|---------------------|
| <i>Fagus grandifolia</i>      | American Beech      |
| <i>Fraxinus americana</i>     | White Ash           |
| <i>Populus deltoides</i>      | Cottonwood          |
| <i>Quercus macrocarpa</i>     | Bur Oak             |
| <i>Quercus buckleyi</i>       | Texas Red Oak       |
| <i>Carya illinoinensis</i>    | Pecan               |
| <i>Betula nigra</i>           | Black Walnut        |
| <i>Koelreuteria bipinnata</i> | Golden Rain Tree    |
| <i>Prunus mexicana</i>        | Mexican Plum        |
| <i>Myrica cerifera</i>        | Southern Wax Myrtle |
| <i>Diospyrus texana</i>       | Texas Persimmon     |

### Buffer Shrubs

| Scientific Name                  | Common Name           |
|----------------------------------|-----------------------|
| <i>Berberis thunbergii</i>       | Japanese Barberry     |
| <i>Punica granatum</i>           | Pomegranate           |
| <i>Nerium oleander</i>           | Oleander              |
| <i>Prunus caroliniana</i>        | Cherry Laurel         |
| <i>Ilex decidua</i>              | Possumhaw             |
| <i>Leucophyllum frutescens</i>   | Texas Sage            |
| <i>Callistemon citrinus</i>      | Crimson Bottlebrush   |
| <i>Juniperus chinensis</i>       | Chinese Juniper       |
| <i>Hydrangea macrophylla</i>     | Bigleaf Hydrangea     |
| <i>Viburnum suspensum</i>        | Suspensum Viburnum    |
| <i>Cephalanthus occidentalis</i> | Common Buttonbush     |
| <i>Aucuba japonica</i>           | Japanese laurel       |
| <i>Musa</i>                      | Banana                |
| <i>Euonymus alatus</i>           | Burning Bush          |
| <i>Lagerstroemia indica</i>      | Dwarf Crepe myrtle    |
| <i>Gardenia jasminoides</i>      | Gardenia              |
| <i>Hesperaloe parviflora</i>     | Red yucca             |
| <i>Hibiscus syriacus</i>         | Rose of Sharon        |
| <i>Pyracantha coccinea</i>       | Pyracantha            |
| <i>Loropetalum chinense</i>      | Chinese Fringe Flower |
| <i>Camellia sasanqua</i>         | Camellia              |

### Pollinator Garden

| Scientific Name                | Common Name           |
|--------------------------------|-----------------------|
| <i>Coropsis lanceolata</i>     | Lanceleaf Coropsis    |
| <i>Asclepias tuberosa</i>      | Butterfly Weed        |
| <i>Sympathyrum spp.</i>        | Aster                 |
| <i>Agastache foeniculum</i>    | Anise hyssop          |
| <i>Penstemon heterophyllus</i> | Foothill Penstemon    |
| <i>Echinacea 'Pica bella'</i>  | Pica Bella Coneflower |
| <i>Monarda fistulosa</i>       | Wild Bergamot         |
| <i>Salidago speciosa</i>       | Showy Goldenrod       |
| <i>Liatris spicata</i>         | Blazing Star          |
| <i>Eutrochium maculatum</i>    | Joe Pye Weed          |
| <i>Lantana spp.</i>            | Lantana               |
| <i>Erythrina herbacea</i>      | Coral Bean            |
| <i>Coreopsis lanceolata</i>    | Lanceleaf Coreopsis   |
| <i>Buddleja davidii</i>        | Butterfly Bush        |
| <i>Monarda didyma</i>          | Beebalm               |
| <i>Salvia spp.</i>             | Sages                 |
| <i>Tithonia rotundifolia</i>   | Mexican Sunflower     |
| <i>Heuchera sanguinea</i>      | Coral Bells           |

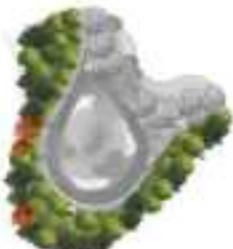
### Ecotone (Wetland Meadows)

| Scientific Name                | Common Name        |
|--------------------------------|--------------------|
| <i>Canna x generalis</i>       | Canna              |
| <i>Cyperus alternifolius</i>   | Umbrella Sedge     |
| <i>Equisetum hyemale</i>       | Horsetail          |
| <i>Iris pseudacorus</i>        | Yellow Flag        |
| <i>Pontederia cordata</i>      | Pickerel Weed      |
| <i>Typha angustifolia</i>      | Narrowleaf Cattail |
| <i>Rudbeckia maxima</i>        | Great Coneflower   |
| <i>Euphorbia mantevidensis</i> | Sand Spikebrush    |
| <i>Saccharum plumegress</i>    | Giant Plumegrass   |
| <i>Coreopsis tinctoria</i>     | Plains Coreopsis   |

# V. Site #5-3

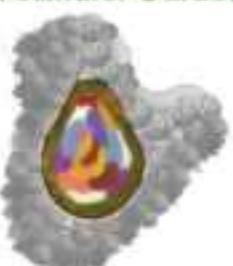
## Plant List, Zoom In, 1 Acre

### Existing Forest and Understory



| Scientific Name           | Common Name    | Scientific Name               | Common Name         |
|---------------------------|----------------|-------------------------------|---------------------|
| <i>Fagus grandifolia</i>  | American Beech | <i>Betula nigra</i>           | Black Walnut        |
| <i>Fraxinus americana</i> | White Ash      | <i>Koelreuteria bipinnata</i> | Golden Rain Tree    |
| <i>Populus deltoides</i>  | Cottonwood     | <i>Prunus mexicana</i>        | Mexican Plum        |
| <i>Quercus macrocarpa</i> | Bur Oak        | <i>Myrica cerifera</i>        | Southern Wax Myrtle |
| <i>Quercus buckleyi</i>   | Texas Red Oak  | <i>Diospyrus texana</i>       | Texas Persimmon     |
| <i>Carya illinoensis</i>  | Pecan          |                               |                     |

### Pollinator Garden



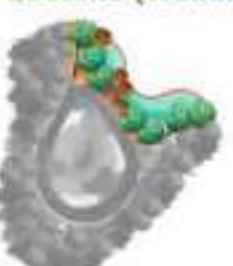
| Scientific Name                | Common Name           | Scientific Name             | Common Name      | Scientific Name              | Common Name         |
|--------------------------------|-----------------------|-----------------------------|------------------|------------------------------|---------------------|
| <i>Coreopsis lanceolata</i>    | Lanceleaf Coreopsis   | <i>Monarda fistulosa</i>    | Wild Bergamot    | <i>Coreopsis lanceolata</i>  | Lanceleaf Coreopsis |
| <i>Asclepias tuberosa</i>      | Butterfly Weed        | <i>Solidago speciosa</i>    | Shaw's Goldenrod | <i>Buddleja davidii</i>      | Butterfly Bush      |
| <i>Sympathyridichum spp.</i>   | Aster                 | <i>Liatris spicata</i>      | Blazing Star     | <i>Monarda didyma</i>        | Beebalm             |
| <i>Agastache foeniculum</i>    | Anise hyssop          | <i>Eutrochium maculatum</i> | Joe Pye Weed     | <i>Salvia spp.</i>           | Sages               |
| <i>Penstemon heterophyllus</i> | Foothill Penstemon    | <i>Lantana spp.</i>         | Lantana          | <i>Lithonia rotundifolia</i> | Mexican Sunflower   |
| <i>Echinacea 'Pica Bella'</i>  | Pica Bella Coneflower | <i>Erythrina herbacea</i>   | Coral Bean       | <i>Heuchera sanguinea</i>    | Coral Bells         |

### Buffer Shrubs



| Scientific Name                | Common Name         | Scientific Name                   | Common Name        | Scientific Name              | Common Name           |
|--------------------------------|---------------------|-----------------------------------|--------------------|------------------------------|-----------------------|
| <i>Berberis thunbergii</i>     | Japanese Barberry   | <i>Juniperus chinensis</i>        | Chinese Juniper    | <i>Lagerstroemia indica</i>  | Dwarf Crepe myrtle    |
| <i>Punica granatum</i>         | Pomegranate         | <i>Hydrangea macrophylla</i>      | Bigleaf Hydrangea  | <i>Gardenia jasminoides</i>  | Gardenia              |
| <i>Nerium oleander</i>         | Cleander            | <i>Viburnum suspensum</i>         | Suspensum Viburnum | <i>Hesperaloe parviflora</i> | Red yucca             |
| <i>Prunus caroliniana</i>      | Cherry Laurel       | <i>Cephaelanthus occidentalis</i> | Common Buttonbush  | <i>Hibiscus syriacus</i>     | Rose of Sharon        |
| <i>Ilex decidua</i>            | Possumhaw           | <i>Aucuba japonica</i>            | Japanese laurel    | <i>Pyracantha coccinea</i>   | Pyracantha            |
| <i>Leucophyllum frutescens</i> | Texas Sage          | <i>Musa</i>                       | Banana             | <i>Loropetalum chinense</i>  | Chinese Fringe Flower |
| <i>Callistemon citrinus</i>    | Crimson Bottlebrush | <i>Euonymus alatus</i>            | Burning Bush       | <i>Camellia sasanqua</i>     | Camellia              |

### Ecotone (Wetland Meadows)



| Scientific Name              | Common Name        | Scientific Name                 | Common Name        |
|------------------------------|--------------------|---------------------------------|--------------------|
| <i>Canna x generalis</i>     | Canna              | <i>Typha angustifolia</i>       | Narrowleaf Cattail |
| <i>Cyperus alternifolius</i> | Umbrella Sedge     | <i>Rudbeckia maxima</i>         | Great Coneflower   |
| <i>Equisetum hyemale</i>     | Horsetail          | <i>Eleocharis montevidensis</i> | Sand Spikebrush    |
| <i>Iris pseudacorus</i>      | Yellow Flag        | <i>Saccharum plumegras</i>      | Giant Pumegras     |
| <i>Pontederia cordata</i>    | Pickerel Weed      | <i>Coreopsis tinctoria</i>      | Plains Coreopsis   |
| <i>Typha angustifolia</i>    | Narrowleaf Cattail |                                 |                    |

## V. Site #5-3

### Reference, Plant List, 1 Acre

1. <https://www.gardendesign.com/perennials/pollinators.html>
2. <https://houstonarboretum.org/2016/03/planting-for-pollinators/>
3. <https://www.houstonzoo.org/saving-wildlife/texas-conservation/pollinators/>
4. <https://buchanansplants.com/4-easy-ways-you-can-help-pollinators/>
5. <https://www.fws.gov/pollinators/pdfs/hawaiianisland.ecoreggguide.final.hi-res.pdf>
6. <http://www.urbandomesticdiva.com/2011/03/gardening-garden-plan-week-week-2-three.html>

