



# **Genius Reserve Ecological Restoration**

**by Tim Hull and Chris Baker**

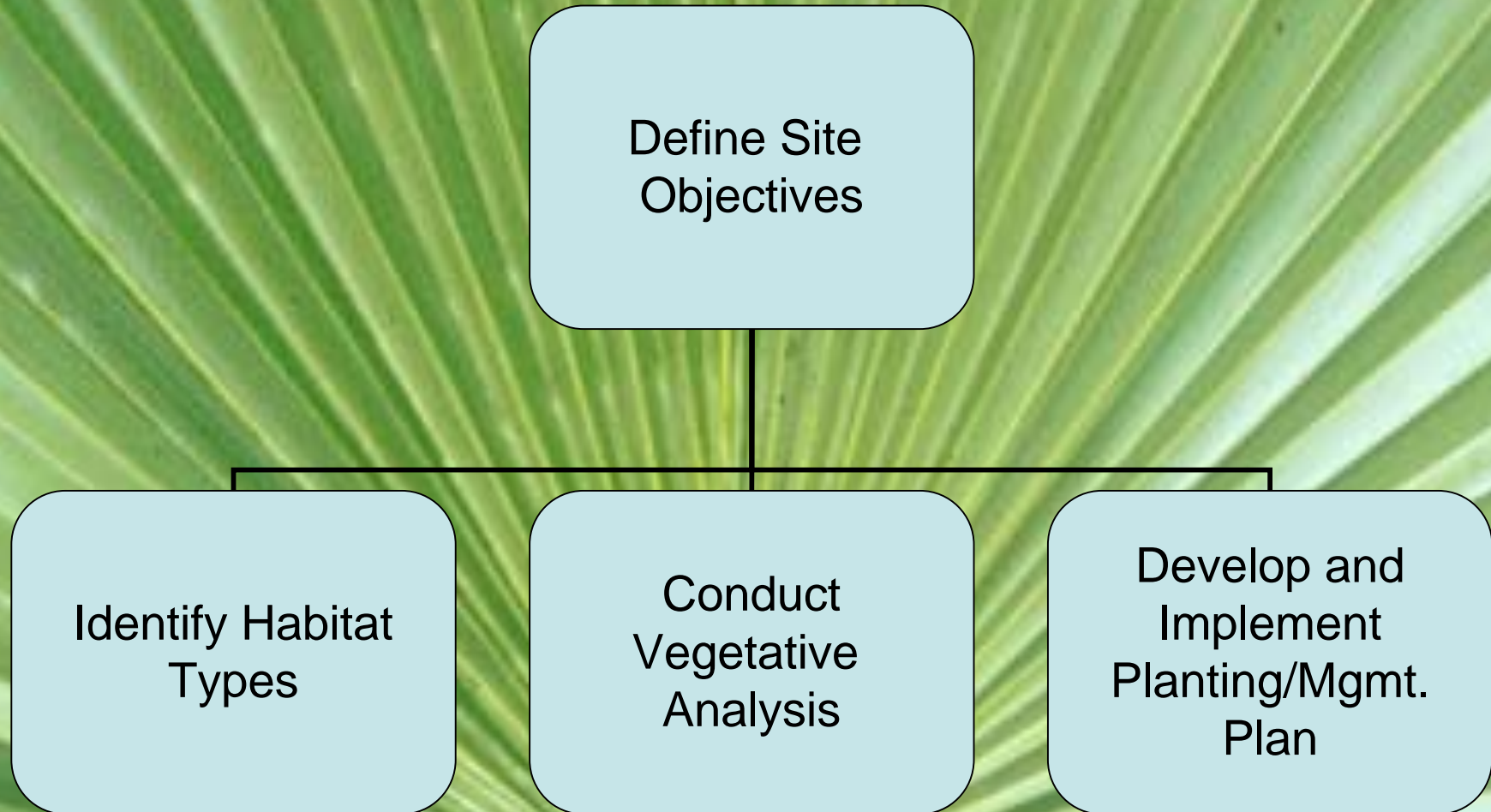
# Ecological Restoration

- *Ecological restoration is the process of intentionally altering a site to establish a defined, indigenous, historic ecosystem. The goal of the process is to emulate the structure, function, diversity, and dynamics of the specified ecosystem.*

From SER International, "Society for Ecological Restoration International" <<http://www.ser.org/default.asp>>



# Restoration Planning



# Mesic Hammock

- A hardwood forest community of open or closed canopy dominated by Live Oak with occasional Cabbage Palm.
- Subcanopy consists of Saw Palmetto, Beautyberry, and other shrubs.
- Groundcover is usually sparse but some grasses can persist in patches.



