Southwest Florida
Water Management District

AN OVERVIEW OF COASTAL ECOSYSTEM RESTORATION FOR TAMPA BAY

Brandt F. Henningsen, Ph.D.

SWIM Program

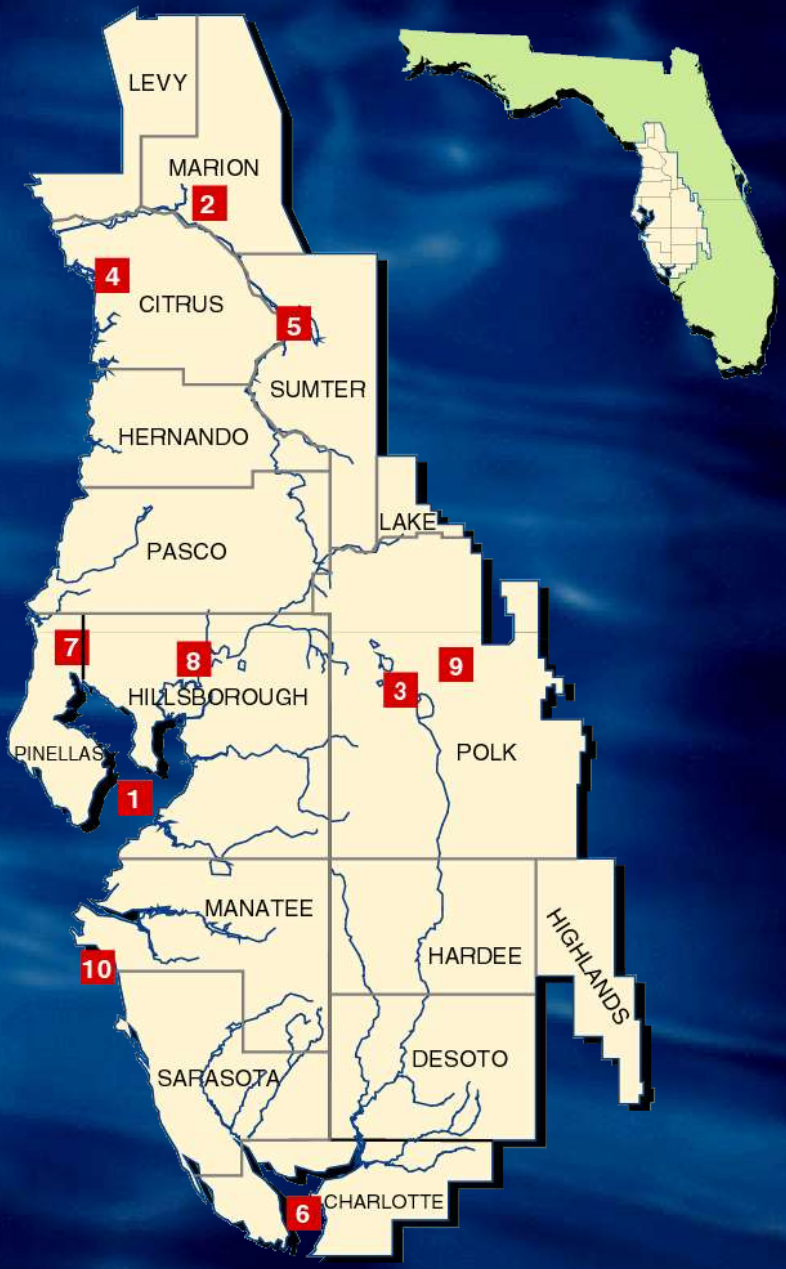
Southwest Florida Water Management District

Surface Water Improvement and Management (SWIM) Program of the Southwest Florida Water Management District

Southwest Florida
Water Management District

Surface Water Improvement and Management Priority Water Bodies

1. **Tampa Bay**
2. **Rainbow River**
3. **Banana Lake**
4. **Crystal River/Kings Bay**
5. **Lake Panasoffkee**
6. **Charlotte Harbor**
7. **Lake Tarpon**
8. **Lake Thonotosassa**
9. **Winter Haven Chain of Lakes**
10. **Sarasota Bay**



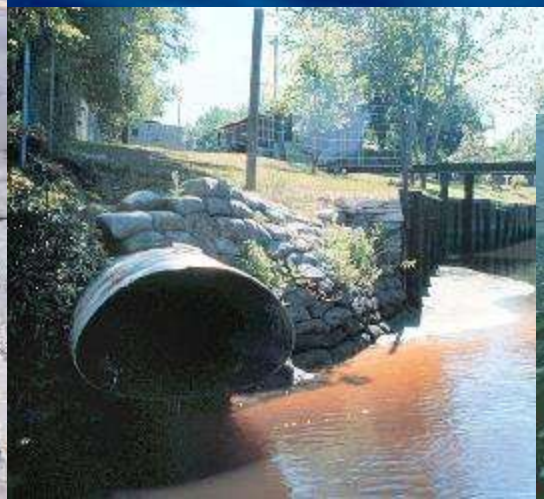








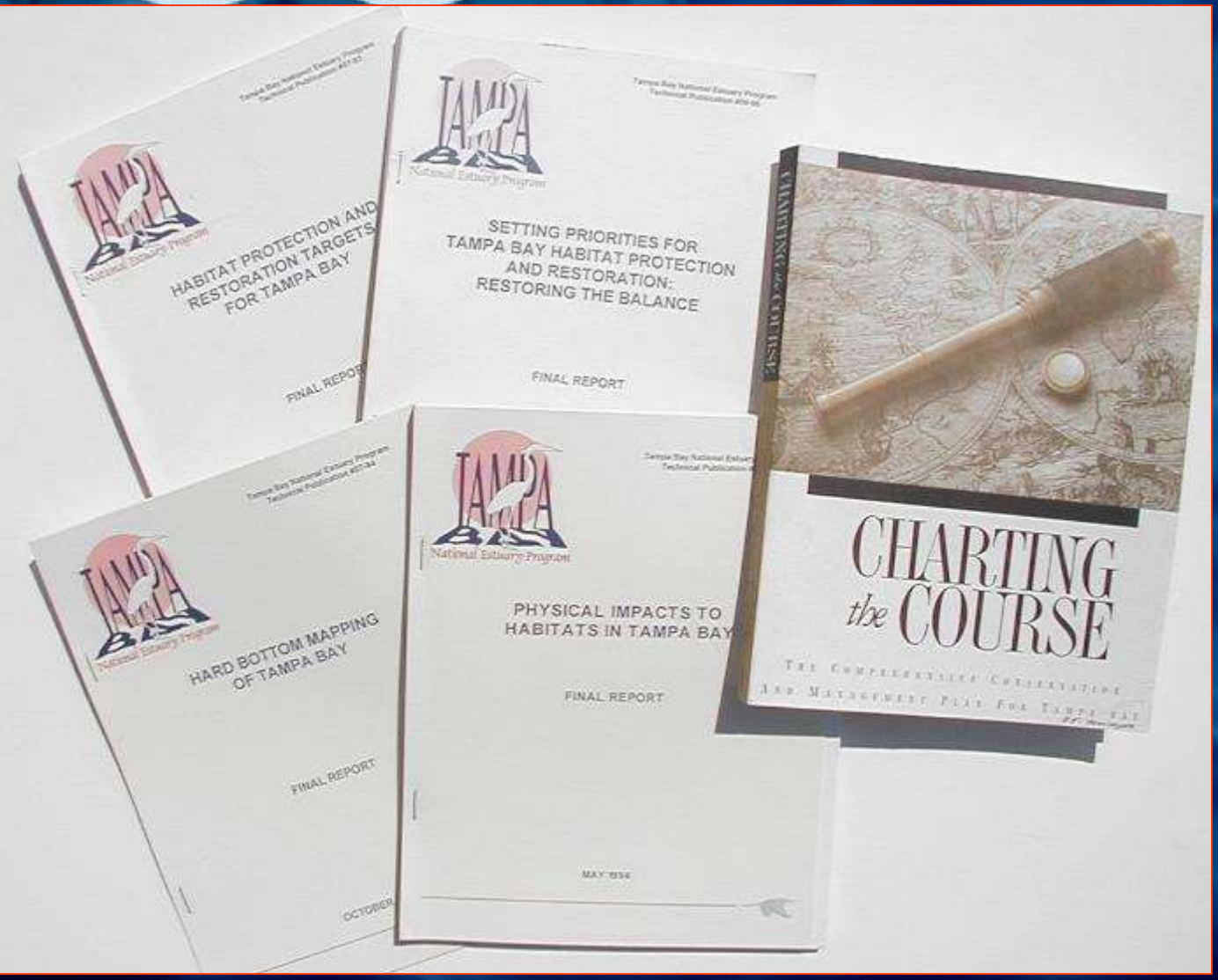



Southwest Florida
Water Management District

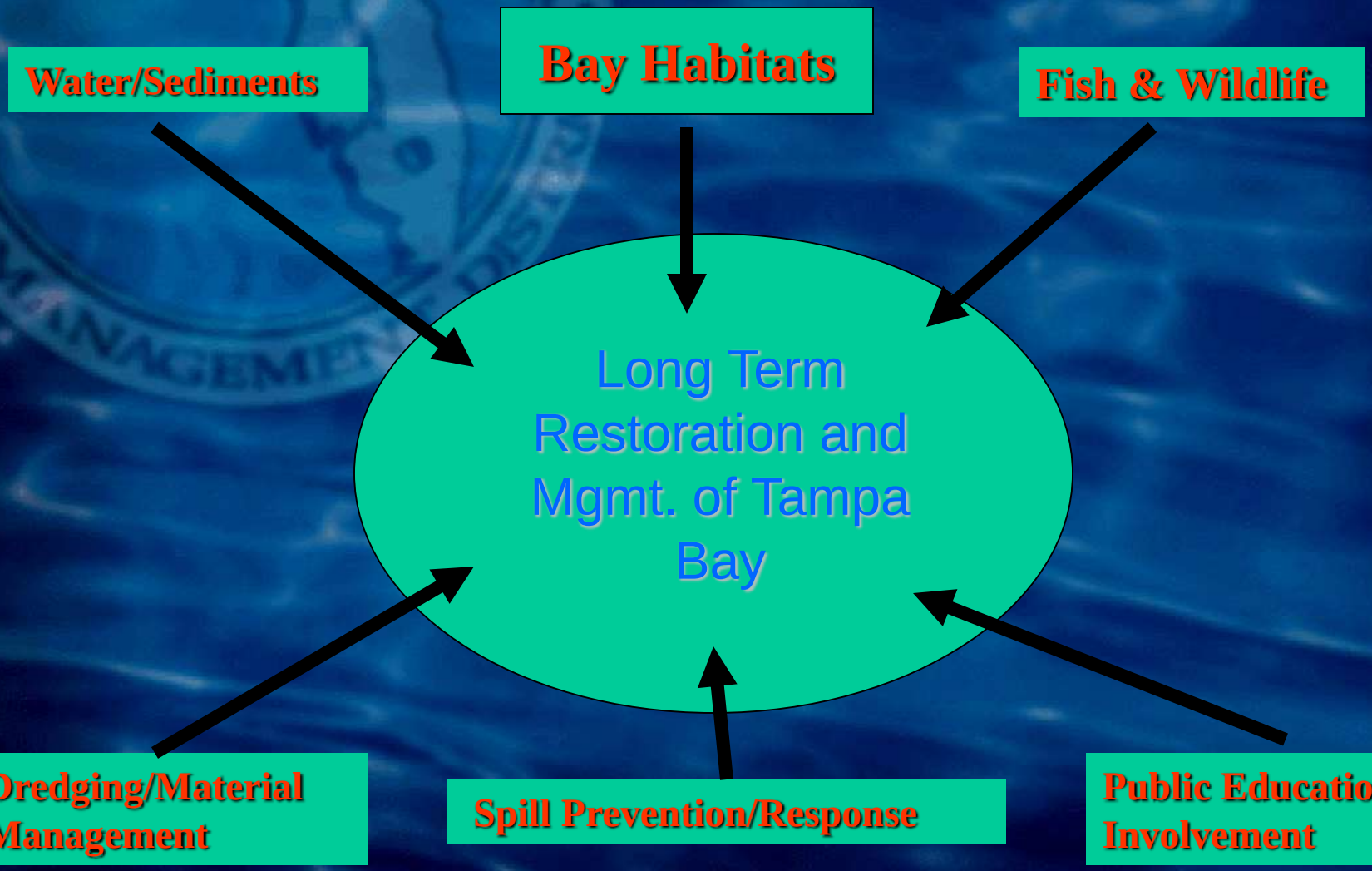
First Comprehensive Tampa Bay Management Plan: SWIM Program of SWFWMD (1988)