### Cover Photo Copyright

<http://www.cypresscreekproject.net/about>

## VI. Site #6-1



Xin Xu  
April, 2018

## VI. Site #6-1

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## VI. Site #6-1

### Site Selection

#### Site Selection



Subsite 6

# VI. Site #6-1

## Property Boundary

Final Study -Site Selection - Analysis Final



Aerial Photo

Area: 325 acres



### Legend

Zone 7 Site Boundary

Habitat Map



### Legend

1. Shaped Site + Roads

— Site Boundary

— 10 Acre Site Boundary

2. High/Low Point

— Low Point

— High Point

3. Existing Water

— Water Stream

4. Proposed Features

— View Deck

— Picnic Area

— Primary Road

— Secondary Road

— Access Point

5. Habitat Types

— Human Habitat

— Wildlife Habitat

— Wetland

— Corridor

— Meadow

— Pond

— Forest Habitat

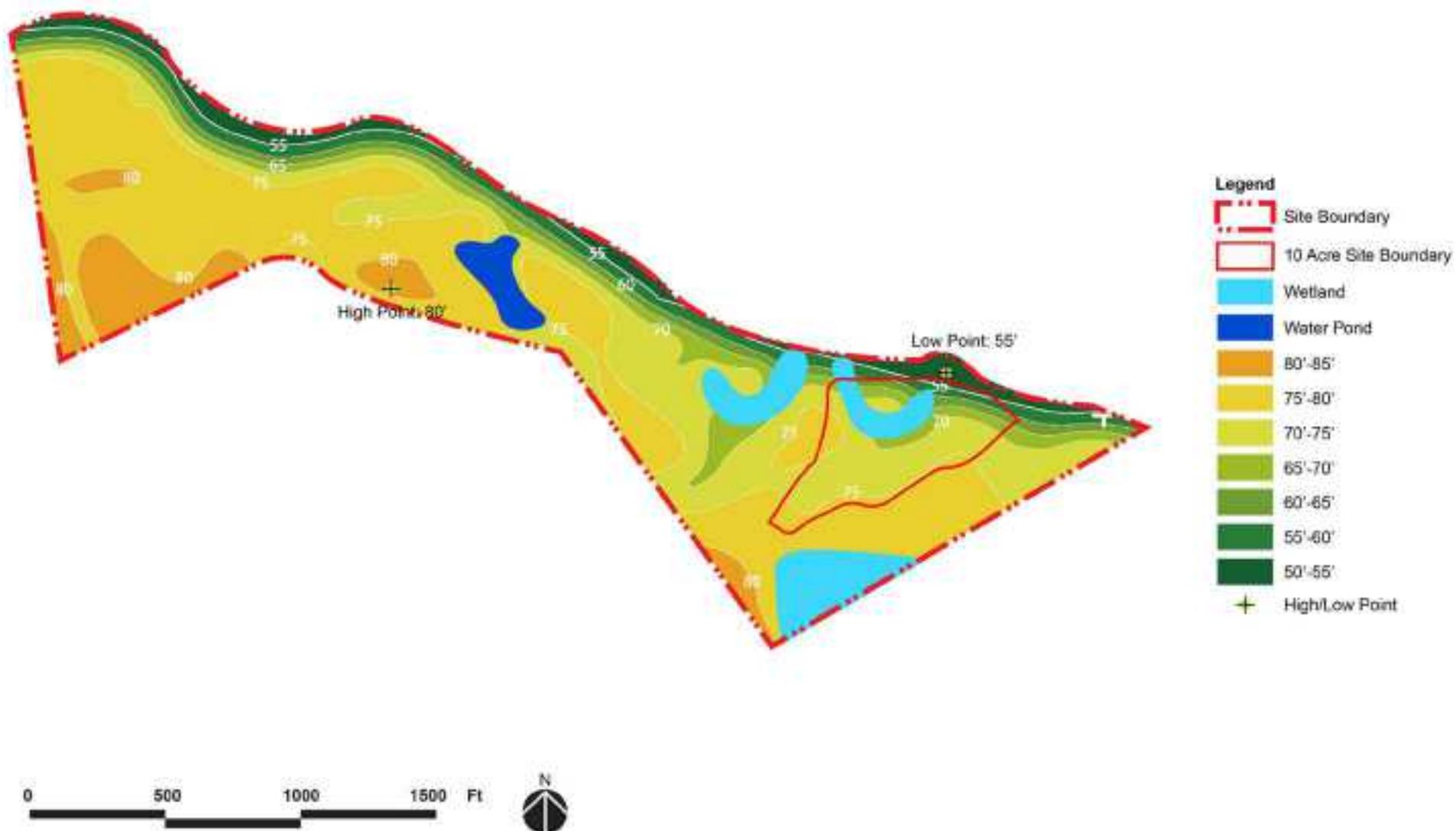
— Erosion Control

### Description

- Vegetation: After careful aerial photo interpretation, I depict the land into 7 categories of landscape types. Overall, the site is consisted of the forest. These valuable resources should be preserved. Moreover, I create space for people so that they can have opportunities to get close to the nature.
- Water: There is one existing creek on the north side of the site. Moreover, an existing forest wetland in the site can be preserved.
- Access: The main access is located in the south side of the site. There are also several trails that connect the 10 acre site with other parts.
- Area: The site is 10.1 acres, and is located in the east part of site 6.

## VI. Site #6-1

### Elevation Zones



## VI. Site #6-1

### Land Use Strategic Plan, 10 Acres

Proposed Site Selection

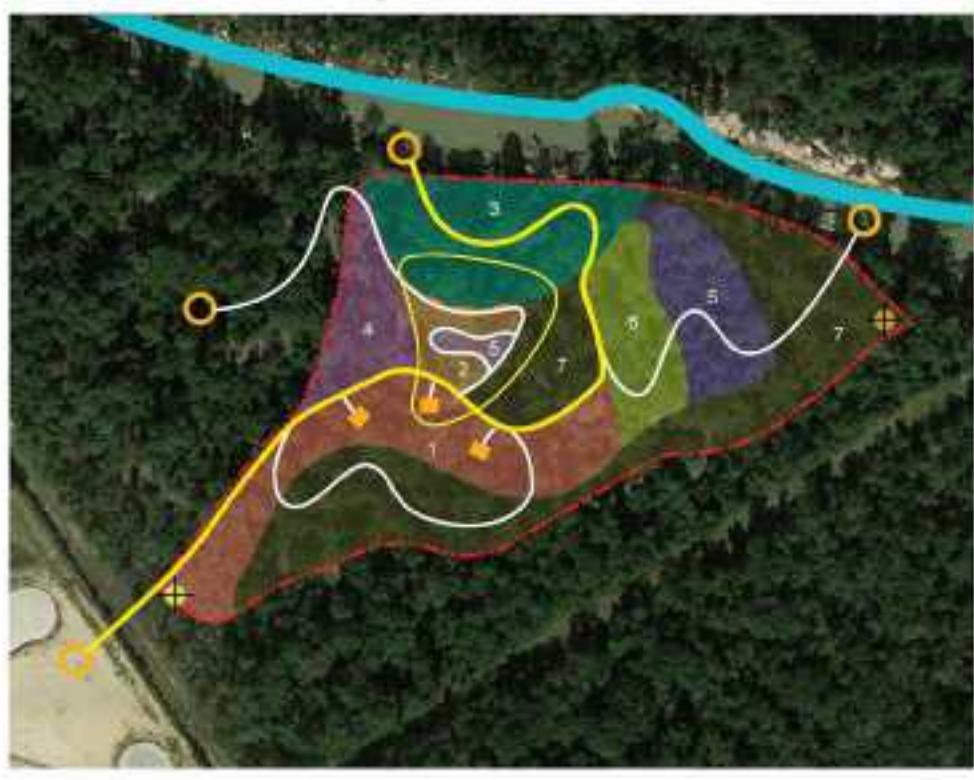


#### Legend

- 1. Shaped Site + Road
- 10 Acre Site Boundary
- 2. High/Low Point
- ♦ Low Point
- ★ High Point
- 3. High/Low Point
- Creek
- 4. Existing Contours
- Contours (5 ft interval)
- 5. Forest Wetland



Proposed Habitat Zoning

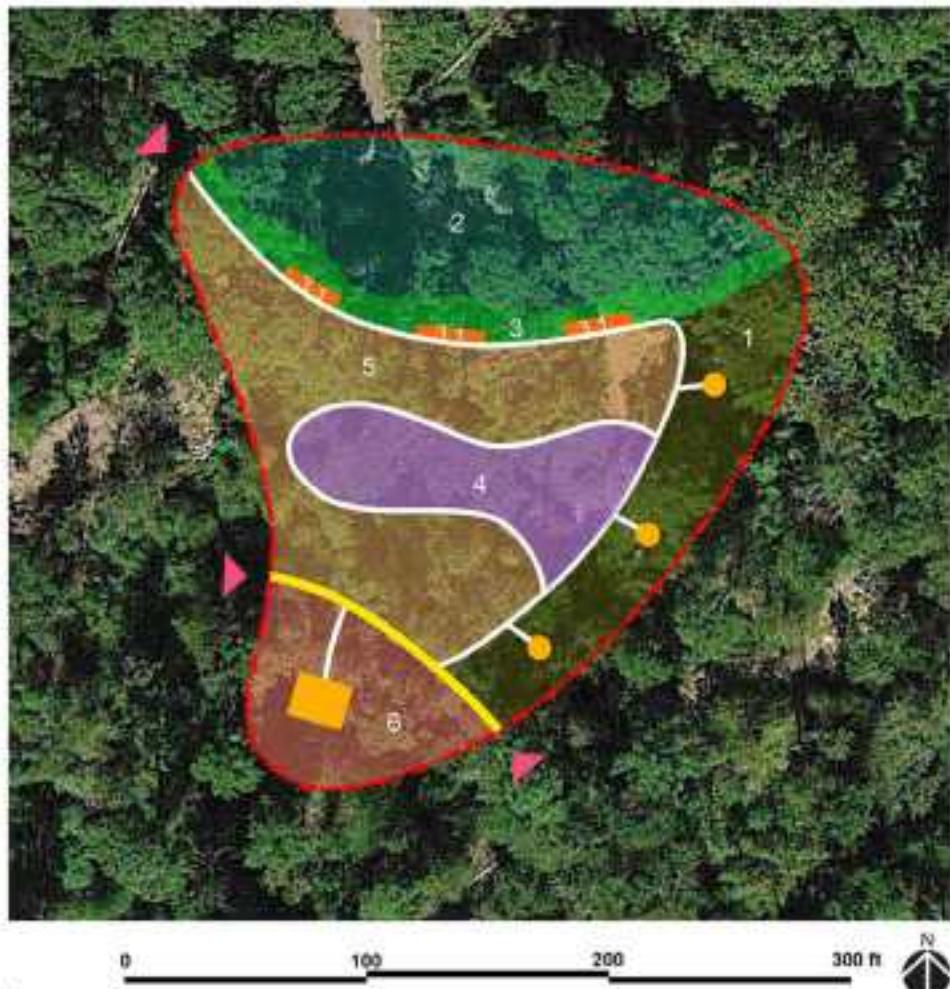


#### Legend

- 1. Shaped Site + Roads
- 10 Acre Site Boundary
- 2. High/Low Point
- ♦ Low Point
- ★ High Point
- 3. Existing Water
- Water Stream
- 4. Proposed Features
- View Deck
- Picnic Area
- Primary Road
- Secondary Road
- Access Point
- 5. Habitat Types
- 1 Human Habitat
- 2 Wildlife Habitat
- 3 Wetland
- 4 Corridor
- 5 Meadow
- 6 Shrub
- 7 Forest Habitat

## VI. Site #6-1

### Land Use Zoning, Zoom In, 1 Acre



#### Legend

| Recreation Zone     | Protection Zone     | Special Features    |
|---------------------|---------------------|---------------------|
| Single Table Picnic | 1- Forest Patch     | 4- Meadow           |
| Group Picnic        | 2- Wetland          | 5- Wildlife Habitat |
| View Deck           | 3- Wetland Addition | 6- Human Zone       |
| Primary Trail       |                     |                     |
| Secondary Trails    |                     |                     |
| Entry Point         |                     |                     |

| Habitat Zone               | Treatment                       | Featured Wildlife                    | Plant Life Forms                   |
|----------------------------|---------------------------------|--------------------------------------|------------------------------------|
| Zone 1<br>Forest Patch     | Trails<br>Buffer<br>Picnic      | Deer<br>Raccoon<br>Fox<br>Woodpecker | Trees<br>Shrubs                    |
| Zone 2<br>Wetland          | Existing Forest<br>Wetland      | Waterfowl<br>Egret                   | Wetland Plants                     |
| Zone 3<br>Wetland Addition | 3.1 View Deck                   | Frog<br>Turtle                       | Trees<br>Shrubs                    |
| Zone 4<br>Meadow           | Shrub<br>Seed Source<br>Flowers | Bees<br>Rabbit<br>Butterflies        | Grasses<br>Shrubs                  |
| Zone 5<br>Wildlife Habitat | Bird<br>Mammal<br>Understory    | Deer<br>Rat<br>Finches<br>Squirrel   | Trees<br>Shrubs                    |
| Zone 6<br>Human Space      | Entrance<br>Picnic              | Trails<br>Children Play              | Pets<br>Trees<br>Shrubs<br>Grasses |