# Mesic Oak Hammock



# Cross Section of Mesic Hammock

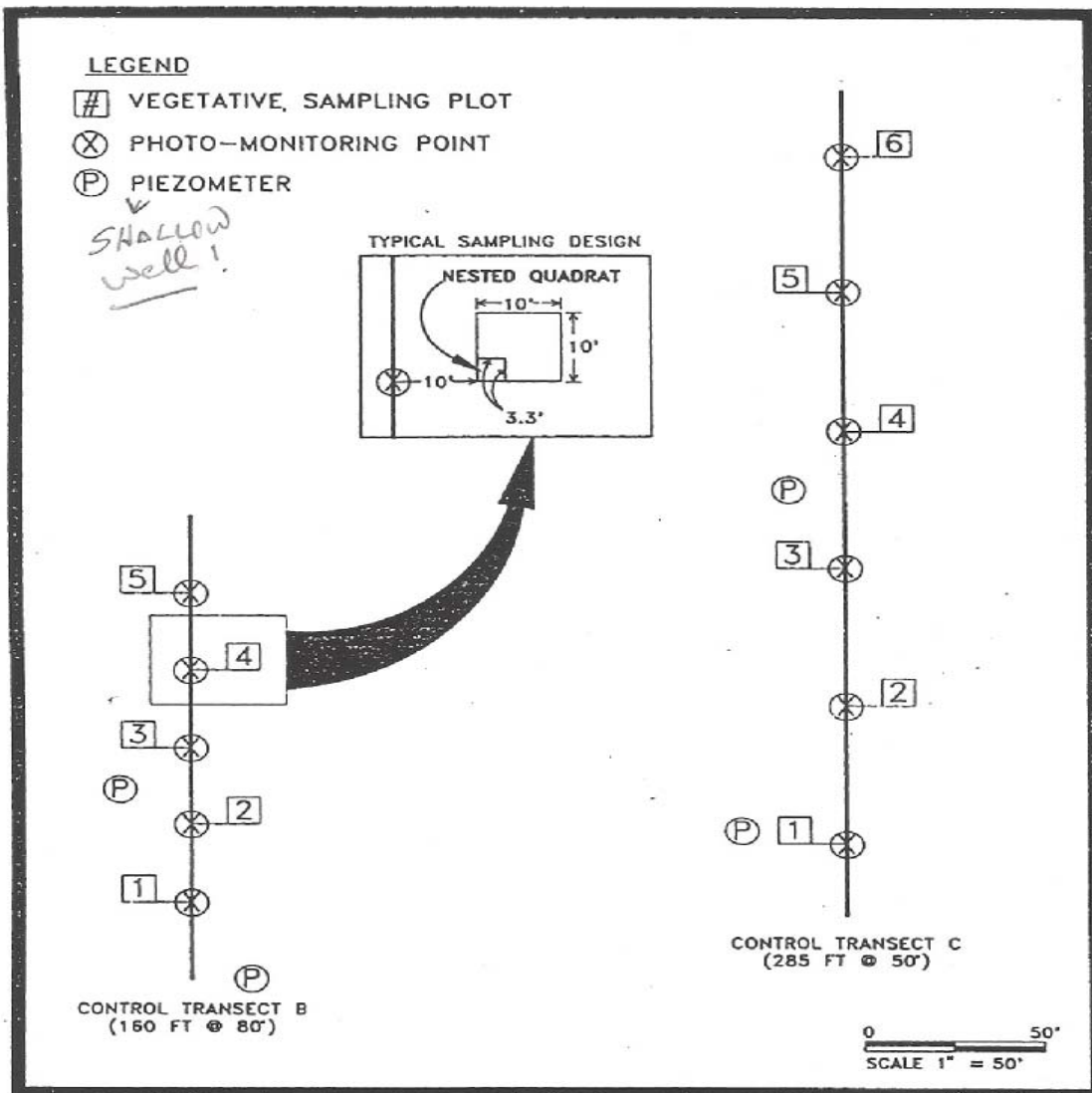




# Vegetative Analysis

- Design/Define Sampling Methodology
  - Transects and Plots
- Conduct Vegetative Inventory
  - References
  - Experts