Southwest Florida
Water Management District



Tampa Bay National Estuary Program: Evaluations and Management Plan (CCMP)

Restoration and Management Plans for Tampa Bay



Southwest Florida
Water Management District

Plans rely on use of

Normative Forecasting:

defining a future reality and what steps must be taken to achieve that reality

(100 year timeframe 1997-2096)

TWO OPPORTUNITIES EXIST

Conserve remaining habitats

Give Mother Nature a helping hand

Southwest Florida
Water Management District

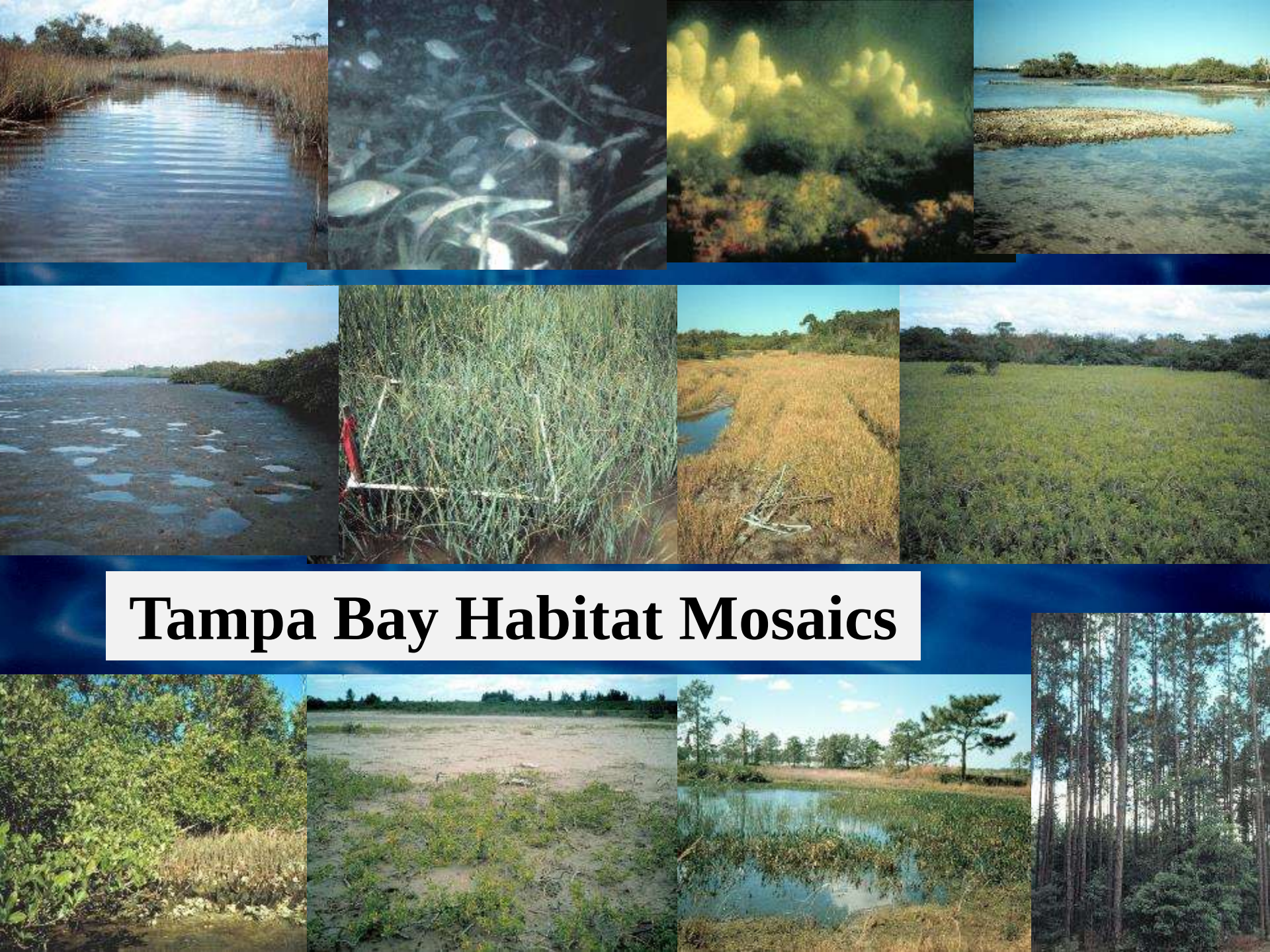
First Rule of Ecology:

Everything is connected to everything else!!!

Southwest Florida
Water Management District

HABITAT MOSAICS

Low and high marsh
Mangrove forest
Salterns
Mudflats
Shallow and deep open water
Hard bottom
Seagrass meadows
Tidal creeks
Transitional habitats
Island hammocks
Freshwater wetlands
Uplands



Tampa Bay Habitat Mosaics

Southwest Florida
Water Management District

Habitat Mosaics = **Ecosystem Restoration**

Southwest Florida
Water Management District

"Ecosystem restoration isn't rocket science,

it's much more complicated than that!"

- Famous Unknown Restoration Ecologist

Southwest Florida
Water Management District

THE SECRET TO SUCCESSFUL RESTORATION:

MIMIC NATURE!!!!!

Southwest Florida
Water Management District

Restoring the Balance

Re-establish percentages of differing coastal/estuarine habitats in direct proportion to (estimated) historical percentages of those habitats

Southwest Florida
Water Management District

GOALS OF ECOSYSTEM RESTORATION PROJECTS FOR TAMPA BAY

- Ecosystem restoration of site (habitat mosaics = “restoring the balance”)
- Water quality improvements for bay
- Post project management
- Evaluation of project effectiveness

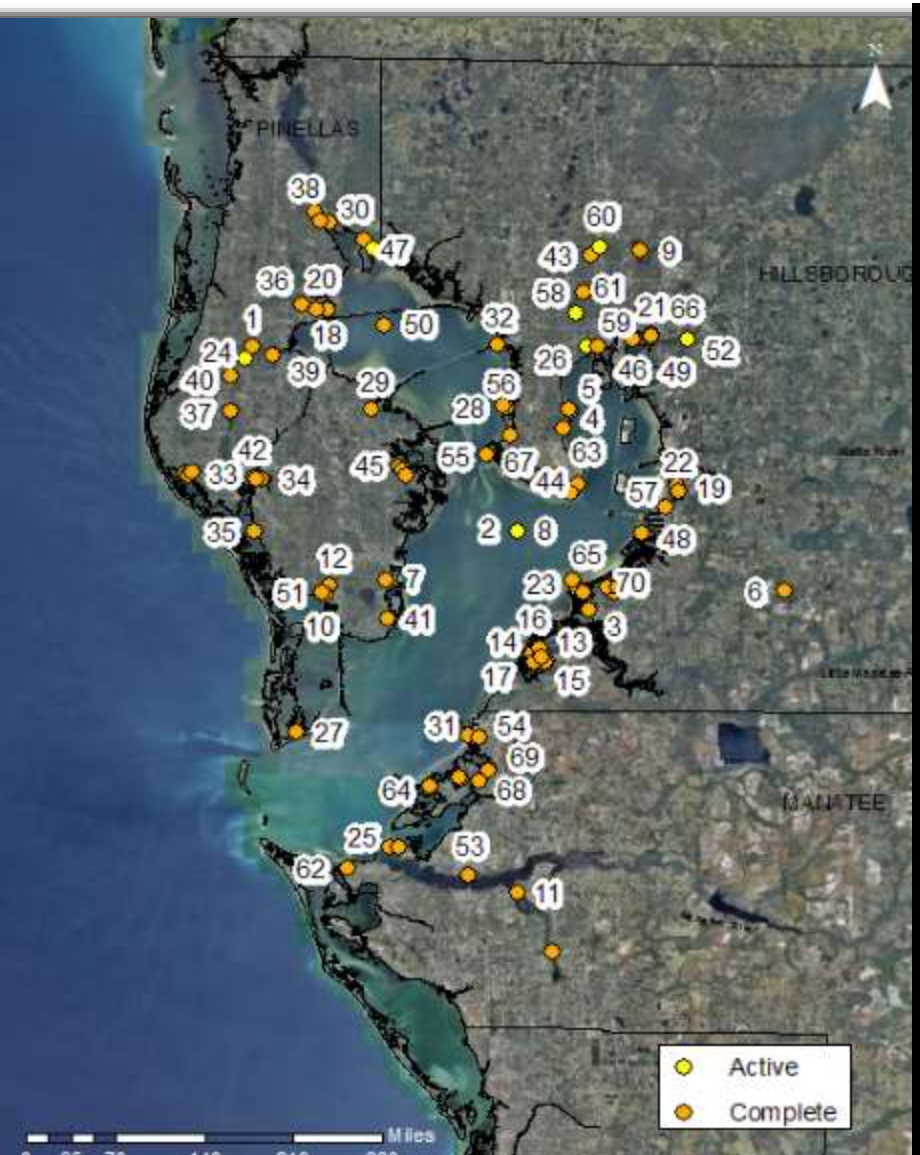
Southwest Florida Water Management District

SUMMARY

RESTORATION STRATEGIES

- Use of "KISS Principle"
- Ecosystem restoration (habitat mosaics = restoring the balance)
- Set project "free", allow ecological processes to occur (e.g., natural recruitment, succession, etc.)
- Goal: little to no maintenance or management
- Dedication for the long term effort

Tampa Bay
Habitat Restoration Projects



1988-2016

Hillsborough, Pinellas, and Manatee Counties

- **97 Completed = 4629 ac = 7.2 sq. mi**
- **>15 Ongoing**
- **Small Urban Projects**
- **Small to Large Ecosystem**
- **Partnerships**

SWIM HABITAT RESTORATION: Tampa Bay Acreage 1989 - 2016

1989..... 3.0 ac
1990.....16.5 ac
1991.....17.5 ac
1992..... 8.5 ac
1993.....22.0 ac
1994.....13.6 ac
1995.....13.5 ac
1996.....19.5 ac
1997.....94.0 ac
1998.....64.0 ac
1999.....163.4 ac
2000.....50.0 ac
2001.....184.0 ac

2002.....209.3 ac
2003.....37.0 ac
2004.....578.0 ac
2005.....109.0 ac
2006.....364.6 ac
2007.....86.2 ac
2008.....134.5 ac
2009.....47.9 ac
2010.....135.0 ac
2011.....422.0 ac
2012.....162.0 ac
2013.....370.7 ac
2014.....315.3 ac
2015.....779.0 ac
2016.....12.5 ac

97 projects in 27 years

Total

4,629 ac

(7.2 sq. miles)

Southwest Florida
Water Management District

Project Design

Restoration Design Process:

- **Have land available for restoration (i.e., often via partners)**
- **Have funds available for restoration**
- **Do design, permitting, construction**