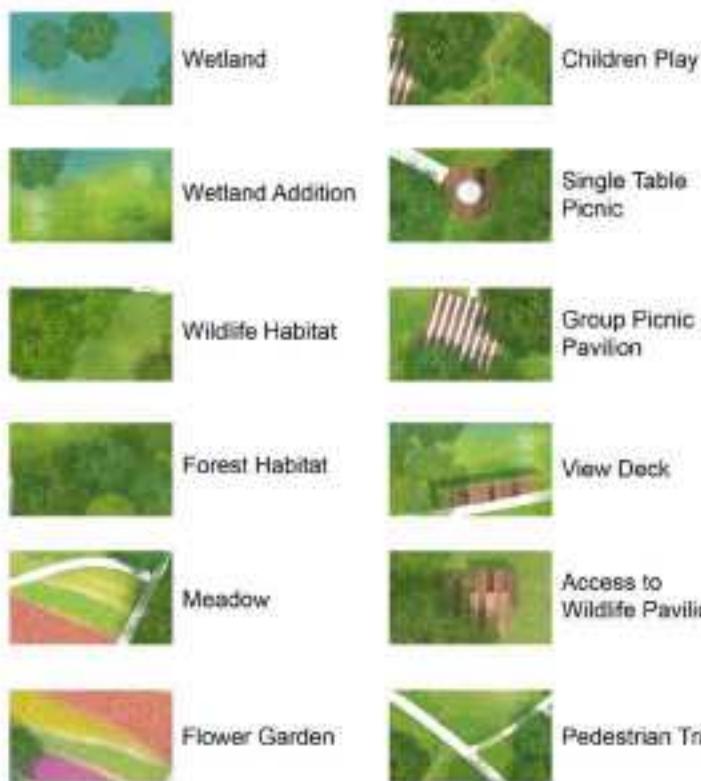
### Index Map



## VI. Site #6-1

### Master Plan, Zoom In, 1 Acre

#### Legend



#### Existing Site 1 Acre



# VI. Site #6-1

## Plant List, Zoom In, 1 Acre

### Forest Habitat

| Tree                                              | Fruit Season        |   |
|---------------------------------------------------|---------------------|---|
| American Beech ( <i>Fagus grandifolia</i> )       | Fall to Winter      | 1 |
| Eastern Black Walnut ( <i>Juglans nigra</i> )     | Late Summer to Fall | 1 |
| Pecan ( <i>Carya illinoinensis</i> )              | Fall to Winter      | 1 |
| Carolina Buckthorn ( <i>Rhamnus caroliniana</i> ) | Summer to Fall      | 1 |
| American Holly ( <i>Ilex opaca</i> )              | Summer to Spring    | 2 |

| Shrub                                                | Fruit Season     |   |
|------------------------------------------------------|------------------|---|
| Desert Olive ( <i>Forestiera neomexicana</i> )       | Fall to Winter   | 1 |
| Yaupon ( <i>Ilex vomitoria</i> )                     | Fall to Winter   | 1 |
| Parsley Hawthorn ( <i>Crataegus marshallii</i> )     | Spring           | 2 |
| American Beautyberry ( <i>Callicarpa americana</i> ) | Fall             | 2 |
| Desert Yaupon ( <i>Schaefflera cuneifolia</i> )      | Spring to Summer | 1 |
| Coralberry ( <i>Symporicarpos orbiculatus</i> )      | Fall to Spring   | 1 |
| Viburnums ( <i>Viburnum</i> spp.)                    | Summer to Fall   | 1 |

### Wildlife Habitat

| Tree                                             | Fruit Season   |   |
|--------------------------------------------------|----------------|---|
| Black Cherry ( <i>Prunus serotina</i> )          | Summer to Fall | 2 |
| Chokecherry ( <i>Prunus virginiana</i> )         | Late Summer    | 1 |
| Parsley Hawthorn ( <i>Crataegus marshallii</i> ) | Fall to Spring | 1 |
| Lime Prickly-Ash ( <i>Zanthoxylum fagara</i> )   | Fall           | 1 |
| Mayhaw ( <i>Crataegus opaca</i> )                | Summer         | 1 |

| Shrub                                      | Fruit Season   |   |
|--------------------------------------------|----------------|---|
| Possumhaw ( <i>Ilex decidua</i> )          | Fall to Winter | 1 |
| Pyracantha ( <i>Pyracantha coccinea</i> )  | Fall to Winter | 1 |
| Natal Plum ( <i>Carissa macrocarpa</i> )   | Summer         | 1 |
| Japanese Laurel ( <i>Aucuba japonica</i> ) | Fall           | 1 |

### Wetland & Wetland Addition

| Tree                                       |   |
|--------------------------------------------|---|
| Shumard Oak ( <i>Quercus shumardii</i> )   | 3 |
| Water Oak ( <i>Quercus nigra</i> )         | 3 |
| Cottonwood ( <i>Populus deltoides</i> )    | 3 |
| Bald Cypress ( <i>Taxodium distichum</i> ) | 3 |

| Shrub                                          |   |
|------------------------------------------------|---|
| Northern Spicebush ( <i>Lindera benzoin</i> )  | 3 |
| False Indigo Bush ( <i>Amorpha fruticosa</i> ) | 3 |
| Rattle Bush ( <i>Sesbania drummondii</i> )     | 3 |
| Hemp Sesbania ( <i>Sesbania drummondii</i> )   | 3 |

| Fern                                        |   |
|---------------------------------------------|---|
| River Fern ( <i>Thelypteris kunthii</i> )   | 3 |
| Water Clover ( <i>Marsilea vestita</i> )    | 3 |
| Carolina Fern ( <i>Azolla caroliniana</i> ) | 3 |

| Fern                                               |   |
|----------------------------------------------------|---|
| Curly Dock ( <i>Rumex crispus</i> )                | 3 |
| Halberd-leaf Rosemallow ( <i>Hibiscus laevis</i> ) | 3 |
| Mexican Seedbox ( <i>Ludwigia octovalvis</i> )     | 3 |



### Meadow & Wildflower Garden

| Tree                                              |   |
|---------------------------------------------------|---|
| Cedar Elm ( <i>Ulmus crassifolia</i> )            | 2 |
| Texas Red Oak ( <i>Quercus buckleyi</i> )         | 2 |
| American Elm ( <i>Ulmus Americana</i> )           | 1 |
| Texas Persimmon ( <i>Diospyros texana</i> )       | 2 |
| Texas Ash ( <i>Fraxinus albicans</i> )            | 2 |
| Eastern Red Cedar ( <i>Juniperus virginiana</i> ) | 1 |
| Mexican Plum ( <i>Prunus mexicana</i> )           | 2 |
| Live Oak ( <i>Quercus virginiana</i> )            | 2 |
| Shumard Oak ( <i>Quercus shumardii</i> )          | 2 |

| Shrub                                             |   |
|---------------------------------------------------|---|
| Possomhaw ( <i>Ilex decidua</i> )                 | 2 |
| Texas Persimmon ( <i>Diospyros texana</i> )       | 2 |
| Button Bush ( <i>Cephaelanthus occidentalis</i> ) | 1 |
| Begonia ( <i>Begonia x semperflorens</i> )        | 2 |
| Blackfoot Daisy ( <i>Melampodium leucanthum</i> ) | 2 |
| Res Sage ( <i>Salvia greggii</i> )                | 1 |
| Boat-tail Brush ( <i>Grevillea robusta</i> )      | 2 |
| Bulbine ( <i>Bulbine frutescens</i> )             | 1 |
| Cast Iron Plant ( <i>Aspidistra elatior</i> )     | 1 |

| Groundcover                                        |   |
|----------------------------------------------------|---|
| Sage ( <i>Salvia roemeriana</i> )                  | 2 |
| Plateau Goldeneye ( <i>Viguiera dentata</i> )      | 1 |
| Gregg Salvia ( <i>Salvia greggii</i> )             | 4 |
| Asian Jasmine ( <i>Trachelospermum asiaticum</i> ) | 5 |
| Zoysia Species ( <i>Zoysia</i> )                   | 6 |

[https://www.birdsboronline.com/colorpop105/swamp\\_cypress\\_taxodium\\_distichum.html](https://www.birdsboronline.com/colorpop105/swamp_cypress_taxodium_distichum.html)  
<https://www.thegardenguy.com/product/four-leaf-water-clover-water-gardens-fish-ponds-bog-plants>

## VI. Site #6-1

### Reference, Plant List, 1 Acre

1. <http://www.wildflower.org>
2. <http://www.missouribotanicalgarden.org>
3. [http://www.austintexas.gov/watershed\\_protection/publications/document.cfm?id=203088](http://www.austintexas.gov/watershed_protection/publications/document.cfm?id=203088)
4. <https://floridata.com/Plants/>
5. <http://aggie-horticulture.tamu.edu/ornamentals>
6. <https://www.virginia.org/listings/OutdoorsAndSports/OccoquanBayNationalWildlifeRefuge/>

## VI. Site #6-2



Ruoran Shi  
April, 2018

## VI. Site #6-2

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## VI. Site #6-2

### Site Selection



Site #6

# VI. Site #6-2

## Property Boundary

Final Study - Site Selection - Analysis Final



Aerial Photo

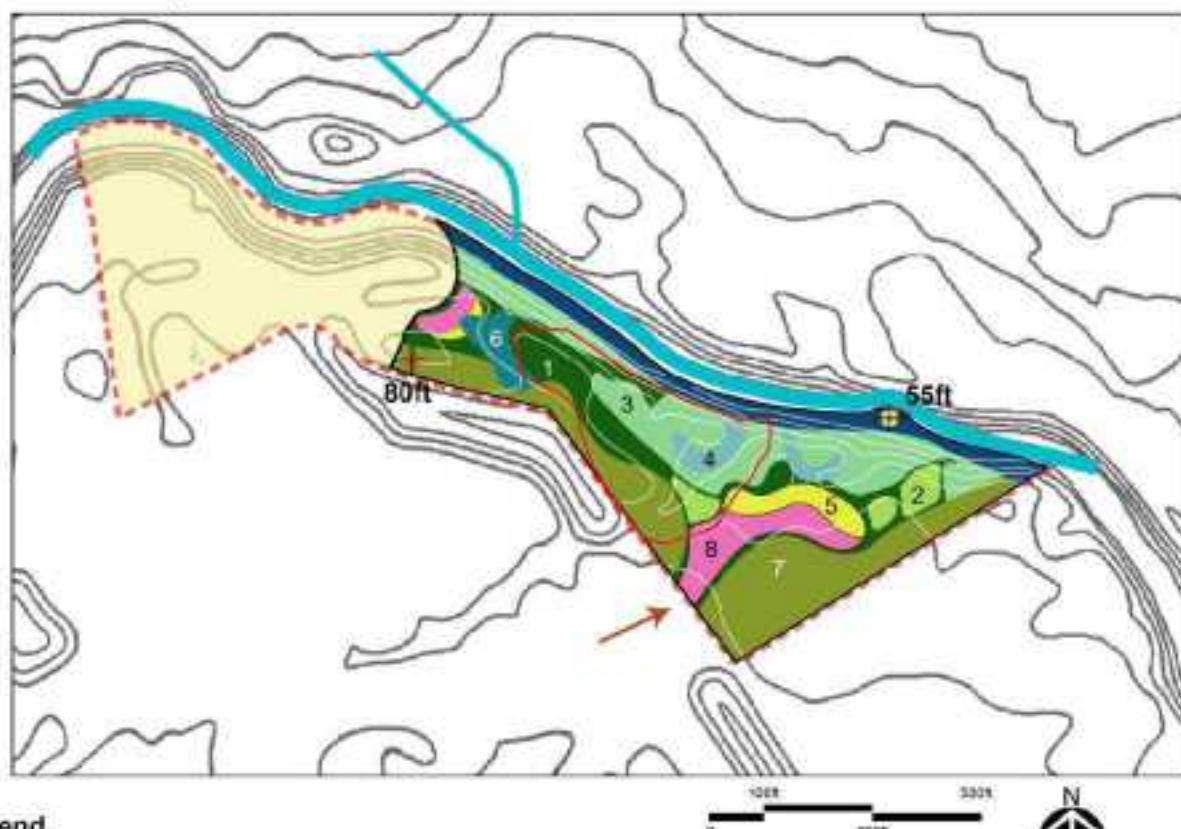


Area: 325 acres



Reference: Google Maps  
<https://www.fws.gov/wetlands/index.html>

## Habitat Map



### Legend

1. Shaped Site
  - Site Boundary
  - Entry
  - Developed Land
  - 10 ac site
2. Contours
  - Contour (5ft Interval)
3. Existing Water
  - Pond
  - Creek
  - Wetland
4. High/Low Point
  - ◆ 80ft, High Point
  - ◆ 55ft, Low Point
5. Habitat Types
  - 1 Forage
  - 2 Shrub Patch
  - 3 Erosion Control
  - 4 Wetland
  - 5 Bird Understory
  - 6 Pond
  - 7 Buffer
  - 8 Pollinator

### Description

1. Vegetation: Overall, the site is covered by tree canopy. It is a great resource and is supposed to be carefully protected.
2. Access: The proposed entry point is located at the south side of the site. It is for both pedestrian and bike riders.
3. Water: There is an existing pond at the east side of the site. There are two existing wetlands at the east side of the site.
4. Area: The exact area of the 10 acres site is 10.02 acres.