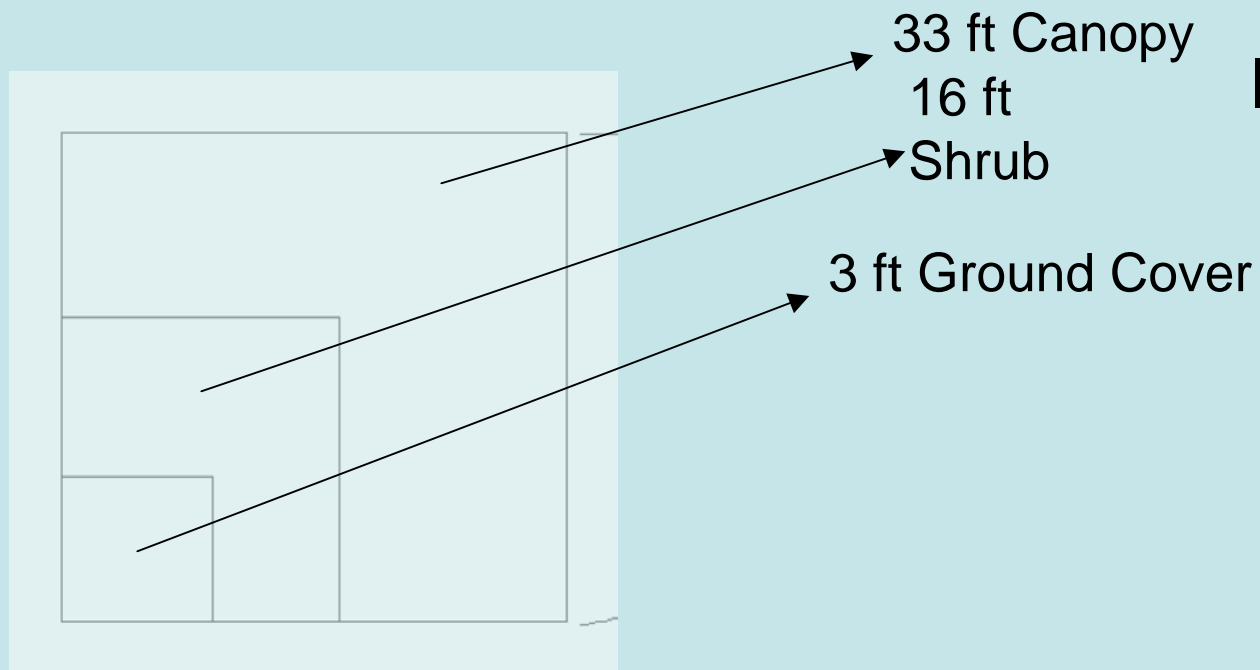
BREEDLOVE, DENNIS AND ASSOCIATES, INC.  
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FIGURE 3. PLAN VIEW OF CONTROL TRANSECTS B (HERBACEOUS WETLAND) AND C (CYPRESS WETLAND), CYPRESS SPRINGS PROJECT SITE, ORANGE COUNTY, FLORIDA.

A typical plan view of transect and nested plot lay out



# The Nested Quadrat Layout



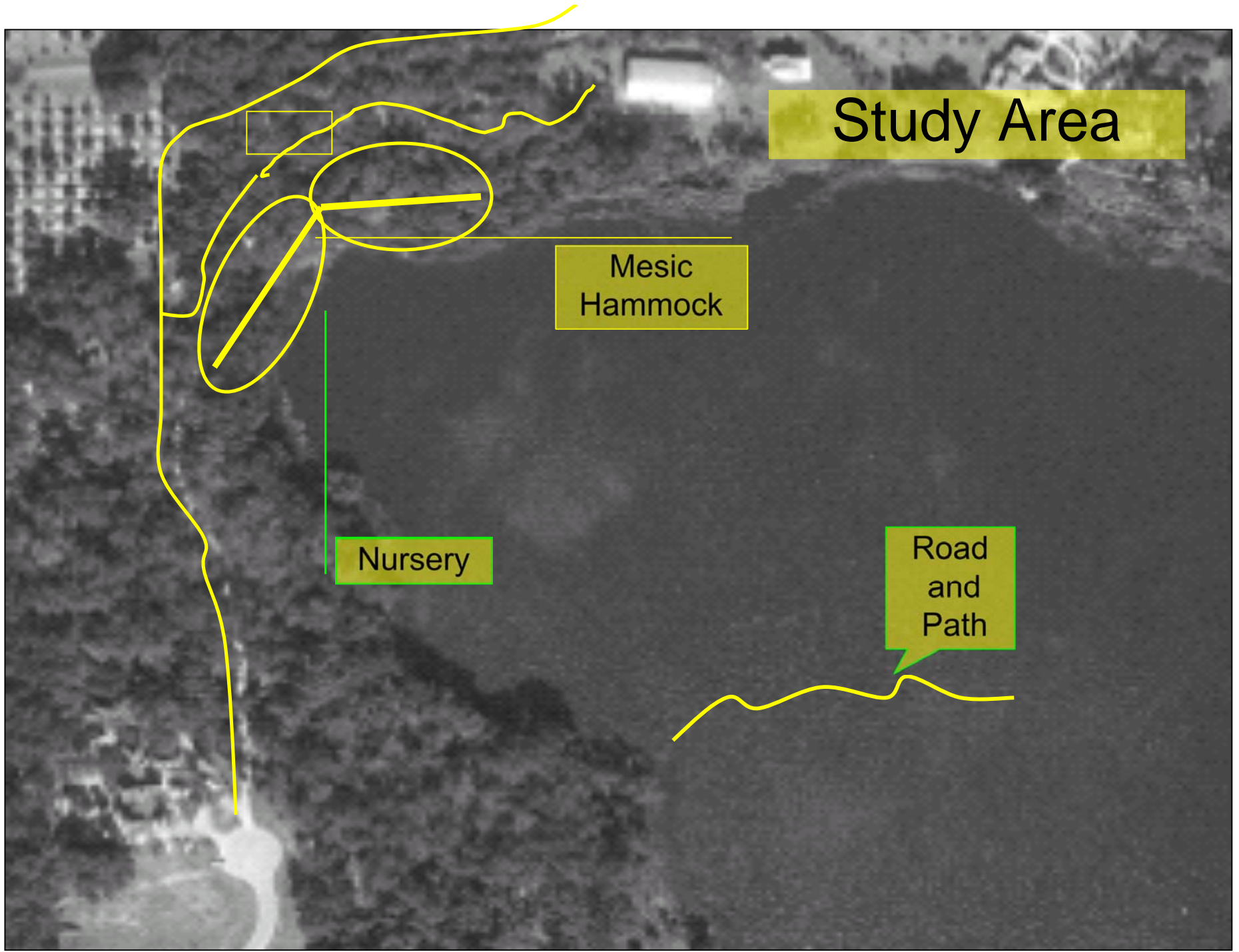
Plots Consist of Three Inset Boxes. The largest  $33^2$  Is for the Canopy Totals, an Inserted  $16^2$  Records the Shrub, and two  $3^2$  Oppositely Arranged Cover the Herbaceous.