GPS Mapping and Design

Create Habitat Mosaics

Restore Historical Habitats

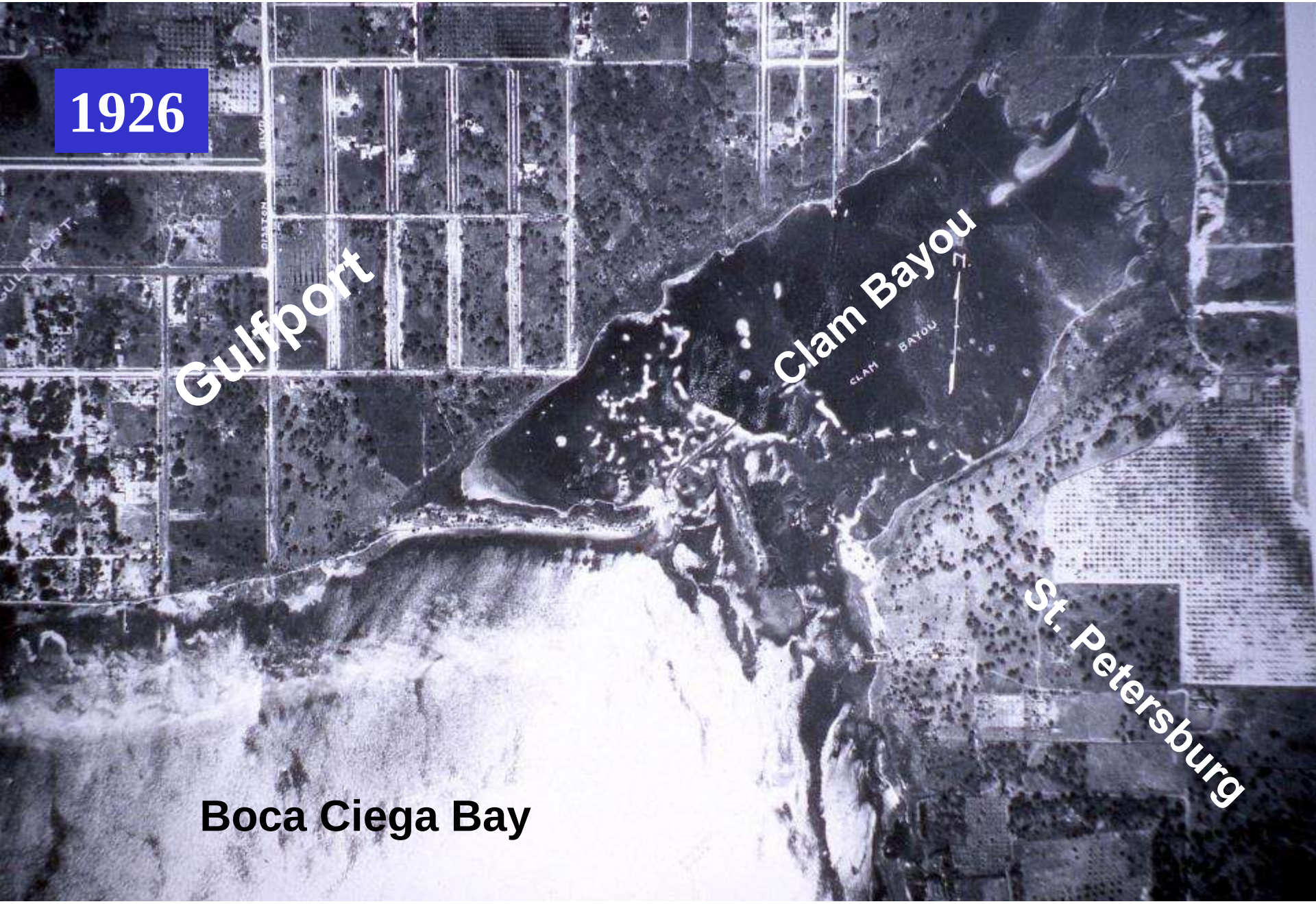
Retention of Extant Native Habitats

Use of Freshwater Flows and Some Stormwater Polishing

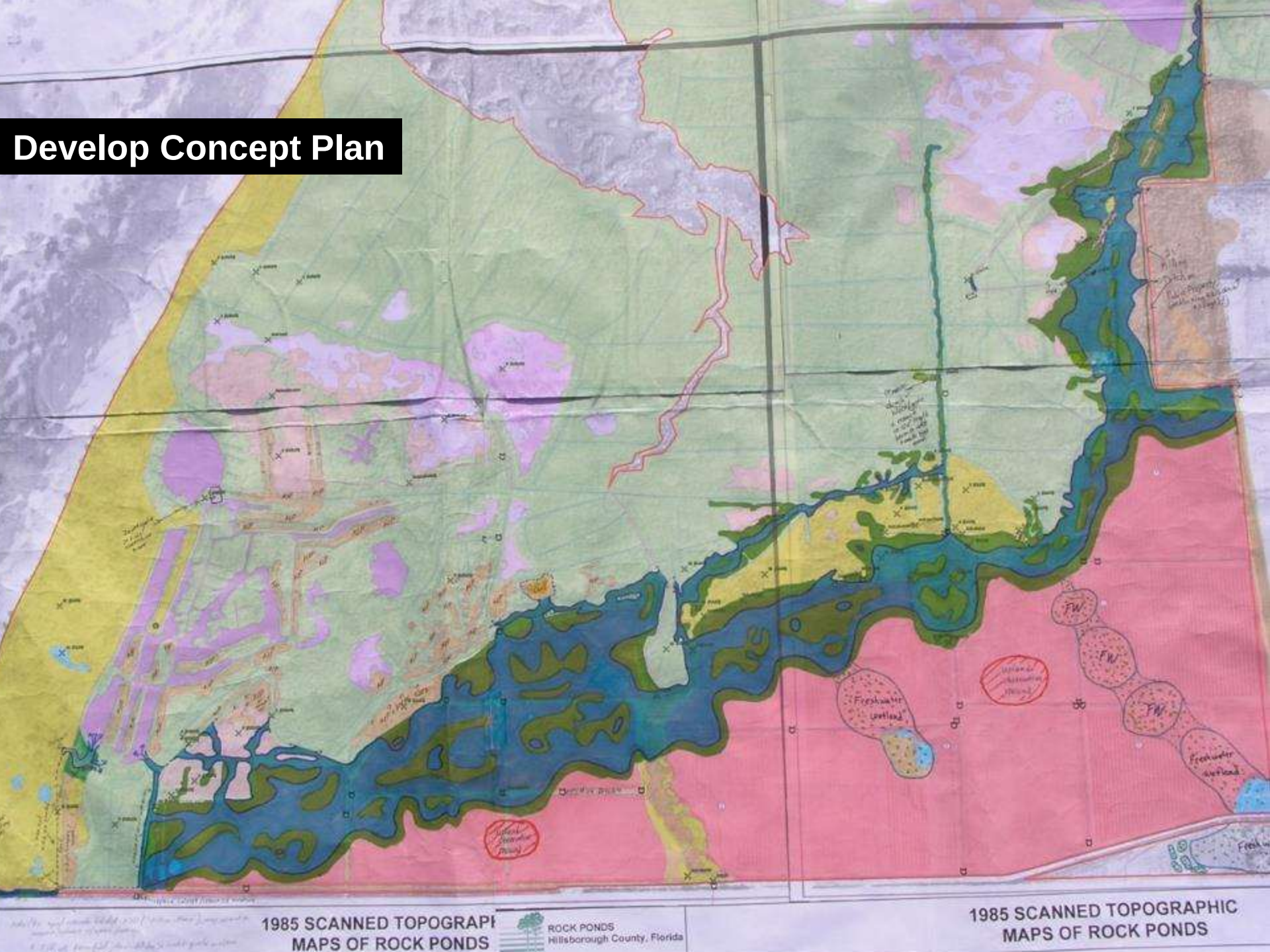
Restore Hydrology

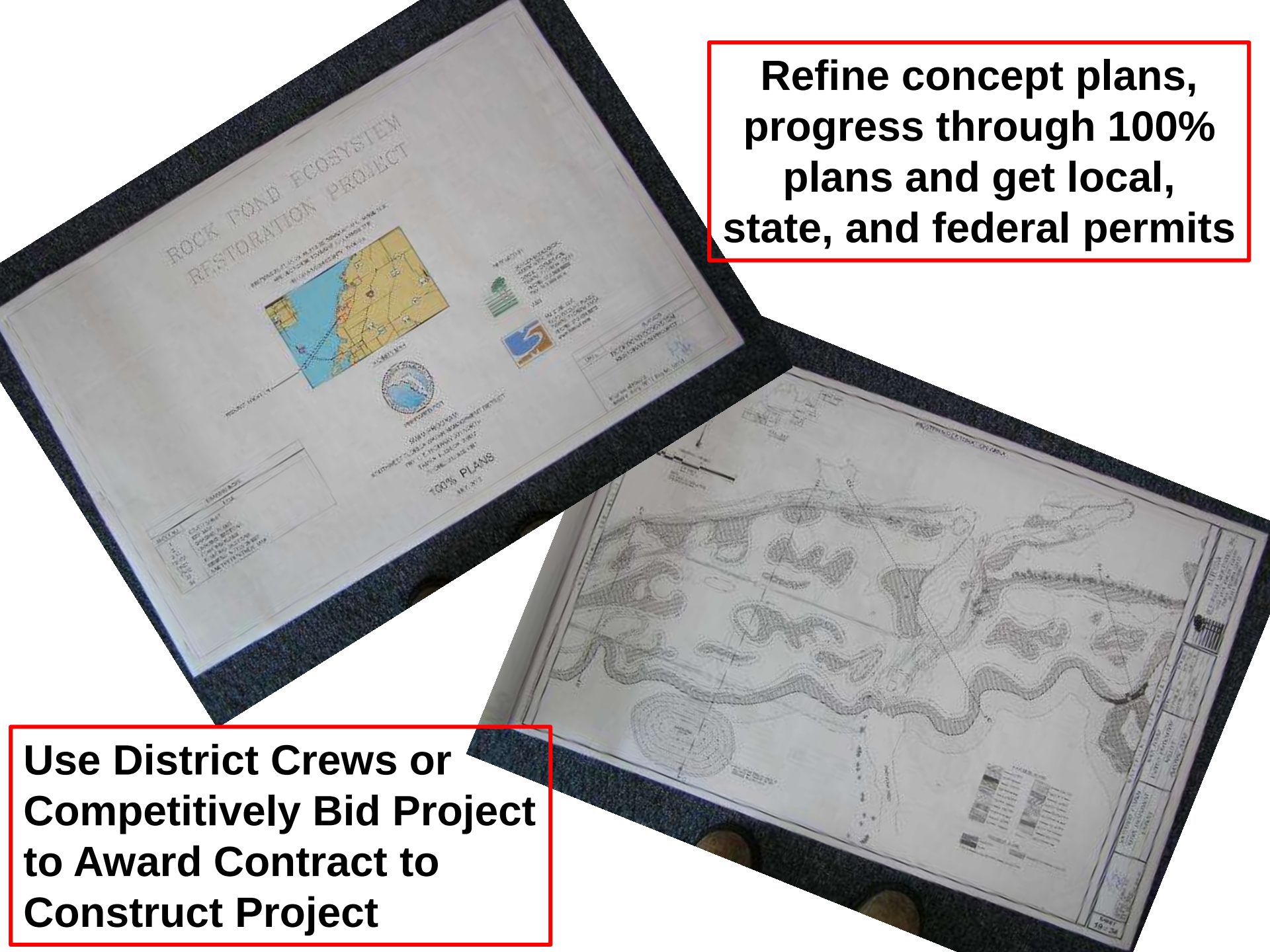
Accommodate Sea Level Rise

Start of Design: Understanding Previous Original Habitats



Develop Concept Plan



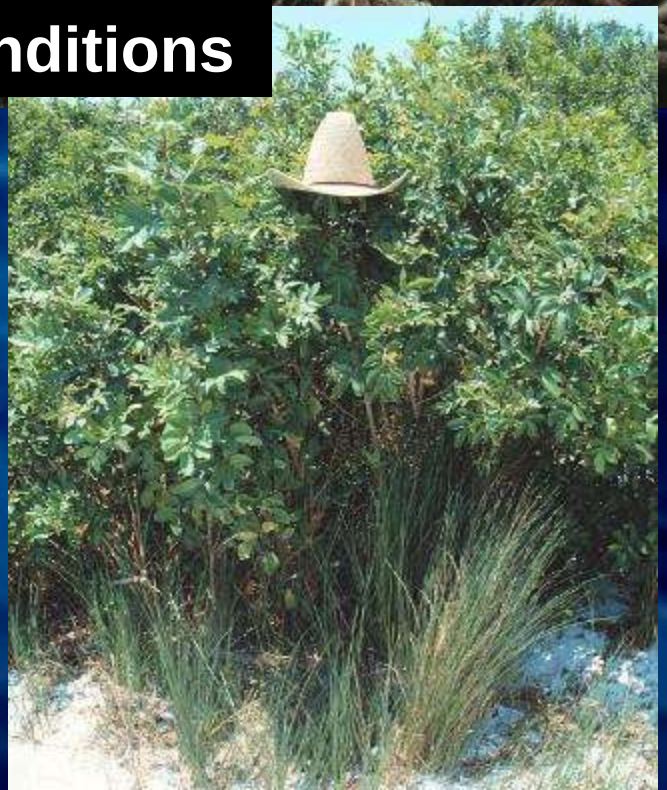


Refine concept plans, progress through 100% plans and get local, state, and federal permits

Use District Crews or Competitively Bid Project to Award Contract to Construct Project


Most of our restoration sites have lost their original native vegetation !!
Most are covered by “non-native” vegetation !!