## VI. Site #6-2

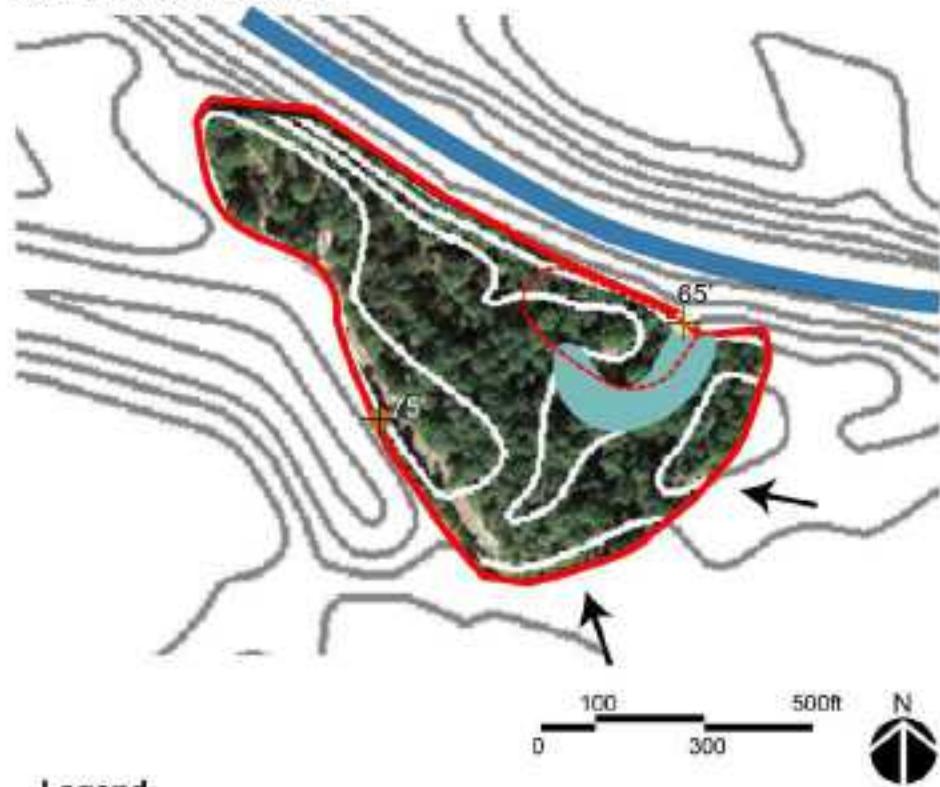
### Elevation Zones



## VI. Site #6-2

### Land Use Strategic Plan, 10 Acres

10 Acre Site Condition



#### Legend

- 1. Shaped Site
  - Site Boundary
- 2. High/Low Point
  - Entry
  - 1 Acre Site Boundary
  - ◆ 75ft, High Point
  - ◆ 65ft, Low Point

#### 2. High/Low Point

- ◆ 75ft, High Point
- ◆ 65ft, Low Point

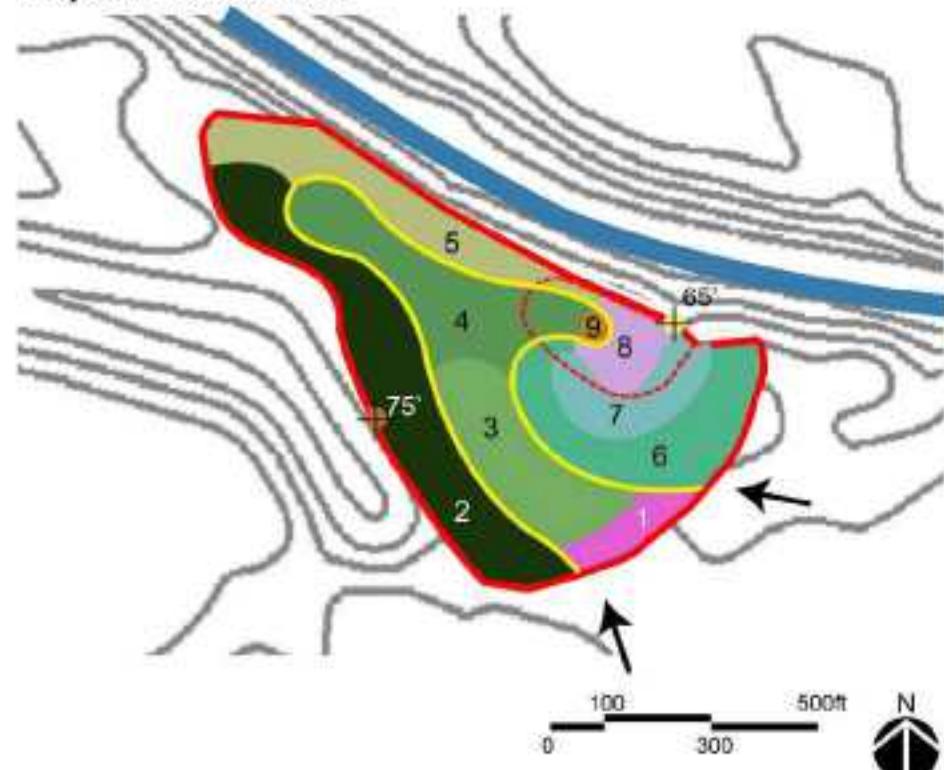
#### 3. Existing Water

- Wetland
- Creek

#### 4. Contours

- Contour (5ft Interval)

Proposed Habitat Zone



#### Legend

- 1. Shaped Site
  - Site Boundary
- 2. High/Low Point
  - Entry
  - 1 Acre Site Boundary
  - ◆ 75ft, High Point
  - ◆ 65ft, Low Point
- 3. Contours
  - Contour (5ft Interval)
- 4. Proposed Habitats
  - Wild Flower Garden
  - Buffer
  - Shrub Patches
  - Forest
  - Erosion Control
  - Amphibian Habitat
  - Wetland
  - Pollinator Garden
  - Picnic / Bike Station

## VI. Site #6-2

### Land Use Zoning, Zoom In, 1 Acre



Legend

- Entry
- Blind
- Bike/Pedestrian Lane
- Bike Parking
- Family Picnic Table



0

50

100

200FT

Protection Zone

- Amphibian Habitat
- Forest A
- Forest B
- Erosion Control
- Wetland

Special Features

- Pollinator Area A
- Pollinator Area B
- Human Area

| Habitat                                                                          | Featured Wildlife             | Treatments                                               | Plant Life Forms                      |
|----------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------|---------------------------------------|
| Pollinator Attracting Area A<br>Zone 1<br>1.1 Canopy<br>1.2 Wetland edge         | Bee, Butterfly<br>Hummingbird | Nectar<br>Pollen                                         | Trees<br>Large Shrubs                 |
| Pollinator Attracting Area B<br>Zone 2<br>2.1 Wetland edge<br>2.2 Natural garden | Bee, Butterfly<br>Hummingbird | Nectar<br>Pollen                                         | Small Shrubs<br>Perennials<br>Annuals |
| Amphibian Habitat<br>Zone 3                                                      | Amphibian                     | Shelters<br>Visual Screen                                | Grass<br>Shrubs                       |
| Forest A<br>Zone 4                                                               | Deer<br>Small Mammals         | Canopy Thinning<br>Food Resource                         | Canopy Trees                          |
| Forest B<br>Zone 5                                                               | Song Birds                    | Food Resource<br>Screen                                  | Canopy Trees                          |
| Erosion Control<br>Zone 6                                                        |                               | Erosion Control<br>Banking                               | Ground-covers                         |
| Wetland<br>Zone 8                                                                | Birds, Mammals                | Lake shore<br>Impoundments                               | Wetland Species                       |
| Human Activity Area<br>Zone 7                                                    | Human                         | Picnic Table<br>Bike Rack<br>Education Board<br>Seed Box |                                       |

Index Map



N.T.S.