# The Genius Reserve



+	ORANGE COUNTY FLORIDA	PHOTO DATE	11-09-00	SECTION	TWP	RANGE
		PHOTO JOB NO.	CPD-823	8	22S	30E





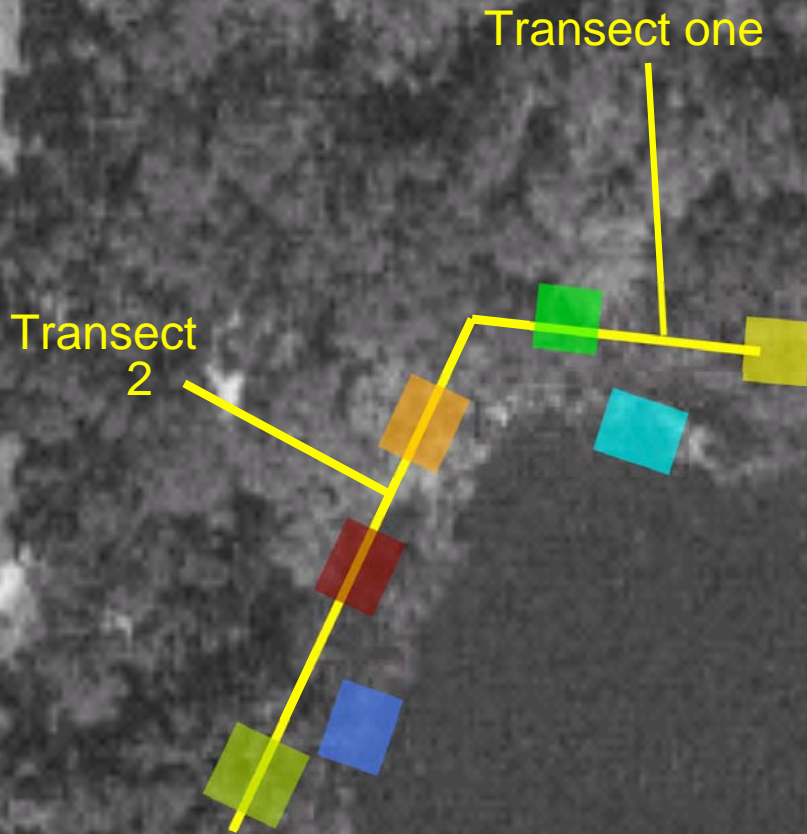
Study Area

Mesic Hammock

Nursery

Road and Path

# The Layout of The Transect Lines and Plots



Plot 1	Plot 5
Plot 2	Plot 6
Plot 3	Plot 7
Plot 4	



# Transect 1: A Healthy Model that needs little, “Enhancement”





# Plot 1

Species	% Cover	Stem Count	Status
<b>Canopy</b>			
Laurel Oak	100%	3	Native
Resurrection Fern	<1%	-	Native
<b>Shrub</b>			
Saw Palmetto	60%	-	Native
Detritus	28%	-	-
Laurel Oak (Sapling)	10%	-	Native
Southern Magnolia (Sapling)	<1%	-	Native
Rusty Lyonia	<1%	-	Native
Camphor Tree	<1%	-	Exotic
Smilax Vine sp.	<1%	-	Native
Grape Vine sp.	<1%	-	Native
<b>Herbaceous Meter Square 1</b>			
Detritus	98%	-	-
Grape Vine sp.	1%	-	Native
Other vine sp.	1%	-	?
<b>Herbaceous Meter Square 2</b>			
Detritus	99%	-	-
Grape Vine sp.	1%	-	Native