Pre-Restoration Site Conditions



Widespread and Dense Growth of Non-Native Plants

Cogon Grass
and
Guinea Grass

Often Pervasive
Throughout Sites

Brazilian pepper thickets and Australian pine forests


Australian Pine
Brazilian Pepper
Cogon Grass
Guinea Grass


Australian Pine
Forest

Construct Project: Private or District Crews

Grading with GPS Dozer

GPS-SATELLITE CEI-LAYOUT-CONSTRUCTION

Construction Manager
Double Checks Elevations

Southwest Florida
Water Management District

PROJECT EXAMPLES

First SWIM Restoration (Demo) Project - 1988

PROJECT DESIGNS: SIMPLE TO COMPLEX

Stabilize shorelines with vegetation

Bayshore Blvd
Freshly Planted 1990

Bayshore Blvd
1 year old - 1991

Fred & Idah Schultz
NATURE PRESERVE

A SWIM HABITAT RESTORATION PROJECT

SCHEDA
ECOLOGICAL
ASSOCIATES, INC.

Dedicatio
Novemb

Southwest Florida
Water Management District

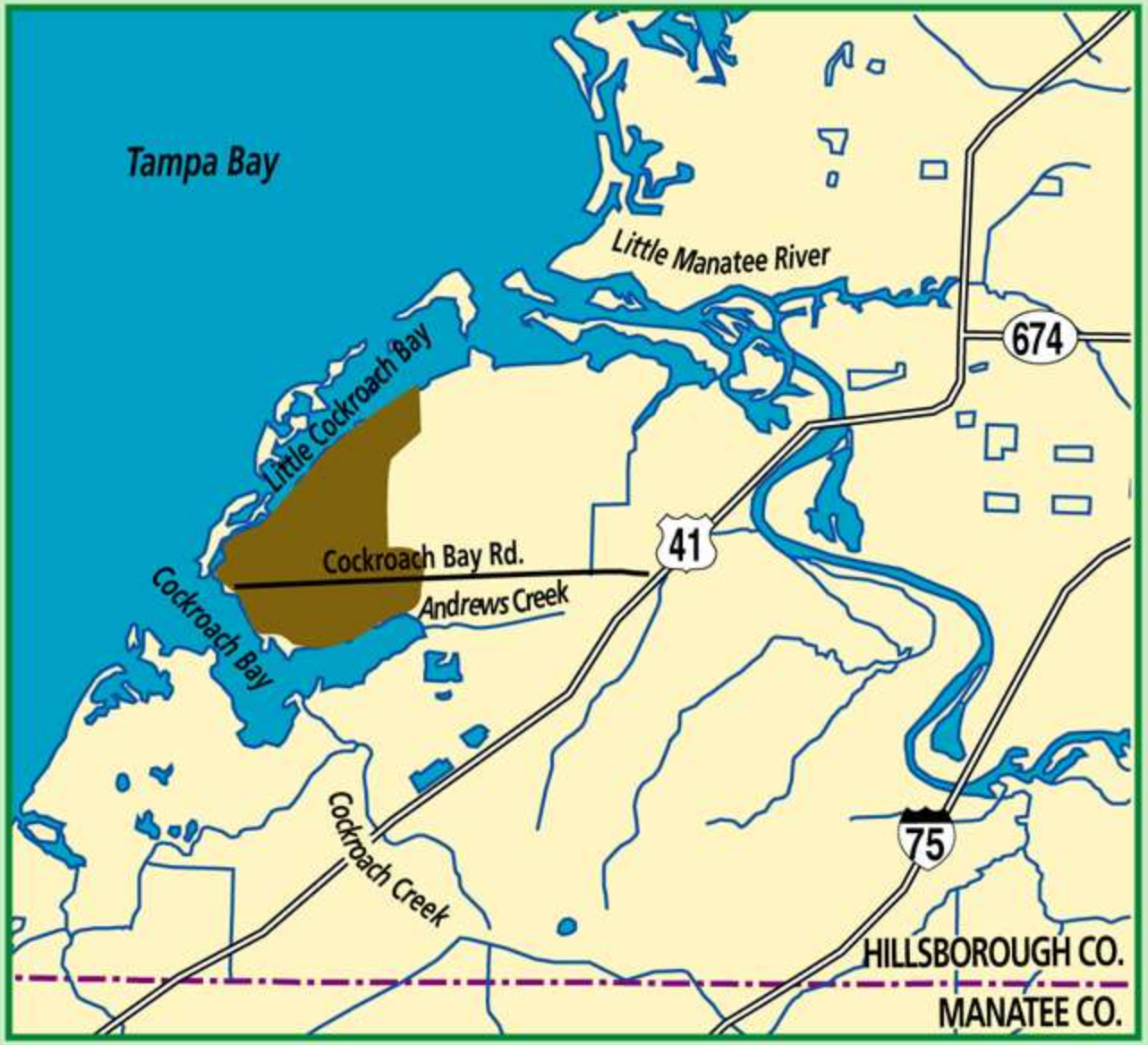
Intertidal Species Typically Planted

Low to High Marsh

- *Spartina alterniflora* – smooth cordgrass
- *Spartina patens* – marsh hay
- *Paspalum vaginatum* – seashore paspalum
- *Spartina bakeri* – sand cordgrass