10 acre site on site 6

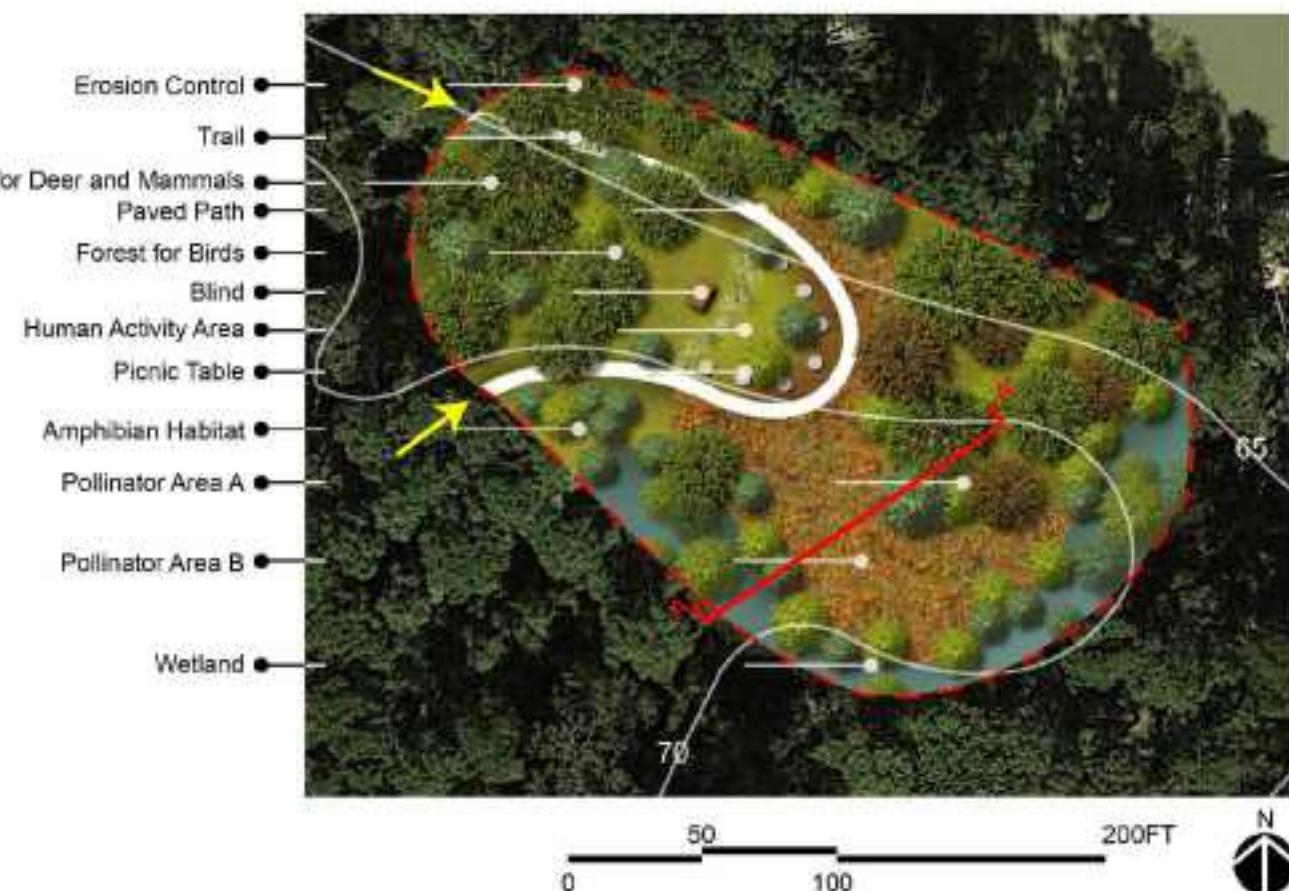


N.T.S. 1 acre site on 10 acre site 6

## VI. Site #6-2

### Master Plan, Zoom In, 1 Acre

#### Legend

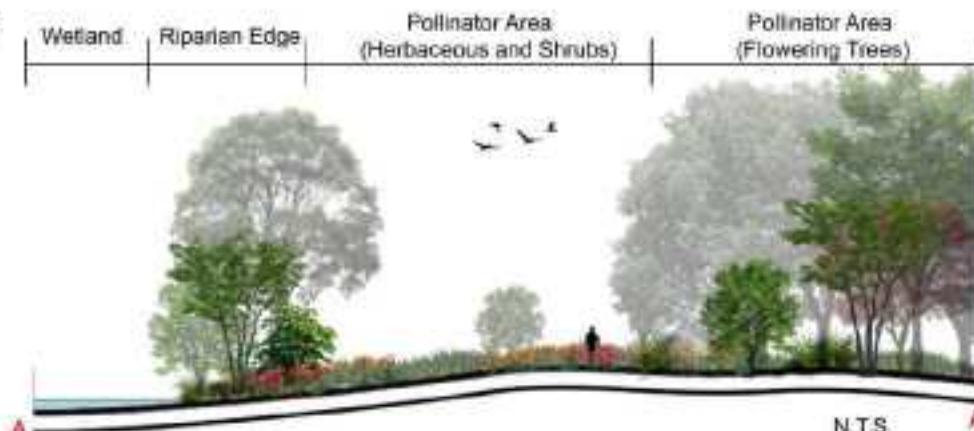


#### Existing Site



-  10 Acre Site Boundary
-  Tree Canopy
-  Wetland

#### Section A-A'



# VI. Site #6-2

## Plant List, Zoom In, 1 Acre

### Pollinator Attracting Species

| Tree                                            | Flower Time |   |
|-------------------------------------------------|-------------|---|
| Mockernut Hickory ( <i>Carya alba</i> )         | April-May   | 3 |
| Persimmon ( <i>Diospyros virginiana</i> )       | May-June    | 3 |
| Umbrella Magnolia ( <i>Magnolia tripetala</i> ) | April-May   | 3 |
| American Holly ( <i>Ilex opaca</i> )            | April-June  | 3 |
| Green Hawthorne ( <i>Crataegus viridis</i> )    | March-April | 3 |
| Sparkleberry ( <i>Vaccinium arboreum</i> )      | April-May   | 3 |

| Shrub                                         | Flower Time |   |
|-----------------------------------------------|-------------|---|
| Fringe-tree ( <i>Chionanthus virginicus</i> ) | April-May   | 3 |
| Witch-alder ( <i>Fothergilla major</i> )      | April-May   | 3 |
| Swamp Rose ( <i>Rosa palustris</i> )          | June-July   | 3 |
| Redbud ( <i>Cercis canadensis</i> )           | March-May   | 3 |
| Painted Buckeye ( <i>Aesculus sylvatica</i> ) | April-May   | 3 |

| Perennial                                       | Flower Time |   |
|-------------------------------------------------|-------------|---|
| Milkweed ( <i>Asclepias incarnata</i> )         | July-Sept   | 3 |
| Lobed Coreopsis ( <i>Coreopsis auriculata</i> ) | April-June  | 3 |
| Hairy Phlox ( <i>Phlox amoena</i> )             | April-June  | 3 |
| Toad Trillium ( <i>Trillium cuneatum</i> )      | March-April | 3 |
| Wild Petunia ( <i>Ruellia humilis</i> )         | May-June    | 3 |

| Vine                                               | Flower Time |   |
|----------------------------------------------------|-------------|---|
| Passion Flower ( <i>Passiflora incarnata</i> )     | May-July    | 3 |
| Yellow Jessamine ( <i>Gelsemium sempervirens</i> ) | March-April | 3 |
| Coral Honeysuckle ( <i>Lonicera sempervirens</i> ) | March-July  | 3 |

### Riparian Wetland

| Tree                                       |   |
|--------------------------------------------|---|
| Bald Cypress ( <i>Taxodium distichum</i> ) | 1 |
| Water Oak ( <i>Quercus nigra</i> )         | 1 |
| River birch ( <i>Betula nigra</i> )        | 1 |

| Shrub                                            |   |
|--------------------------------------------------|---|
| Leucothoe ( <i>Leucothoe racemosa</i> )          | 1 |
| Dwarf palmetto ( <i>Sabal minor</i> )            | 1 |
| Buttonbush ( <i>Cephaelanthus occidentalis</i> ) | 1 |

| Forb                                               |   |
|----------------------------------------------------|---|
| Water hyacinth ( <i>Eichornia crassipes</i> )      | 1 |
| Red milkweed ( <i>Asclepias rubra</i> )            | 1 |
| Iris ( <i>Iris spp.</i> )                          | 1 |
| Great coneflower ( <i>Rudbeckia maxima</i> )       | 1 |
| Seaside goldenrod ( <i>Solidago sempervirens</i> ) | 1 |
| Frog fruit ( <i>Phyla nodiflora</i> )              | 1 |

| Grass                                         |   |
|-----------------------------------------------|---|
| Switchgrass ( <i>Panicum virgatum</i> )       | 1 |
| Southern cattail ( <i>Typha domingensis</i> ) | 1 |
| Horsetail ( <i>Equisetum hyemale</i> )        | 1 |
| Switchgrass ( <i>Panicum virgatum</i> )       | 1 |

### Wild Life Food Source Providers

| Tree                                            |   |
|-------------------------------------------------|---|
| Agarita ( <i>Mahonia aquifoliate</i> )          | 4 |
| Elbow bush ( <i>Forestiera pubescens</i> )      | 4 |
| Texas mulberry ( <i>Morus microphylla</i> )     | 4 |
| Anacua ( <i>Ehretia anacua</i> )                | 4 |
| Desert yaupon ( <i>Schaefflera cuneifolia</i> ) | 4 |
| Texas kidneywood ( <i>Eysenhardtia texana</i> ) | 4 |
| Cedar elm ( <i>Ulmus crassifolia</i> )          | 4 |
| Sugar hackberry ( <i>Callicarpa americana</i> ) | 4 |

### Erosion Control Species

| Grass                                              |   |
|----------------------------------------------------|---|
| Little bluestem ( <i>Schizachyrium scoparium</i> ) | 2 |
| Southern dewberry ( <i>Rubus trivialis</i> )       | 2 |
| Rougeplant ( <i>Rivina humilis</i> )               | 2 |
| Scarlet rosemallow ( <i>Hibiscus coccineus</i> )   | 2 |



Fringe-tree (*Chionanthus virginicus*)

<https://plants.ces.ncsu.edu/plants/all/chionanthus-virginicus/>

## VI. Site #6-2

### Reference, Plant List, 1 Acre

1. <http://counties.agrilife.org/harris/files/2011/05/houstonplants1.pdf>
2. <https://www.wildflower.org/expert/show.php?id=5803>
3. <http://www.pollinator.org/PDFs/Guides/SoutheastMixedForestrx5FINAL.pdf>
4. <https://www.wildflower.org/expert/show.php?id=6778>
5. Field Guide for Plant Identification Volume Two: Wetlands |Vegetation common to Harris County wetland areas
6. <https://goo.gl/images/PVp3vj>

## VII. Site #7-1



Zhen Yao  
April, 2018

## VII. Site #7-1

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## VII. Site #7-1

### Site Selection



Site7

## VII. Site #7-1

### Property Boundary



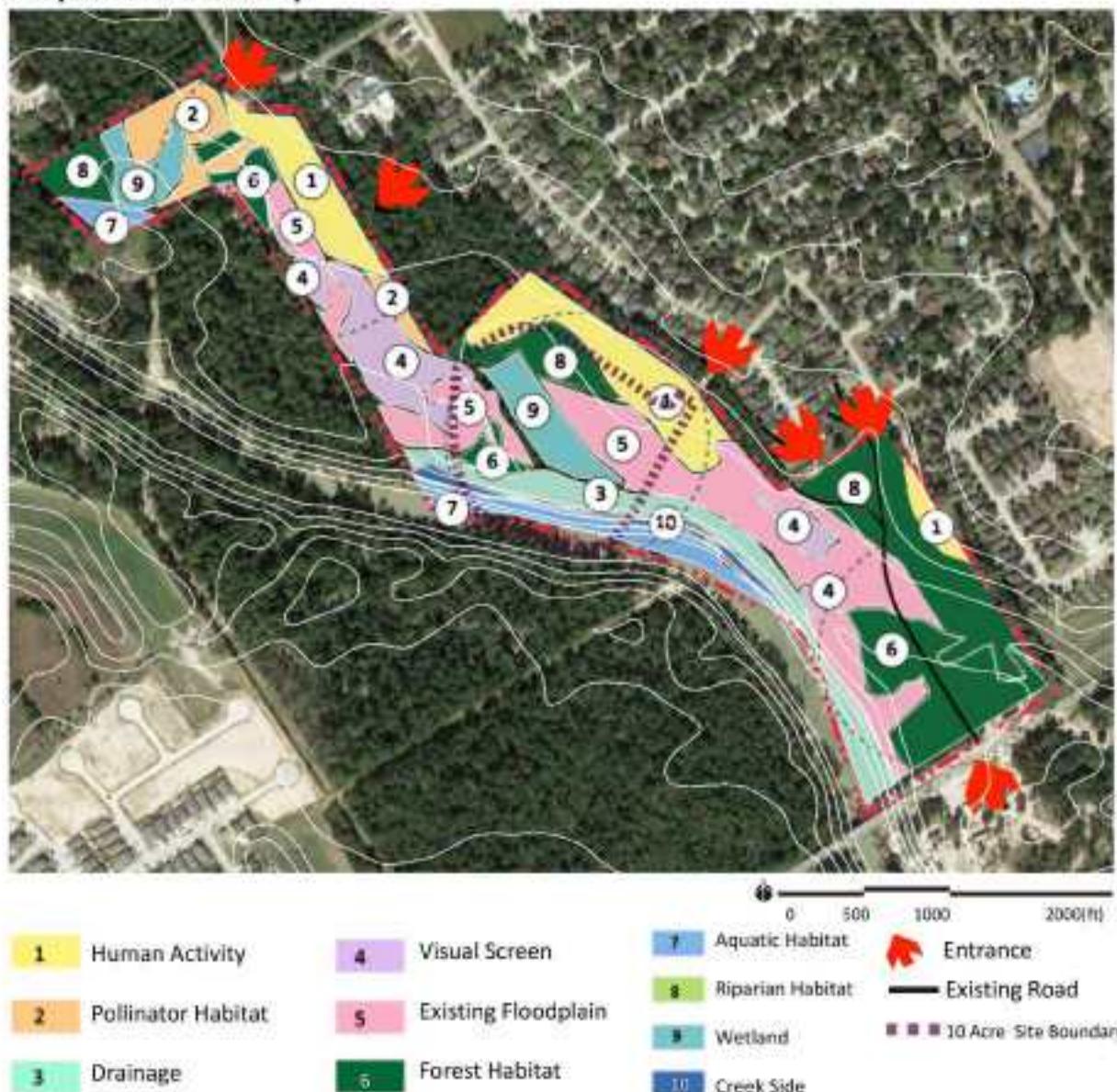
325 Study Site Team Site (53 acres)



— Team Site  
- - - 325 Acres Study Site

N  
N.T.S.