# Plot 2

Species	% Cover	Stem Count	Status
<b>Canopy</b>			
Live Oak	100%	1	Native
<b>Shrub</b>			
Oak spp. (Seedlings)	25%	-	Native
Saw Palmetto	25%	-	Native
Oak debris from hurricanes	50%	-	-
<b>Herbaceous Meter Square 1</b>			
Detritus	99%	-	-
Oak sp. (Seedlings)	1%	-	Native
<b>Herbaceous Meter Square 2</b>			
Detritus	98%	-	-
Wax Myrtle	1%	1	Native
Vine spp.	1%	-	?



## Plot 3 (Littoral Zone)

Species	% Cover	Stem Count	Status
<b>Deep Water (&gt;3')</b>			
Open Water	94%	-	-
Cattail	6%	-	Nuisance sp.
<b>Shallow Water (&lt;3')</b>			
Open Water	30%	-	-
Detritus	30%	-	-
Peruvian Primrose	20%	-	Nuisance sp.
Milkweed Vine	15%	-	?
Dayflower	5%	-	Native
<b>Shoreline</b>			
Dayflower	60%	-	Native
Wild Taro	15%	-	Exotic sp.
Detritus	14%	-	-
Red Maple	7%	-	Native
Milkweed Vine	2%	-	?



# Restoration Recommendations

- 1) Owing to the vitality of the habitat, monitoring for marked increases in Nuisance/Exotic species is the only management recommended at this time
  - Primrose Willow
  - Grape Vine
  - Milkweed Vine

# Transect 2: An Impacted Area that Needs Help





# Plot 4

Species	% Cover	Stem Count	Status
<b>Canopy</b>			
Live Oak	100%	2	Native
<b>Shrub</b>			
Detritus	75%	-	-
Wax Myrtle	25%	-	Native
<b>Herbaceous Meter Square 1</b>			
Detritus	32%	-	-
Swamp Fern	25%	-	Native
Wild Taro	25%	-	Exotic sp.
Bryophyta sp.	12%	-	Native
Ludwegia sp.	3%	-	Nuisance
Milkweed Vine	1%	-	?
Grape Vine sp.	<1%	-	Native
Other vine sp.	1%	-	?
<b>Herbaceous Meter Square 2</b>			
Detritus	80%	-	-
Milkweed Vine	20%	-	?



# Plot 5

Species	% Cover	Stem Count	Status
<b>Canopy</b>			
Elderberry	50%	1	Native
Willow sp.	50%	1	Native
<b>Shrub</b>			
Ludwegia sp.	100%	5	Nuisance
<b>Herbaceous Meter Square 1</b>			
Detritus	70%	-	-
Arrowhead Vine	30%	-	Exotic
<b>Herbaceous Meter Square 2</b>			
Detritus	100%	-	-



## Plot 6 (Littoral Zone)

Species	% Cover	Stem Count	Status
<b>Deep Water (&gt;3')</b>			
Cattail	80%	-	Nuisance sp.
Open Water	20%	-	-
<b>Shallow Water (&lt;3')</b>			
Salix sp.	60%	-	Native
Cattail	40%	-	Nuisance sp.
Buttonbush	5%	-	Native
Open Water	5%	-	-
<b>Shoreline</b>			
Swamp Fern	30%	-	Native
Salix sp.	30%	-	Native
Buttonbush	20%	-	Native
Ludwegia sp.	10%	-	Nuisance sp.
Virginia Chain Fern	5%	-	Native
Red Maple	5%	-	Native
Grape Vine sp.	<1%	-	Native



# Plot 7

Species	% Cover	Stem Count	Status
<b>Canopy</b>			
Red Maple	100%	1	Native
<b>Shrub</b>			
Buttonbush	40%	-	Native
Ludwegia sp.	30%	-	Nuisance sp.
Salix sp.	20%	-	Native
Blackberry	10%	-	Nuisance
<b>Herbaceous Meter Square 1</b>			
Virginia Chain Fern	40%	-	Native
Swamp Fern	20%	-	Native
Cinnamon Fern	10%	-	Native
Wild Taro	10%	-	Exotic
Grape Vine sp.	20%	-	Native
Other vine sp.	1%	-	?
<b>Herbaceous Meter Square 2</b>			
Detritus	50%	-	-
Wild Taro	25%	-	Exotic
Dayflower	10%	-	Native
Dollarweed	10%	-	Native
Swamp Fern	1%	-	Native
Virginia Chain Fern	1%	-	Native