Start with Salt Marsh, allowing Ecological Succession to Occur Over Time

Cockroach Bay Habitat Restoration



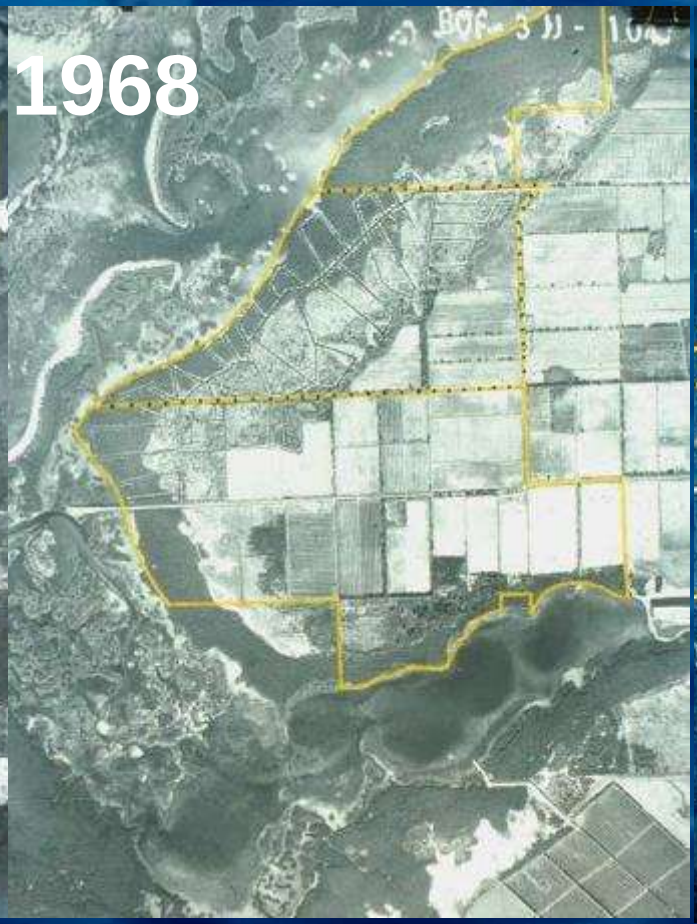
Cockroach Bay Site

0 1 2

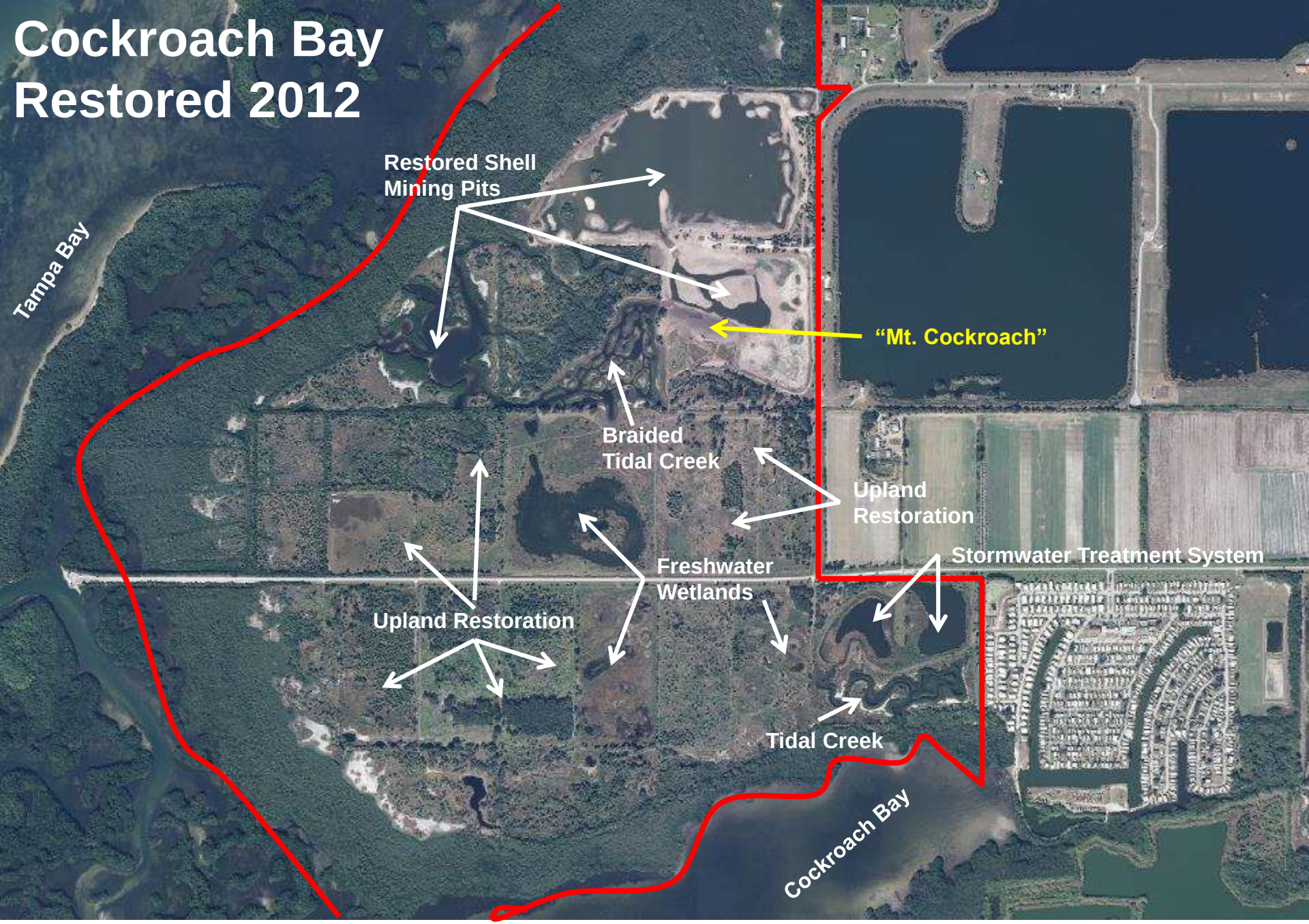
scale in miles

Southwest Florida
Water Management District

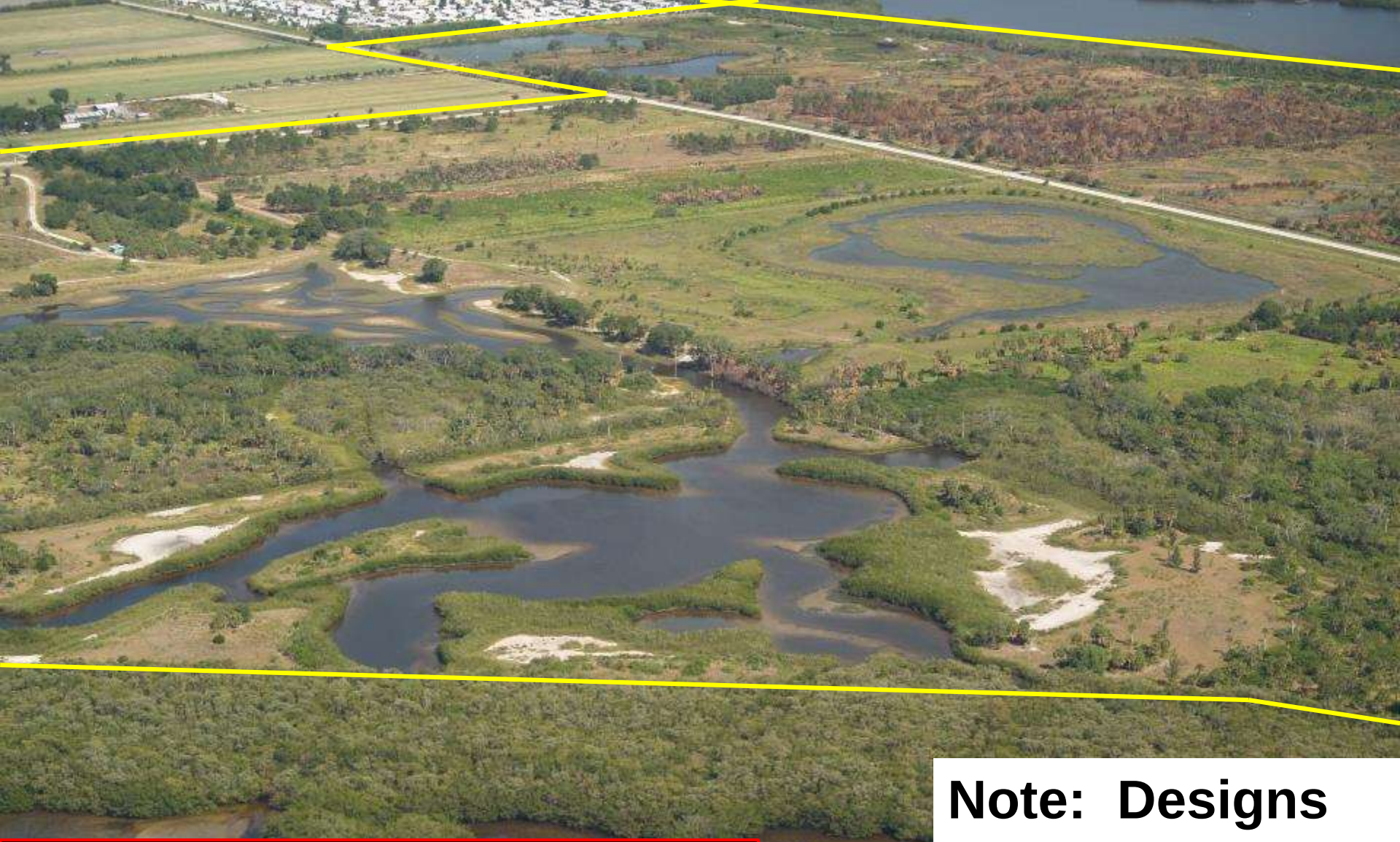
COCKROACH BAY TIME SERIES




Cockroach Bay Habitat Restoration Project
(Unrestored 1993)
Tampa Bay
Shell Mine Pit
Shell Mine Pit
Shell Mine Pit
Proposed Phase of Restoration
Cockroach Bay Road
Proposed Stormwater Treatment and Restoration Site
Property Boundary
Cockroach Bay
A cooperative project with Hillsborough County and the Cockroach Bay Restoration Alliance (COBRA)



Restored Habitats: 282 ac wetlands + 218 ac uplands = 500 ac



Cockroach Bay Ecosystem Restoration Project – May 2008 (500 acres)

Note: Designs to help offset rising sea level



Cockroach Bay – 2 Phases Over 10 Year Period



“Before” Restoration = Fallow Farm Field 2004

Early Construction of Braided Tidal Creek 2005

Mid-Construction of Braided Tidal Creek 2005

Freshly Planted Braided Tidal Creek 2005

Braided Tidal Creek 1 Year Old - 2006

Braided Tidal Creek 2 Years Old - 2007

Eight Year Old Braided Tidal Creek 2013

Eleven Year Old Braided Tidal Creek March 2016

Restored estuarine wetlands – Cockroach Bay

Restoration of freshwater wetlands – Cockroach Bay


Cockroach Bay
Freshwater Wetlands
(2 years old)

Cockroach Bay

Upland Restoration Time Series 0 – 10 yrs


15 years growth – canopy closing hardwood forest


20 years growth


Mixed Hardwood-Pine Forest – 20 years growth

Southwest Florida
Water Management District

7 to 15 year old pine flatwoods

The Kitchen Habitat Restoration

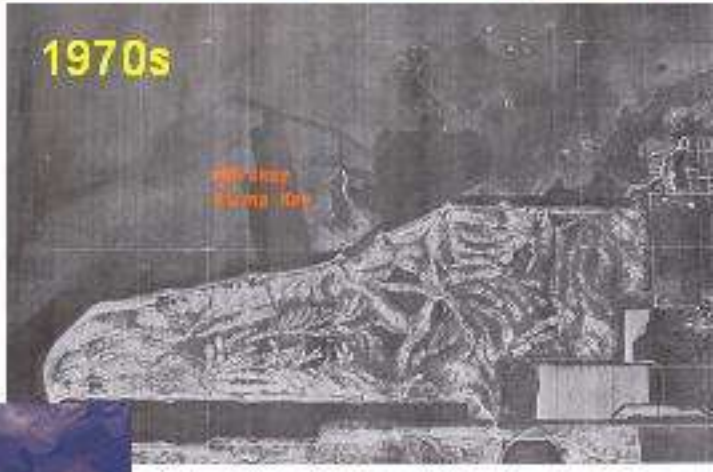
Davis Tract
Dug Creek Site
Pt. Redwing Site

0 1 2

scale in miles

Time Series of the Creation of Port Redwing Peninsula:

1938-1995



Fred & Idah Schultz
NATURE PRESERVE

A SWIM HABITAT RESTORATION PROJECT

SCHEDA
ECOLOGICAL
ASSOCIATES, INC.

Dedicatio
Novemb

Pt. Redwing Peninsula Pre-restoration with Non-native Plants (looking west to east, August 2003)


Pt. Redwing Peninsula Post-restoration
(looking west to east, May 2008)
Schultz
Preserve
Tampa Port
Authority Parcel

Pt. Redwing Peninsula Post-restoration Maturing Project (looking east to west, August 2006)

Schultz Preserve
4 months old
(2004)

Schultz Preserve 1.5 years old (2005)

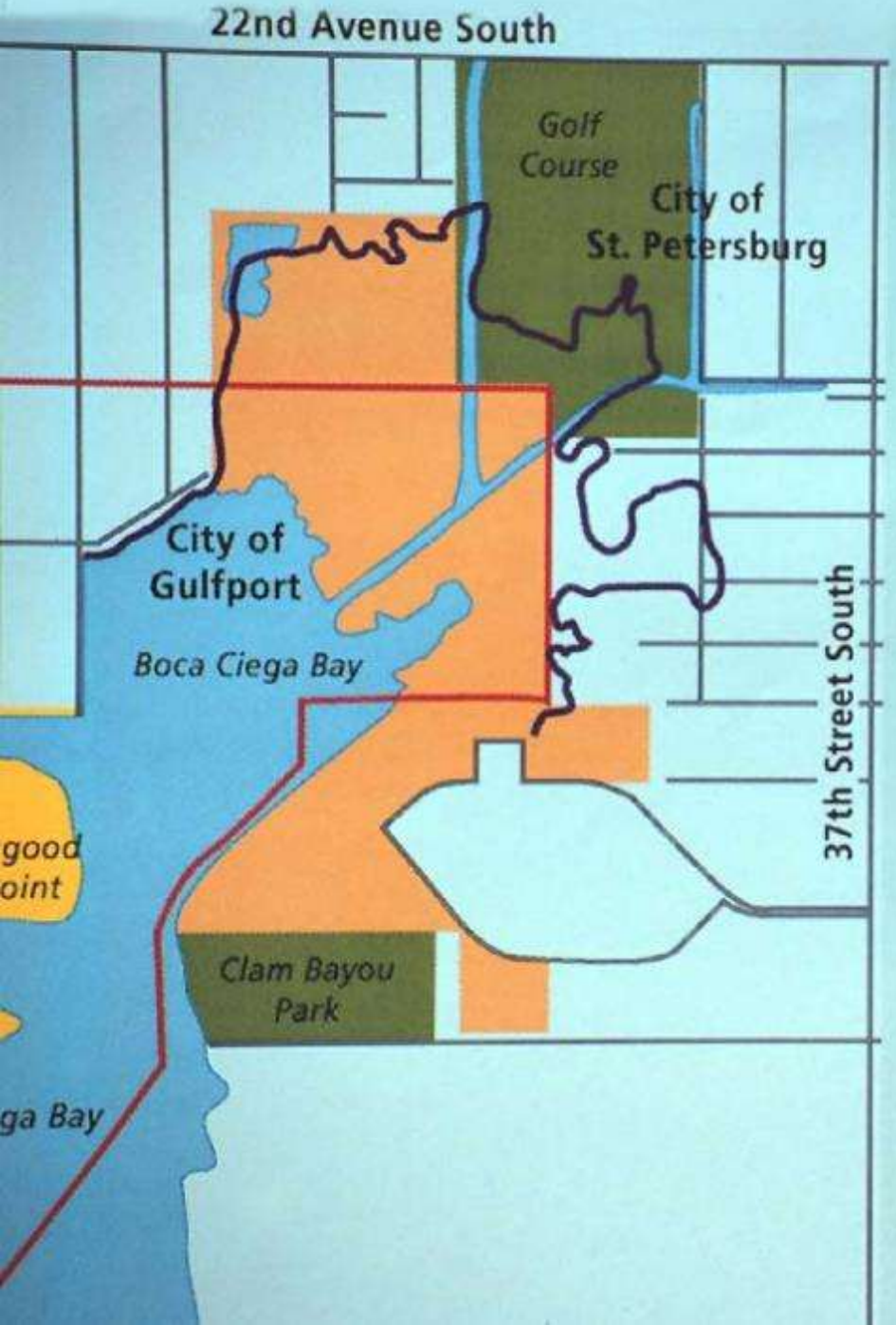
Schultz Preserve
2 years old
2006

Schultz Preserve 8.5 years old (2013)

Schultz Preserve 8.5 years old – note ducks in lagoon (2013)

Schultz Preserve 12.5 years old (2016)

Clam Bayou Habitat Restoration Project



SCHEDA ECOLOGICAL ASSOCIATES, INC.

CLAM BAYOU HABITAT RESTORATION AND STORM WATER RETROFIT PROJECT

Figure 1


CAT


CAT


HITACHI

Without the stormwater ponds, these “floatables” would have ended up in Clam Bayou!!