### Proposed Habitat Map

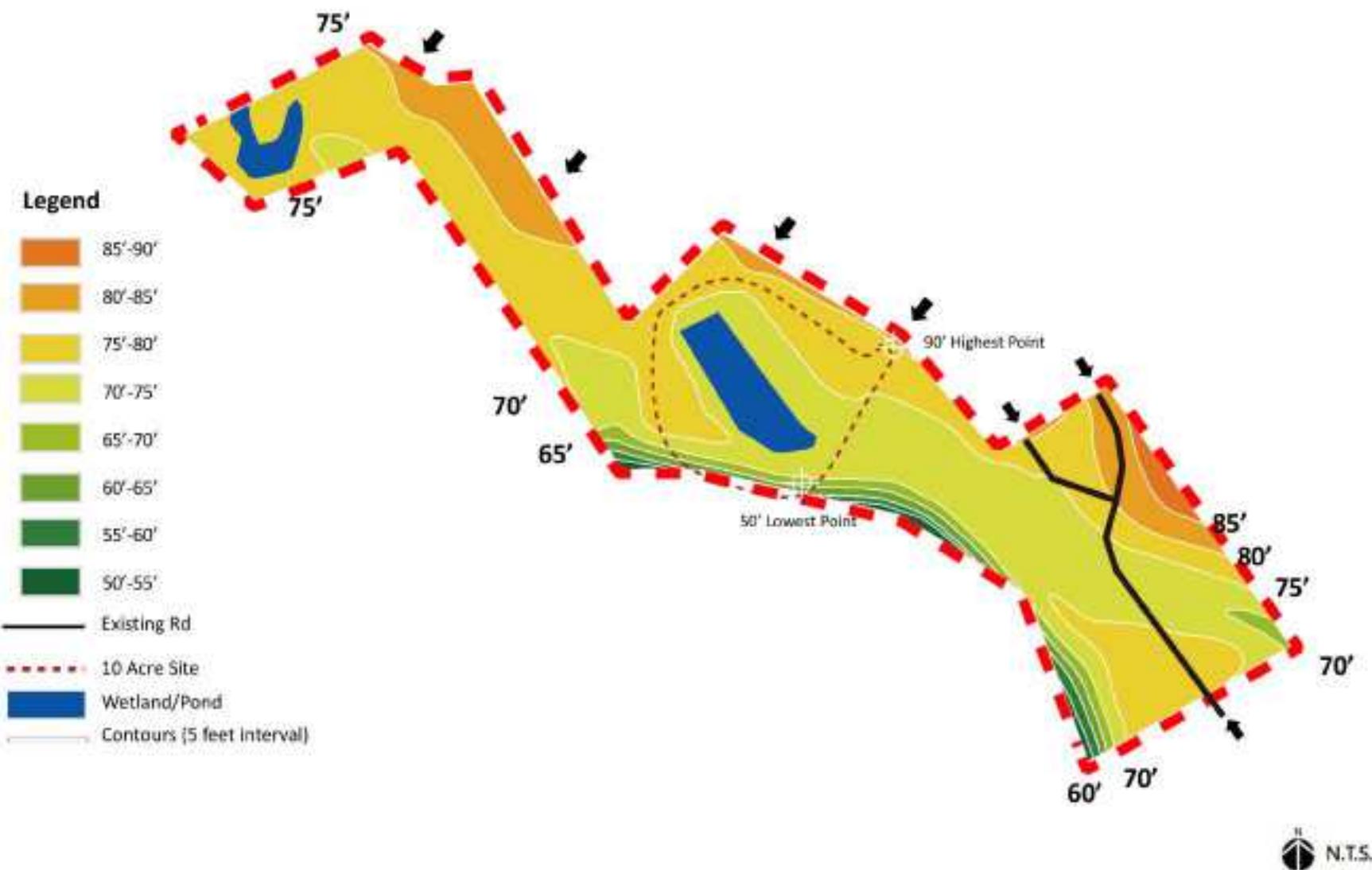


#### Description

- 1 Vegetation: the site is consisted of the forest patches and forest riparian, which should be preserved.
- 2 Access points: we have 6 access points from northeast side which are adjacent to residential area.
- 3 Evidence of water: we have one wetland/pond water source.
- 4 Area: The sub-site is 10.2 acres

## VII. Site #7-1

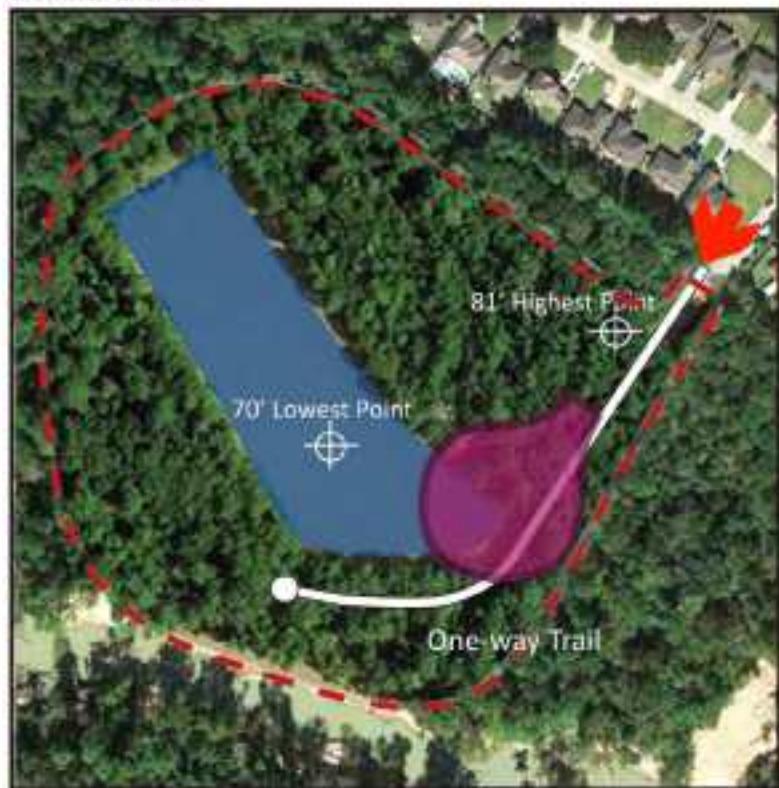
### Elevation Zones



## VII. Site #7-1

### Land Use Strategic Plan, 10 Acres

10 Acre Site



#### Legend

- |                             |                         |
|-----------------------------|-------------------------|
| 1. Shape Site + Road        | 3. Existing Water       |
| ----- 10 Acre Site Boundary | — Wetland/Pond          |
| — Proposed One-way Trail    |                         |
| 3. High, low points         | 4. Proposed 1-acre Site |
| ⊕ 81' Highest Point         | ■ 1 Acre Site           |
| ⊕ 70' Lowest Point          | ↑ Entrance              |
- 0 500 1000 2000(ft)

Proposed Habitats of 10 Acre Site



#### Legend

- |                          |                    |
|--------------------------|--------------------|
| Habitat Zones            |                    |
| 1 Forest Patch           | 5 Visual Screening |
| 2 Stem Thinned Area      | 6 Erosion Control  |
| 3 Wetland Edge           | 7 Creek            |
| 4 Wetland/Pond           | 8 Riparian Area    |
| Proposed 1-acre Site     |                    |
| ----- 10 Acre Site       | Entrance           |
| ■ 1 Acre Site            |                    |
| — Proposed One-way Trail |                    |

## VII. Site #7-1

### Land Use Zoning, Zoom In, 1 Acre

Selected Area



|    |                   | Grove<br>Prairie                                                     | Tree Species             |
|----|-------------------|----------------------------------------------------------------------|--------------------------|
| 1  | Ecotone Area      |                                                                      | Prairie Grass            |
| 2  | Forest Patch      |                                                                      | Existing Forest          |
| 3  | Native Meadow     |                                                                      | Restoration of Prairie   |
| 4  | Prairie Arboretum |                                                                      | Prairie Planting Species |
| 5  | Thinning Area     |                                                                      |                          |
| 6  | Visual Screening  | Native Grass Seed<br>Shrub Buffer/Screen Area                        | Tree                     |
| 7  | Riparian Edge     | Creek Patch<br>Wildlife Habitat                                      |                          |
| 8  | Wildflower Garden | Flower Plant Species<br>Wildlife Habitat                             |                          |
| 9  | Dragonfly Garden  | Aquatic and Fringing<br>Vegetation                                   |                          |
| 10 | Wetland/Pond      | Aquatic and Wetland Planting                                         |                          |
| 11 | Blind             | Accessible to Wildlife                                               |                          |
| 12 | Picnic Area       | 12.1 Small Single Table<br>12.2 Medium Single Table<br>12.3 Pavilion |                          |

Index Map



Site Location

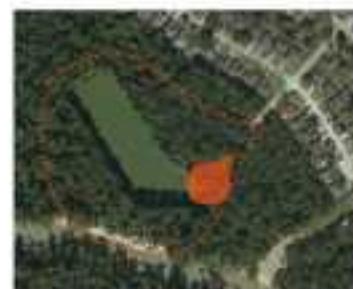
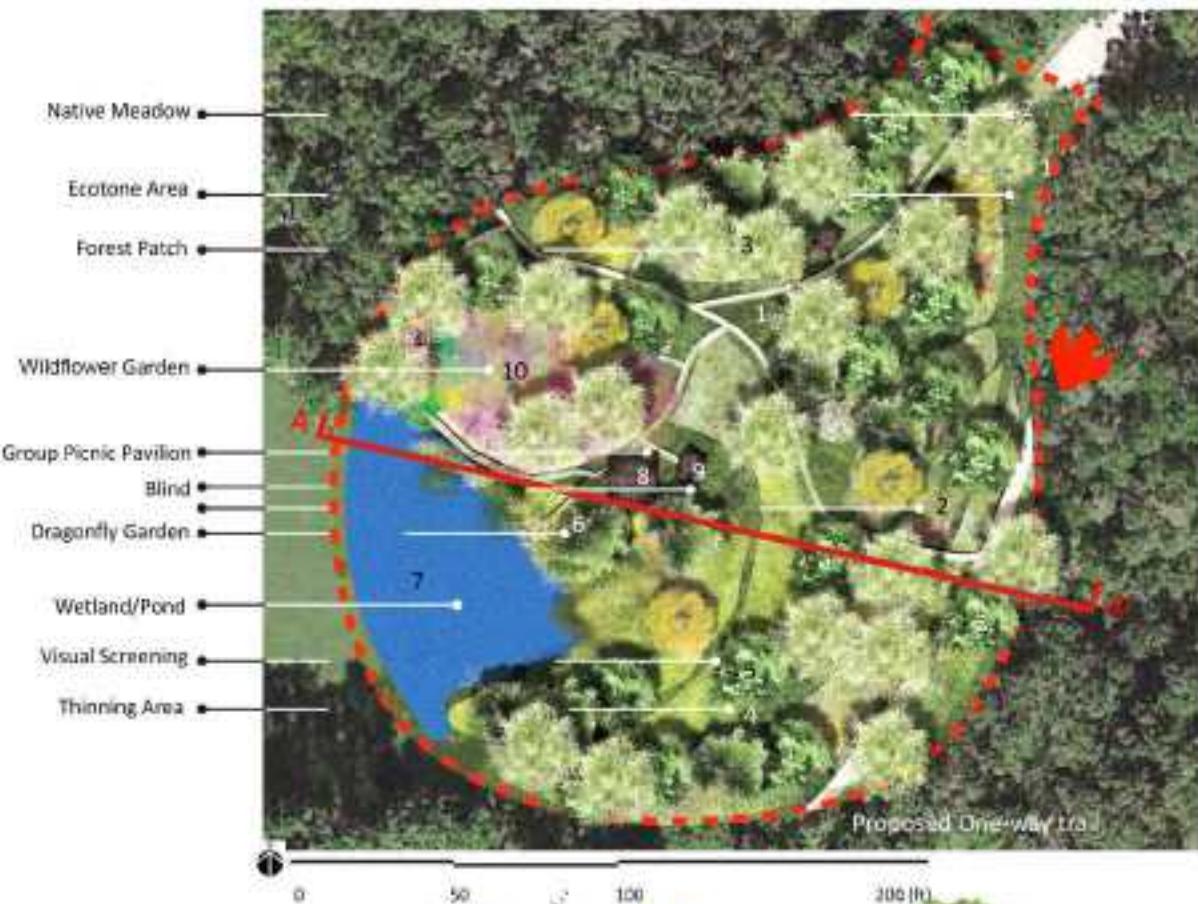


1 Acre Site on 10 Acre site



## VII. Site #7-1

### Master Plan, Zoom In, 1 Acre



1 Acre Site on 10 Acre site

N.T.S.