# Restoration Recommendations

- There is sufficient disturbance and unbalanced re-growth to provide for:
- (A) Elimination of nuisance and exotic vegetation
- (B) Revegetation of the area using native species



# Nuisance/Exotic Species





# Nuisance/Exotic sp. Removal

- Hand removal (Wild Taro, Grape)
- Chemical spraying with Rodeo (Glyphosate) (Cattails, Blackberry), followed by hand removal
- Permitting (Shoreline Alterations)
  - Winter Park Lakes Division
  - Florida DEP



# Winter Park Permit

- Sec. 114-6. Lakeshore protection. (Applies to impacts 10 feet landward of NHWE and lower)
- (a) Every person desiring to perform or cause to be performed any shoreline alteration involving the removal of shoreline or waterfront vegetation shall be required to obtain a permit in conformance with the procedures and standards set forth in this section, unless exempted. The commission, after recommendation from the lakes and waterways advisory board, shall be empowered to grant a permit only if the applicant demonstrates that this shoreline or waterfront clearing or alteration will not be adverse to the public purposes and benefits of maintaining lake water quality and fish and wildlife habitat and reducing nutrient loading by maintaining shoreline and waterfront vegetation necessary for the health and viability of a lake system. The applicant must further demonstrate that the proposed removal of vegetation will not degrade water quality below the standards set forth in F.A.C. Ch. 17.



# Winter Park Permit: Required Attachments

- Completed permit application
- Sketch and photographs of entire shoreline **before** proposed changes; show what plants are present and what plants will be removed. Indicate the length and width of both areas. Include the contour of the existing shoreline.
- Sketch of entire shoreline showing the proposed changes. Show what vegetation will be planted including its length and width. Show any changes in shoreline contour including the amount and type of material removed and/or filled in cubic yards. Show what measures will be taken to prevent erosion or pollution during construction.
- If a Department of Environmental Protection (DEP) permit is available, a copy must be attached to this application. Included must be the specific conditions required by the DEP for re-vegetating the shoreline.