“After” Tropical Storm Debbie, Central Stormwater Pond – Clam Bayou 06/25/2012

16 month old tidal lagoon Clam Bayou 3 (July 2013)


Clam Bayou February 2014


Clam Bayou December 2016

Clam Bayou
Drainage ditch
before restoration of
tidal creek 2011

Under construction 2011

Sinuous tidal creek
channel restored 2012

Mangroves recruiting
onto island 2012


Restored Tidal Creek with Mangroves and Oyster Bar December 2016

Aero Photo

727.520.8181
www.aerophoto.com

Habitat (Restoration) and Stormwater Treatment (Clam Bayou) 1002

Image # 100413 0011
Date 04.13.10

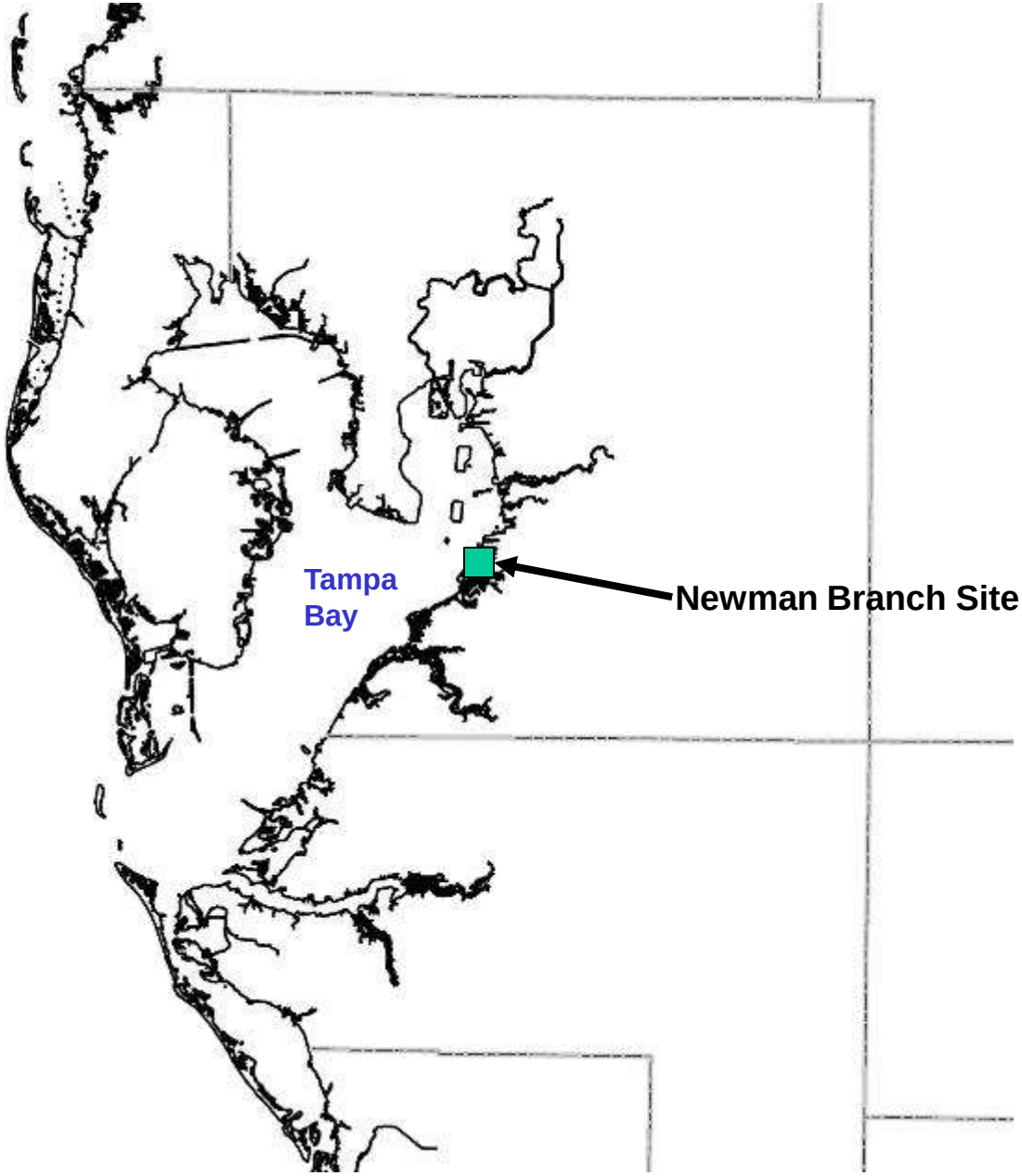
Aero Photo

727.520.8181
www.aerophoto.com

Habitat (Restoration) and Stormwater Treatment (Clam Bayou) 1002

Image # 120126 2042
Date 01.26.12

Location of Newman Branch Restoration Project of Tampa Bay



NEWMAN BRANCH CREEK FISHERIES HABITAT RESTORATION PROJECT
Hillsborough County, Florida

CURRENT AERIAL PHOTOGRAPHY - 2000

Section 16, Range 18E, Township 31S
2000 Aerial Image Source: County Surveying Division, Hillsborough County

Figure 2

Newman Branch Restoration Project - 12 ac – Pre-restoration

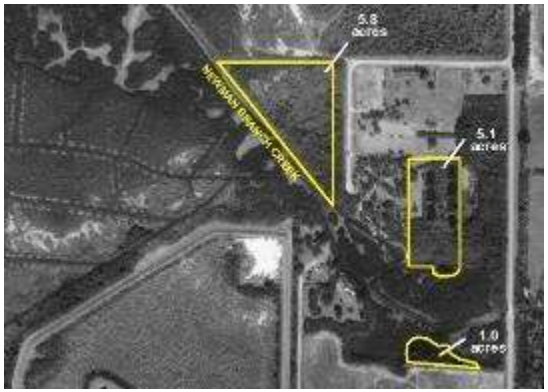
Southwest Florida
Water Management District

Newman Branch Creek Ecosystem Restoration

Surface Water Improvement and Management Program

The Newman Branch Creek Ecosystem Restoration Project is the product of a unique public-private partnership between the District, Preserving the Environment through Ecological Research, Inc., and the Tampa Electric Company.

Construction



Pre-construction aerial view of the restoration site.

One month post-planting

This project involved the restoration of 12 acres of coastal fisheries habitats, freshwater wetlands, and uplands. The centerpiece of the project was the transformation of 24 abandoned fish ponds into a combination of freshwater and estuarine wetlands that connect to Newman Creek. The wetlands receive and treat stormwater from the area which works to improve the water quality of Tampa Bay.

Volunteer marsh planting and dedication ceremony

Newman Branch 2008 Aerial – Post Restoration


2008 Pre-Planting


2012 – Succession Occuring

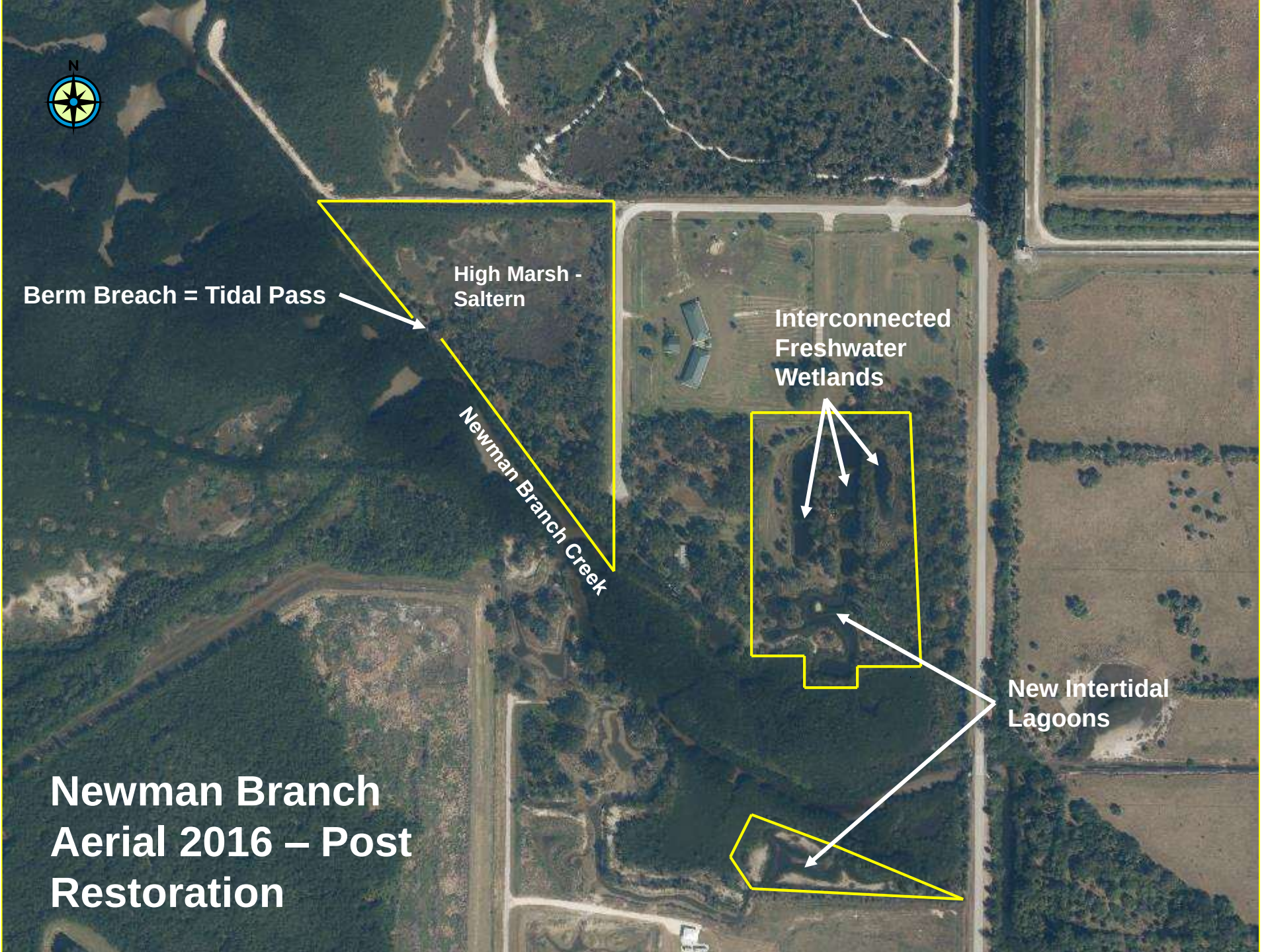

N
Berm Breach = Tidal Pass
High Marsh - Saltern
Newman Branch Creek
Interconnected Freshwater Wetlands
New Intertidal Lagoons
Newman Branch Aerial 2016 – Post Restoration