Source: Google Earth



# VII. Site #7-1

## Plant List, Zoom In, 1 Acre

### Habitat Island

| Tree                                              | Special Features                       |   |
|---------------------------------------------------|----------------------------------------|---|
| Red Maple ( <i>Acer rubrum</i> )                  | variable fall color                    | 2 |
| Sugar Maple ( <i>Acer saccharum</i> )             | late spring creamy white flowers       | 1 |
| Southern Magnolia ( <i>Magnolia grandiflora</i> ) | Trademark tree                         | 4 |
| Shagbark Hickory ( <i>Carya ovata</i> )           | Beautiful golden yellow fall color     | 5 |
| Black Walnut ( <i>Juglans nigra</i> )             | Handsome fissured blocky bark with age | 4 |
| Live Oak ( <i>Quercus virginiana</i> )            | most urban tolerant                    | 5 |
| Cork Oak ( <i>Quercus suber</i> )                 | handsome bark                          | 4 |

### Riparian/ Wetland

| Tree                                            |   |
|-------------------------------------------------|---|
| River Birch ( <i>Betula nigra</i> )             | 5 |
| Eastern Cottonwood ( <i>Populus deltoides</i> ) | 6 |



River Birch



Eastern Cottonwood

### Native Meadow & Wildflower Garden

| Tree                                            |  |
|-------------------------------------------------|--|
| American Chestnut ( <i>Castanea dentata</i> )   |  |
| Camphor Tree ( <i>Cinnamomum camphora</i> )     |  |
| Chinese Pistachio ( <i>Pistacia chinensis</i> ) |  |
| Black Cherry ( <i>Prunus serotina</i> )         |  |
| Hawthorn ( <i>Crataegus spp.</i> )              |  |
| Blutternut ( <i>Juglans cinerea</i> )           |  |
| American Holly ( <i>Ilex opaca</i> )            |  |
| American Beech ( <i>Fagus grandifolia</i> )     |  |

### Shrub

| Shrub                                                | Fruit Season     |   |
|------------------------------------------------------|------------------|---|
| Desert Olive ( <i>Forestiera neomexicana</i> )       | Fall to Winter   | 5 |
| Yaupon Holly ( <i>Ilex vomitoria</i> )               | Fall to Winter   | 5 |
| Parsley Hawthorn ( <i>Crataegus marshii</i> )        | Spring           | 4 |
| Texas Gold Columbia                                  | Summer           | 5 |
| American Beautyberry ( <i>Callicarpa americana</i> ) | Fall             | 4 |
| Desert Yaupon ( <i>Schaeferia cuneifolia</i> )       | Spring to Summer | 5 |
| Coralberry ( <i>Symphoricarpos orbiculatus</i> )     | Fall to Spring   | 5 |
| Viburnums ( <i>Viburnum spp.</i> )                   | Summer to Fall   | 5 |

### Shrub

|                                                |   |
|------------------------------------------------|---|
| Northern spicebush ( <i>Lindera benzoin</i> )  | 6 |
| False Indigo bush ( <i>Amorpha fruticosa</i> ) | 6 |
| Rattle Bush ( <i>Sesbania drummondii</i> )     | 6 |
| Hemp Sesbania ( <i>Sesbania drummondii</i> )   | 6 |

### Vine

| Vine                                        | Fruit Season     |   |
|---------------------------------------------|------------------|---|
| Mustang Grape ( <i>Vitis mustangensis</i> ) | Spring to Summer | 5 |
| Common Dewberry ( <i>Rubus flagellans</i> ) | Summer           | 5 |



Mustang Grape



Common Dewberry

### Fern

|                                             |   |
|---------------------------------------------|---|
| River fern ( <i>Thelypteris kunthii</i> )   | 6 |
| Water Clover ( <i>Marsilea vestita</i> )    | 6 |
| Carolina Fern ( <i>Azolla caroliniana</i> ) | 6 |



River Fern



Water Clover

### Groundcover

|                                                    |   |
|----------------------------------------------------|---|
| Sage ( <i>Salvia roemeriana</i> )                  | 5 |
| Plateau goldeneye ( <i>Viguiera dentata</i> )      | 4 |
| Gregg Salvia ( <i>Salvia greggii</i> )             | 7 |
| Asian Jasmine ( <i>Trachelospermum asiaticum</i> ) | 8 |
| Zoysia Species ( <i>Zoysia</i> )                   | 1 |



Sage



Asian Jasmine

## VII. Site #7-1

### Reference, Plant List, 1 Acre

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5. <http://aggie-horticulture.tamu.edu/ornamentals>

## VII. Site #7-2



Huiyu Wang  
April.2018

## VII. Site #7-2

### Table of Contents

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| Site Selection,<br>Study Site/ Team Site | 1 | Individual 1 Acre Blow Up Site Plan | 6 |
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| Elevation Zones,<br>Team Site            | 3 | References                          | 8 |
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| Land Use Zoning Plan, Zoom in,<br>1-Acre | 5 |                                     |   |

## VII. Site #7-2

### Site Selection



Site 7

## VII. Site #7-2

### Property Boundary

Final Study – Site Selection – Analysis Final



Team Site



### Habitat Zone Map



#### Legend

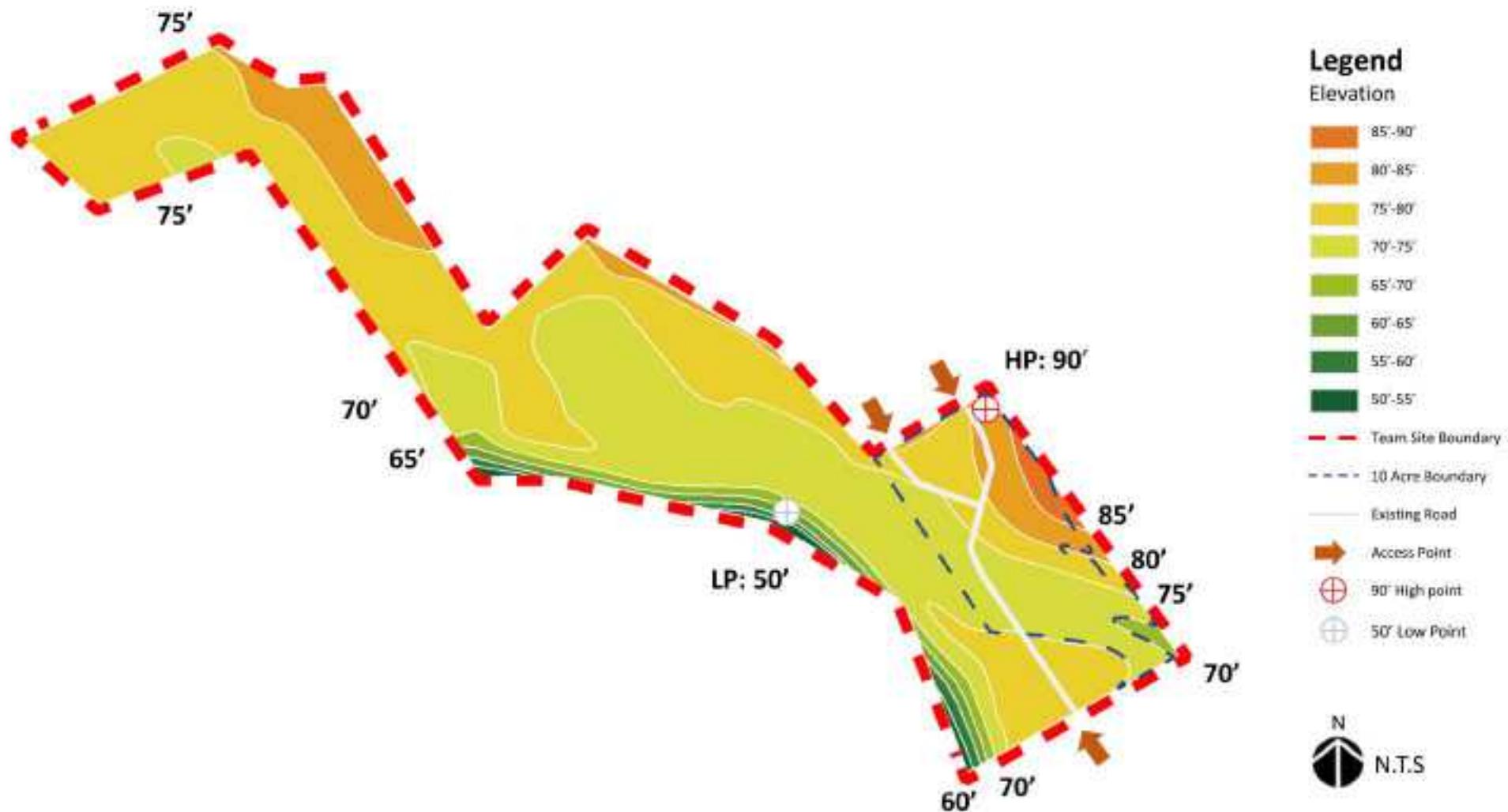
- |                                           |                      |
|-------------------------------------------|----------------------|
| <b>1. Site Boundary / Roads</b>           | <b>3. Land Types</b> |
| Team Site Boundary                        | 1 Human Habitat      |
| 10 Ac Boundary                            | 2 Forest Habitat     |
| Existing Road                             | 3 Wetland Habitat    |
| <b>2. Access Points</b>                   | <b>4. Corridor</b>   |
| Existing Access Point (From Neighborhood) | 5 Corridor           |
|                                           | 3 Tributary          |

#### Description

- Vegetation :** After careful aerial photo interpretation, we depict the land into 10 categories of landscape types. Overall, the site is consisted of the forest patches and wetland riparian.
- Access:** All three access points are from nearby neighborhood.
- Water:** There are three existing streams going through the site. Moreover, a pond exists in the center of the site.
- Area:** Site area 53.21 acres. Generally, the site is higher in northwest side and gently slopes down to south. The water drains from the high point to the water channel on the edge of the south site.