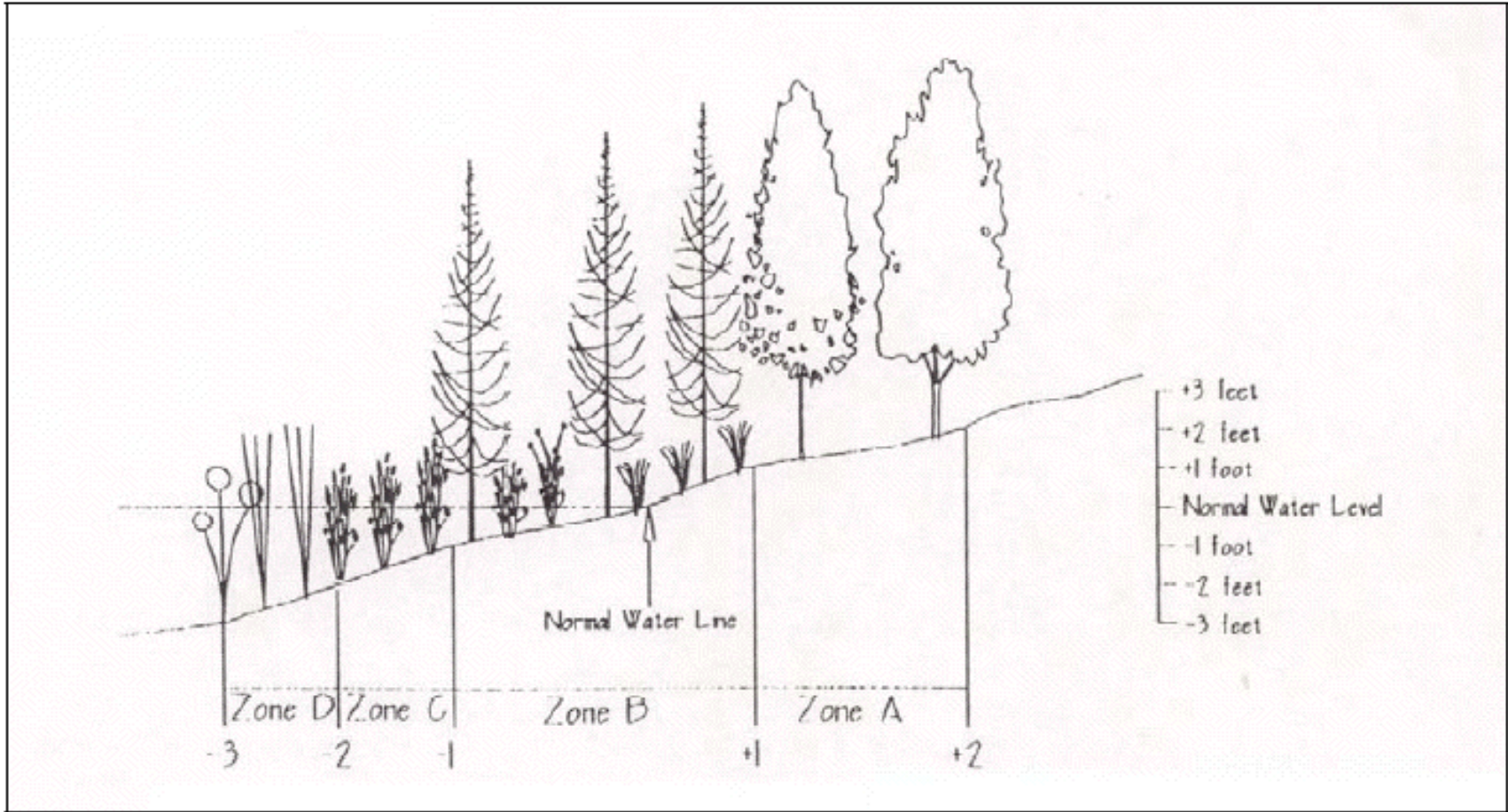


# Replanting Recommendations

- Break up planting areas into four topographical zones
- Zone A = Transitional Wetland
- Zone B = Shoreline
- Zone C = Shallow Littoral Zone
- Zone D = Deep Littoral Zone