Figure 1. Location of Rock Pond Parcel of Tampa Bay

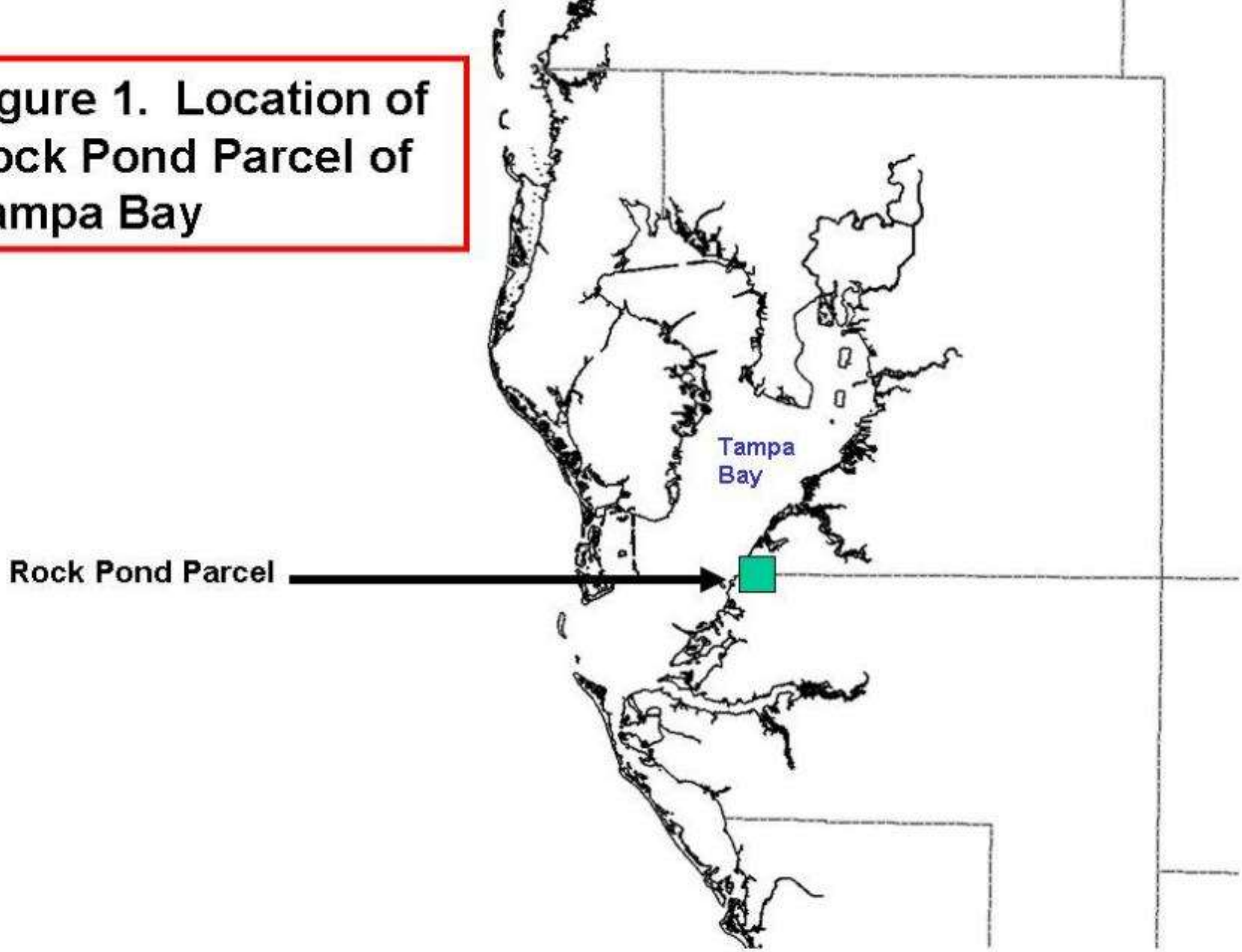
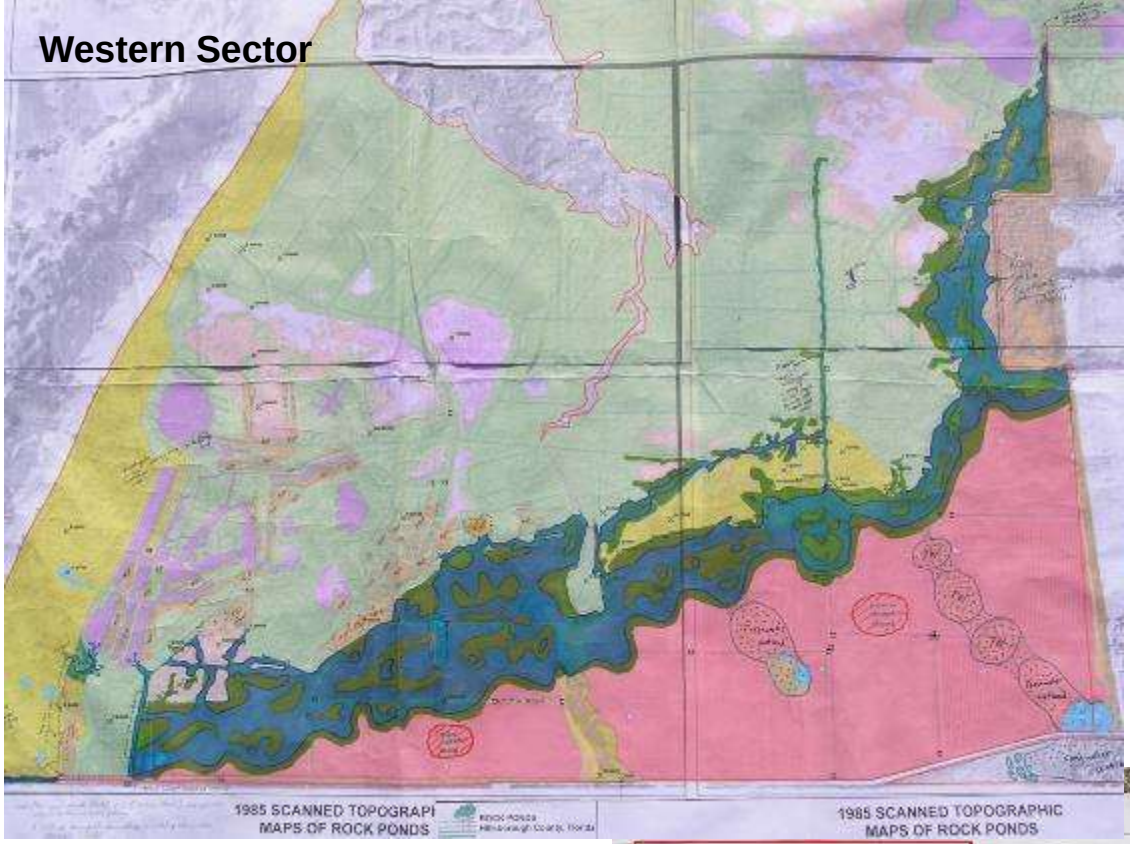
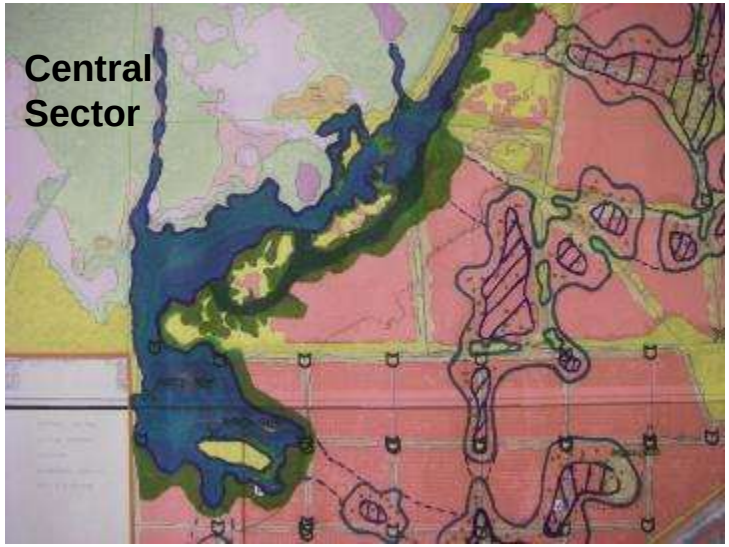
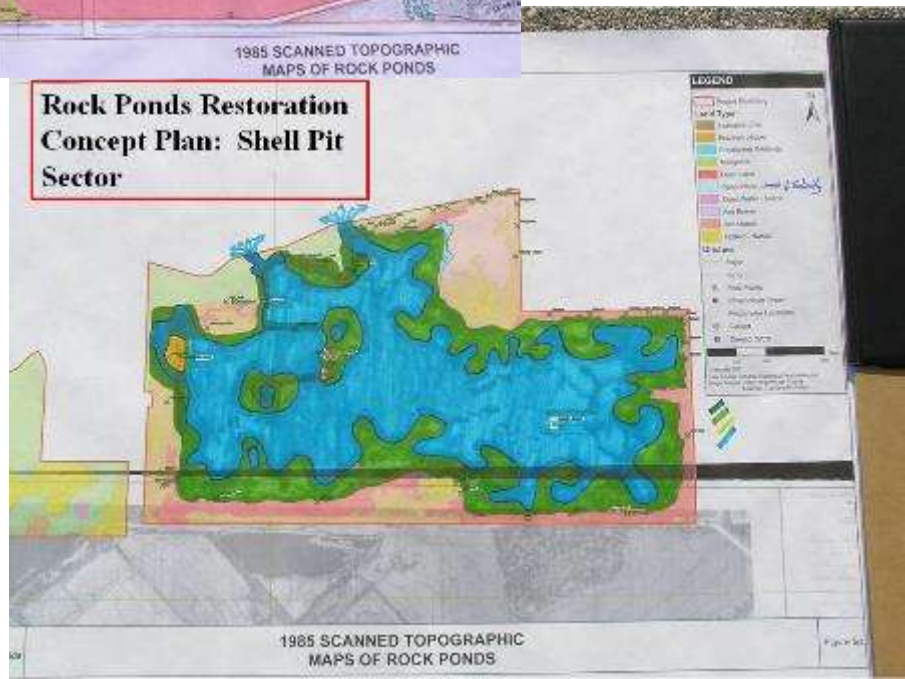


Figure 2. Rock Ponds Parcel – Pre-restoration (red outline)

Concept Plans – 3 Sectors of Rock Ponds







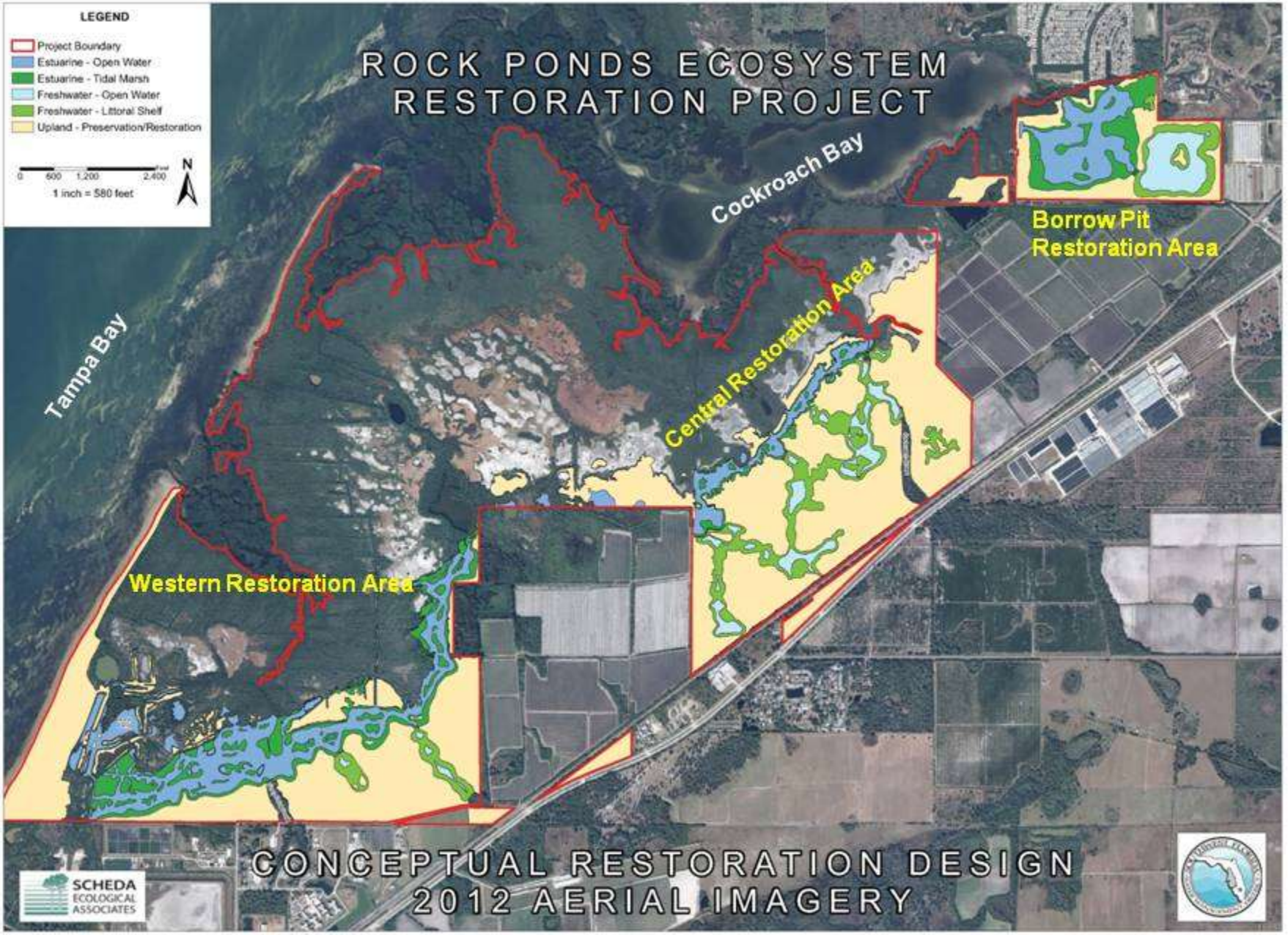


Figure 3. Rock Ponds Ecosystem Restoration Project Plans (Uplands + Wetlands)