## VII. Site #7-2

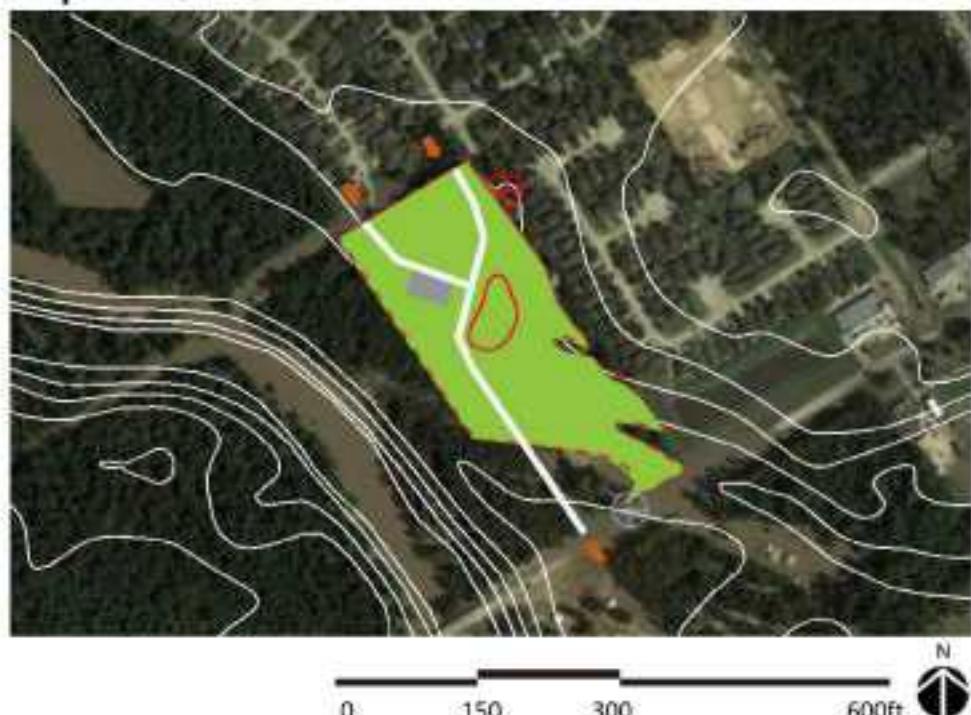
### Elevation Zones



## VII. Site #7-2

### Land Use Strategic Plan, 10 Acres

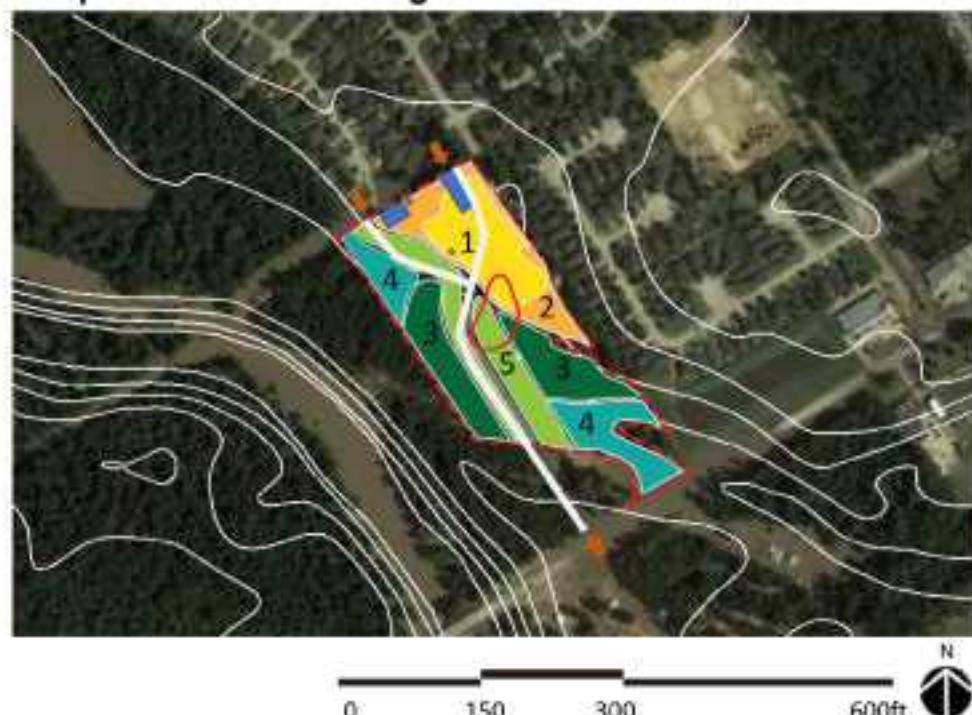
Proposed Site Selection



#### Legend

- 1. Shape Site + Road
  - Site Boundary
  - - - Main Boundary
- 2. High/Low Point
  - ⊕ 79' High Point
  - ⊖ 71' Low point
- 3. Existing Contours
  - Contours (10ft Interval)
- 4. Proposed 1-Acre Site
  - Site Boundary
- 5. Landscape Types
  - Forest Patch (FP)
  - Existing Development (ED)

Proposed Habitat Zoning



#### Legend

- 1. Habitat Zones
  - 1 Primary Human Access
  - 2 Song Birds Habitat / Small Mammal
  - 3 Secondary Human Access / Bird Watch
  - 4 Deer Forage / Browse
  - 5 Small Mammal
- 2.
  - ➡ Access Point
  - Existing Road
  - Parking
  - Restroom

## VII. Site #7-2

### Land Use Zoning, Zoom In, 1 Acre



#### Legend

- Recreation Zone**
- Hiking trails
  - Bench

- Protection Zone**
- 1- Ecotone Area
  - 2- Forest Patch
  - 3- Meadow/ shrub
  - 4- Forest/ Meadow

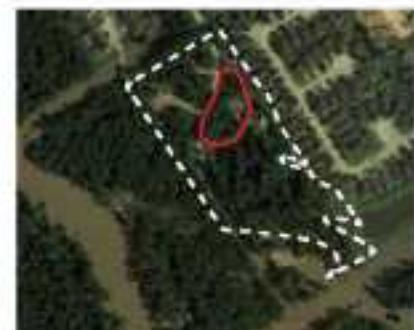
- Human Area**
- 5- Human Access
  - 6- Bird Watch
  - 7- Small Mammal

|      |        |                                                                       |
|------|--------|-----------------------------------------------------------------------|
| EA → | Zone 1 | Song Bird Habitat<br>Buffer/ Trails/ Bench                            |
| FP → | Zone 2 | Song bird and Small Mammal<br>Meadow and Native Forest                |
| MS → | Zone 3 | Small Mammal Habitat (No Human Access)<br>Food Source Plants/ Grasses |
| FM → | Zone 4 | Deer Forage<br>Accessible to Forest                                   |
| HA → | Zone 5 | Human Access / Bird Watch<br>Trails/ Buffer                           |
| BW → | Zone 6 | Bird Watch<br>Trails/ Buffer/ Bench                                   |
| SM → | Zone 7 | Small Mammal (Human Accessible)<br>Trails/ Bench                      |

#### Index Map



Site Location



1 Acre Site Location



## VII. Site #7-2

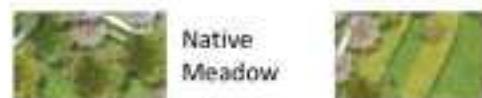
### Master Plan, Zoom In, 1 Acre



Ecotone Area



Bird watch



Native Meadow



Habitat Island



Forest Patch



Group Picnic Area



Grassland Meadow



Bench



Trail



Visual Screen



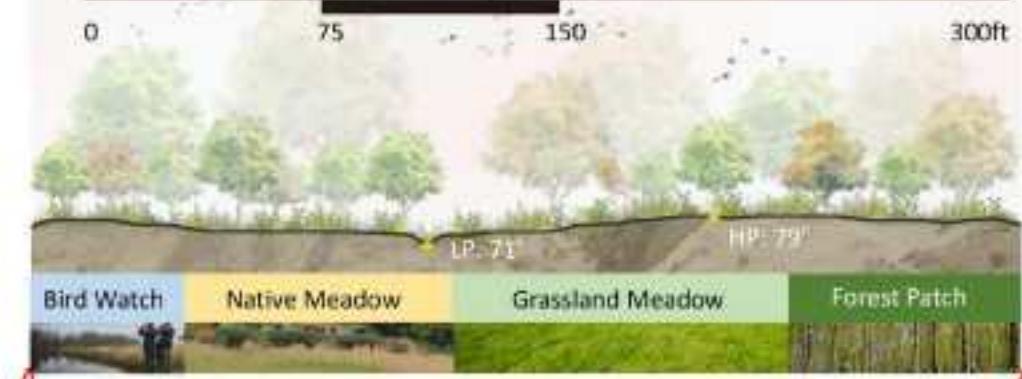
Section A-A'

0 75 150 300ft

Existing Site



N  
N.T.S.



## VII. Site #7-2

### Plant List, Zoom In, 1 Acre

#### Forest Preserve

| Tree                                              | Fruit Season         |
|---------------------------------------------------|----------------------|
| Red Maple ( <i>Acer rubrum</i> )                  | Fall to Winter       |
| Sugar Maple ( <i>Acer saccharum</i> )             | Early summer to Fall |
| Southern Magnolia ( <i>Magnolia grandiflora</i> ) | Fall to Winter       |
| Shagbark Hickory ( <i>Carya ovata</i> )           | Summer to Spring     |
| Black Walnut ( <i>Juglans nigra</i> )             | Summer to Fall       |
| Live Oak ( <i>Quercus virginiana</i> )            | Late Summer          |
| Cork Oak ( <i>Quercus suber</i> )                 | Fall to Spring       |
| Chokecherry ( <i>Prunus virginiana</i> )          | Late summer          |
| Black Cherry ( <i>Prunus serotina</i> )           | Summer to Fall       |

#### Shrub

| Shrub                                             | Fruit Season     |
|---------------------------------------------------|------------------|
| Texas Persimmon ( <i>Ilex decidua</i> )           | Fall to Winter   |
| Yaupon Holly ( <i>Ilex vomitoria</i> )            | Fall to Winter   |
| Button Bush ( <i>Cephaelanthus occidentalis</i> ) | Spring           |
| Desert Yaupon ( <i>Schaefferia cuneifolia</i> )   | Spring to Summer |
| Coralberry ( <i>Symporicarpos orbiculatus</i> )   | Fall to Spring   |
| Blackfoot Daisy ( <i>Melampodium leucanthum</i> ) | Late Spring      |
| Res Sage ( <i>Salvia greggii</i> )                | Early Fall       |
| Boatibrush ( <i>Callistemon citrinus</i> )        | Fall to Winter   |
| Viburnums ( <i>Viburnum spp.</i> )                | Summer to Fall   |

#### Vine

| Vine                                         | Fruit Season     |
|----------------------------------------------|------------------|
| Mustang Grape ( <i>Vitis mustangensis</i> )  | Spring to Summer |
| Common Dewberry ( <i>Rubus flagellaris</i> ) | Summer           |



Yaupon Holly (*Ilex vomitoria*)

#### Buffer Zone

| Tree                                            |
|-------------------------------------------------|
| River Birch ( <i>Betula nigra</i> )             |
| Eastern Cottonwood ( <i>Populus deltoides</i> ) |

| Shrub                                          |
|------------------------------------------------|
| Northern spicebush ( <i>Lindera benzoin</i> )  |
| False indigo bush ( <i>Amorpha fruticosa</i> ) |
| Rattle Bush ( <i>Sesbania drummondii</i> )     |
| Hemp Sesbania ( <i>Sesbania drummondii</i> )   |

#### Fern

| Fern                                           |
|------------------------------------------------|
| Northern spicebush ( <i>Lindera benzoin</i> )  |
| False indigo bush ( <i>Amorpha fruticosa</i> ) |
| Rattle Bush ( <i>Sesbania drummondii</i> )     |
| Hemp Sesbania ( <i>Sesbania drummondii</i> )   |
| Northern spicebush ( <i>Lindera benzoin</i> )  |
| False indigo bush ( <i>Amorpha fruticosa</i> ) |



Sugar Maple (*Acer saccharum*)

#### Habitat Island

| Tree                                            |
|-------------------------------------------------|
| American Chestnut ( <i>Castanea dentata</i> )   |
| Camphor Tree ( <i>Cinnamomum camphora</i> )     |
| Chinese Pistachio ( <i>Pistacia chinensis</i> ) |
| Black Cherry ( <i>Prunus serotina</i> )         |
| Hawthorn ( <i>Crataegus spp.</i> )              |
| Blütnut ( <i>Juglans cinerea</i> )              |
| American Holly ( <i>Ilex opaca</i> )            |
| American Beech ( <i>Fagus grandifolia</i> )     |

#### Shrub

| Shrub                                             |
|---------------------------------------------------|
| Possomhaw ( <i>Ilex decidua</i> )                 |
| Texas Persimmon ( <i>Ilex decidua</i> )           |
| Yaupon Holly ( <i>Ilex vomitoria</i> )            |
| Button Bush ( <i>Cephaelanthus occidentalis</i> ) |
| Desert Yaupon ( <i>Schaefferia cuneifolia</i> )   |
| Coralberry ( <i>Symporicarpos orbiculatus</i> )   |
| Blackfoot Daisy ( <i>Melampodium leucanthum</i> ) |
| Res Sage ( <i>Salvia greggii</i> )                |

#### Groundcover

| Groundcover                                        |
|----------------------------------------------------|
| Sage ( <i>Salvia roemeriana</i> )                  |
| Gregg Sage ( <i>Salvia greggii</i> )               |
| Zoysia Species ( <i>Zoysia</i> )                   |
| Asian Jasmine ( <i>Trachelospermum asiaticum</i> ) |

## VII. Site #7-2

### Reference, Plant List, 1 Acre

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*Main Entrance on-site*

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#### **Page 23-24:**

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# **Sustainable Wildlife Habitat Comprehensive Master Plan**

## **Spring, Texas**

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First Edition

Printed by ISSUU



Texas A&M University College of Architecture  
Landscape Architecture and Urban Planning Department  
College Station, TX 77843-3137

ISBN 978-0-9824661-8-0



9 780982 466180  
\$50.00