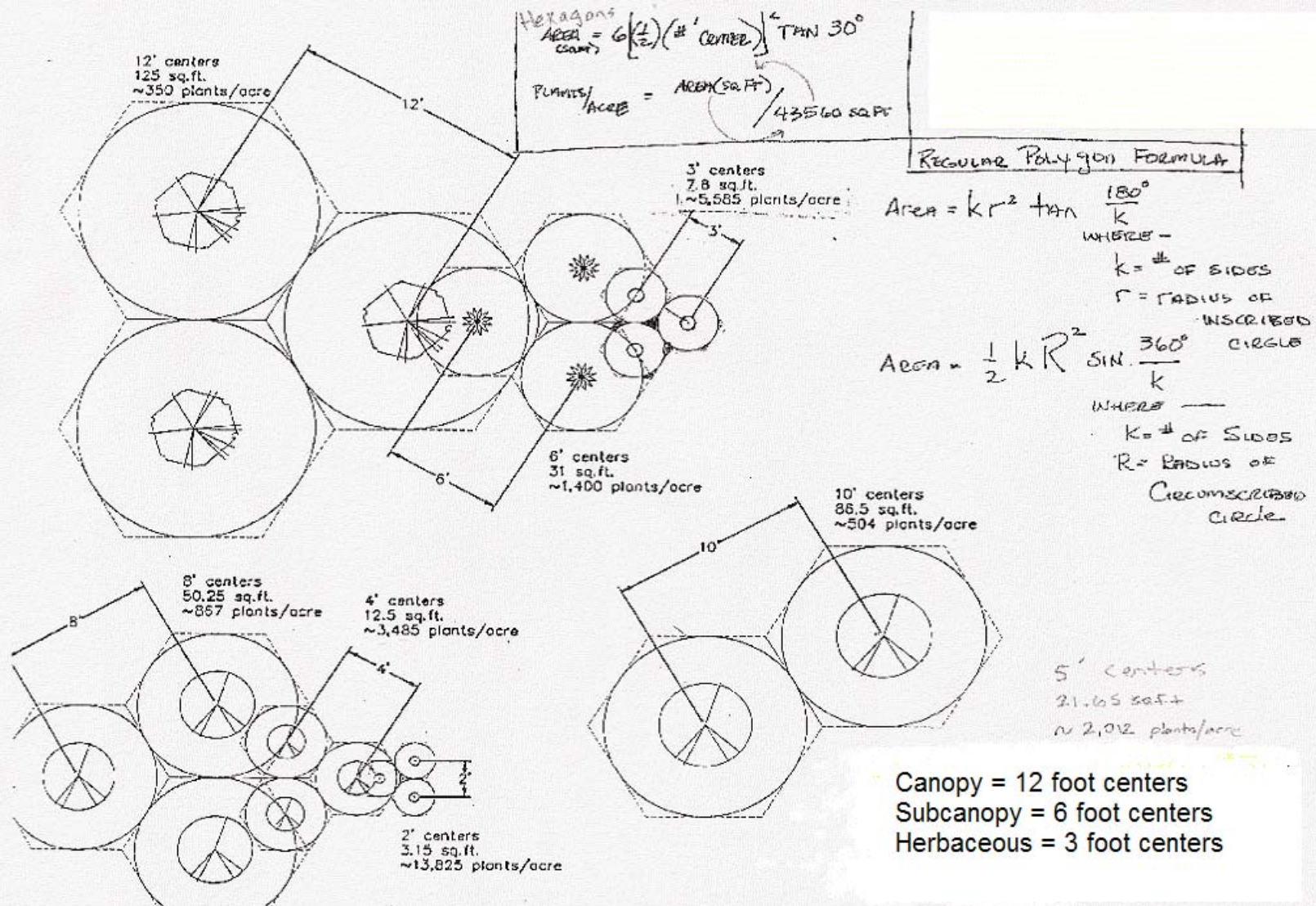


# Planting Zones





# Planting Rings





# Planting Worksheet

175 Linear Feet of Shoreline			Zone D	0.02 Zone C	0.02 Zone B	0.1 Zone A	0.06	Totals	\$/Plant				
	Herb		5,585	112	5,585	112	5,585	559	5,585	335			
	Shrub							0	1,400	84			
	Trees						350	35	350	21			
<b>Zone D (2-3ft Deep)</b>													
Spatterdock	<i>Nuphar luteum</i>	BR		37							37	\$ 1.00	\$ 37.00
White waterlily	<i>Nymphaea odorata</i>	BR		75							75	\$ 1.00	\$ 75.00
<b>Zone C (1-2ft Deep)</b>													
Sawgrass	<i>Cladium jamaicense</i>	Liner				37					37	\$ 1.00	\$ 37.00
Pickeralweed	<i>Pontederia cordata</i>	BR				37					37	\$ 1.00	\$ 37.00
Duckpotato	<i>Sagittaria latifolia</i>	BR				37					37	\$ 1.00	\$ 37.00
<b>Zone B (-1 to +1ft)</b>													
Bandana of the Everglades	<i>Canna flaccida</i>	BR						186			186	\$ 1.00	\$ 186.00
Blue Flag Iris	<i>Iris tridentata</i>	BR						186			186	\$ 1.00	\$ 186.00
Pickeral weed	<i>Pontederia cordata</i>	BR						186			186	\$ 1.00	\$ 186.00
Bald Cypress	<i>Taxodium distichum</i>	3 gal						35			35	\$ 10.00	\$ 350.00
<b>Zone A (&gt;+1ft)</b>													
St. John's wort	<i>Hypericum sp.</i>	1 gal								112	112	\$ 1.00	\$ 112.00
Royal Fern	<i>Osmunda regalis</i>	1 gal								112	112	\$ 1.00	\$ 112.00
Virginia Chain Fern	<i>Woodwardia virginica</i>	1 gal								112	112	\$ 1.00	\$ 112.00
Fetterbush	<i>Lyonia lucida</i>	1 gal								42	42	\$ 4.00	\$ 168.00
Buttonbush	<i>Cephalanthus occidentalis</i>	1 gal								42	42	\$ 4.00	\$ 168.00
Red Maple	<i>Acer rubrum</i>	3 gal								5	5	\$ 10.00	\$ 50.00
Sweetbay	<i>Magnolia virginiana</i>	3 gal								5	5	\$ 10.00	\$ 50.00
Pignut Hickory	<i>Carya gabra</i>	3 gal								6	6	\$ 10.00	\$ 60.00
Cabbage Palm	<i>Sabal palmetto</i>	3 gal								5	5	\$ 10.00	\$ 50.00
								<b>Totals</b>			<b>1258</b>		<b>\$ 2,013.00</b>

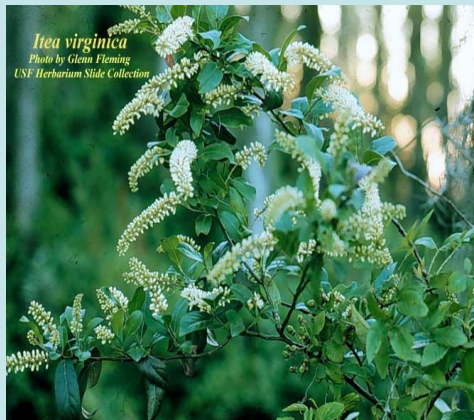


# Native Species (Herbaceous)





# Native Species (Shrubs)





# Native Species (Trees)





# Guidelines for Restoration Success

- Watering, Mulching, Weeding
- Ongoing Semiannual Vegetative Monitoring
- Nuisance and Exotic Species Control
- Supplemental Planting



# Bibliography

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<http://images.google.com/images?hl=en&q=lachnocaulon+anceps&gbv=2>



**The End**

**Questions???**