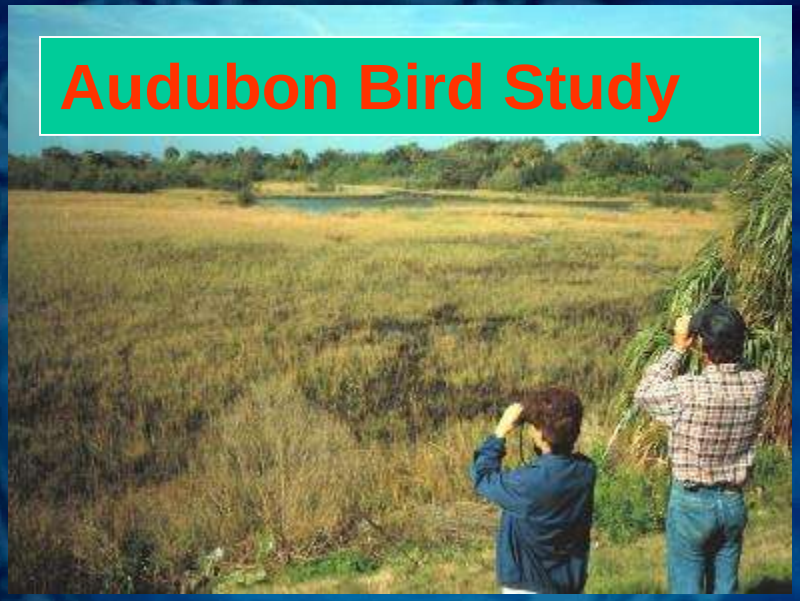
Panorama Rock Ponds
Borrow Pit Restoration
Lagoon Sector
Partially Planted July 2015

Southwest Florida Water Management District

Panorama of Borrow Pit Lagoon Post Restoration November 2016

16 Month Old Salt Marsh with Recruiting Mangroves

Audubon Bird Study



Trash cleanup

USE OF VOLUNTEERS TO STRETCH BUDGETS

Volunteer Marsh Plantings

Often with Tampa Bay Watch, conduct volunteer events installing marsh plugs

Project of Special Note:

September 29, 2007: 350 volunteers set a new record for the greatest number of marsh plants ever installed during one volunteer marsh planting for Tampa Bay: 34,000 marsh plants installed at the Terra Ceia restoration site in 2 hours


I made history!
Terra Ceia Aquatic Preserve
Salt Marsh Restoration
September 29, 2007
The largest salt marsh planting
in Tampa Bay history!
TAMPA BAY
WATCH

November 14, 2015

NEW RECORD

Largest Volunteer Marsh Planting in History of Tampa Bay – Rock Ponds - 289 volunteers installed 40,000 marsh plugs in 2 hours!!!

Southwest Florida
Water Management District

FUTURE HABITAT RESTORATION FOR TAMPA BAY

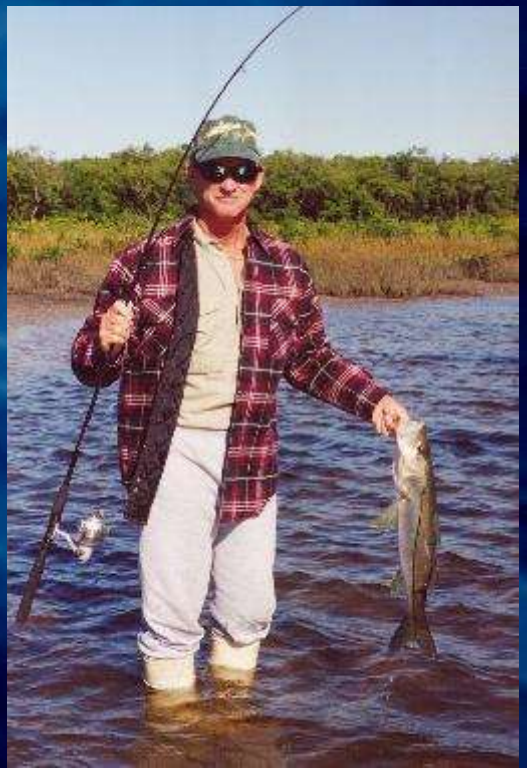
- Combination of small and large projects, keeping in perspective that bigger is better: >7000 ac under development
- Land acquisition critically important to long term success of efforts and future of bay
- Learn from successes and failures
- Secure additional grants and creative funding
- Dedication for the long term
- Updates and implementations of management plans


Both wildlife and the public are using the restored habitats!!!
All the following pictures were taken at various restoration sites!!

Natural Recruitment of Mangroves and High Marsh Plants

Sampling verifies habitats being used by variety of wildlife + casual observations in field

Cockroach Bay Ecosystem Restoration Project

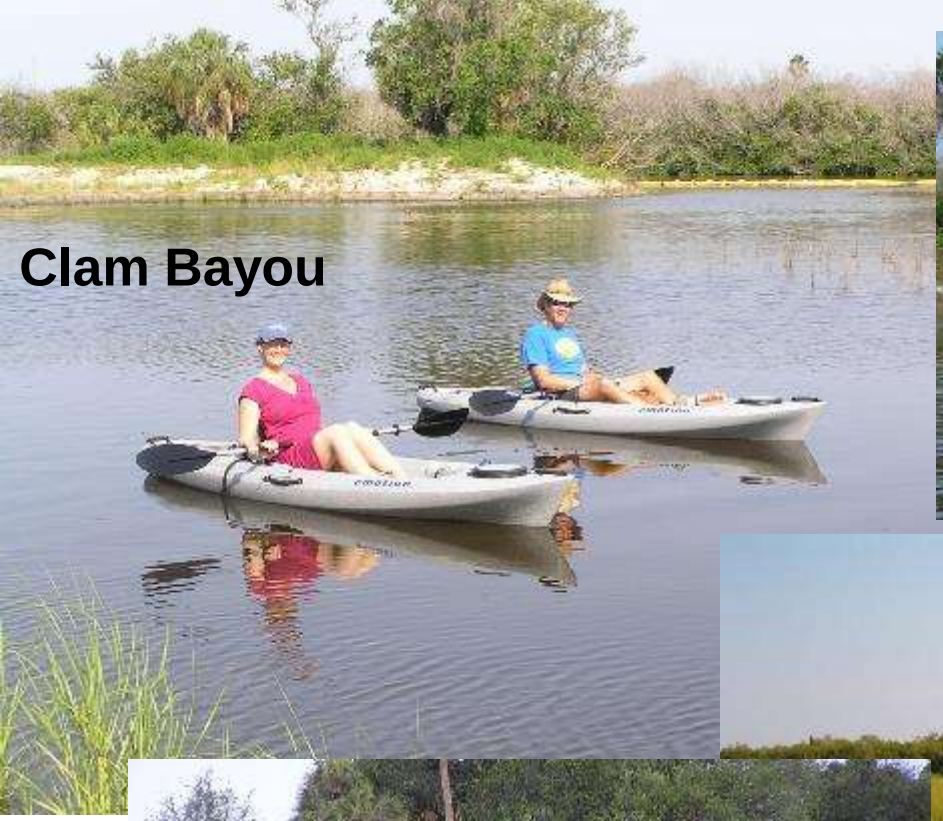


Southwest Florida
Water Management District

Clam
Bayou

Schultz Preserve

Juvenile
redfish

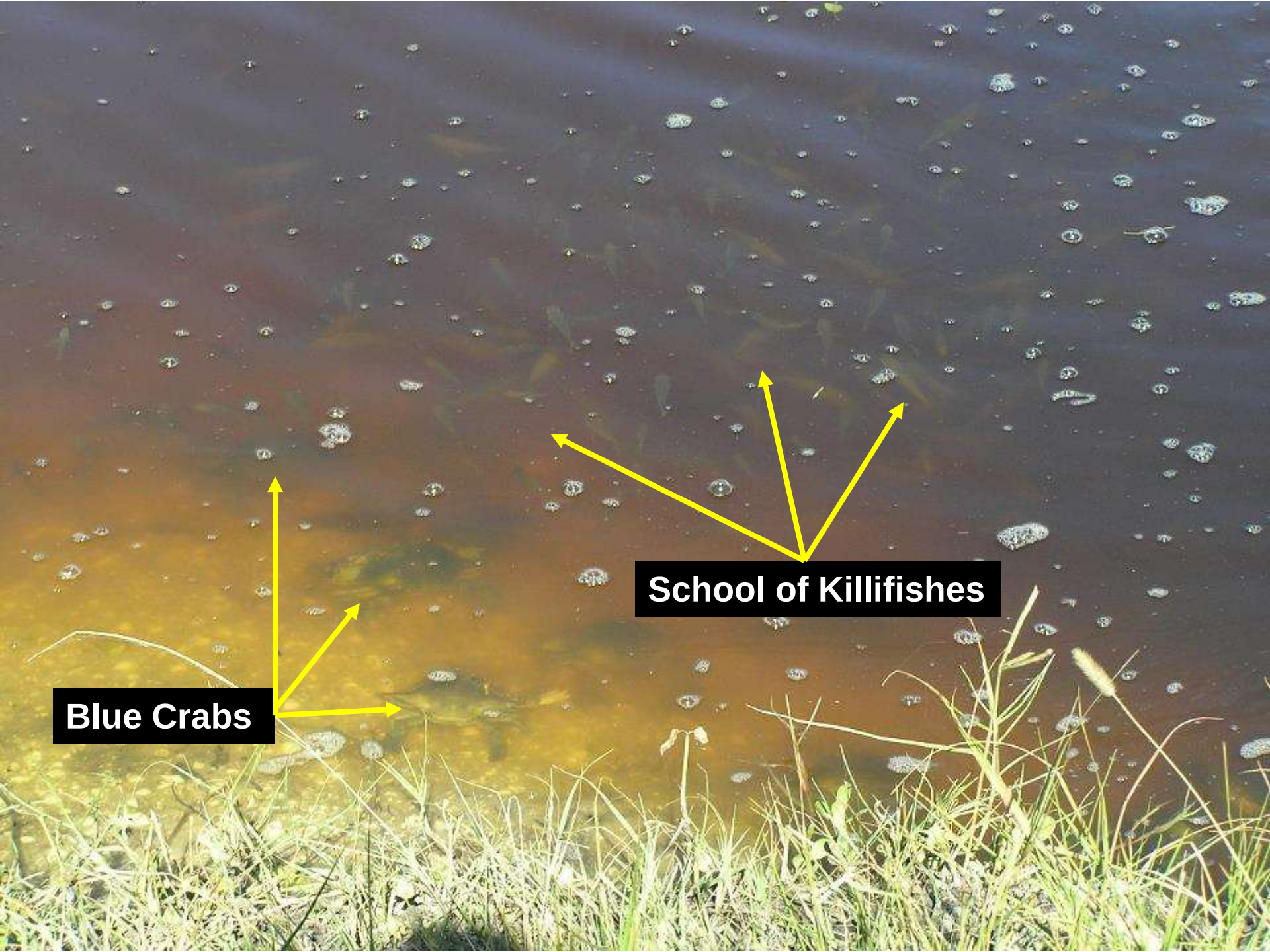

Clam Bayou


Rock Ponds

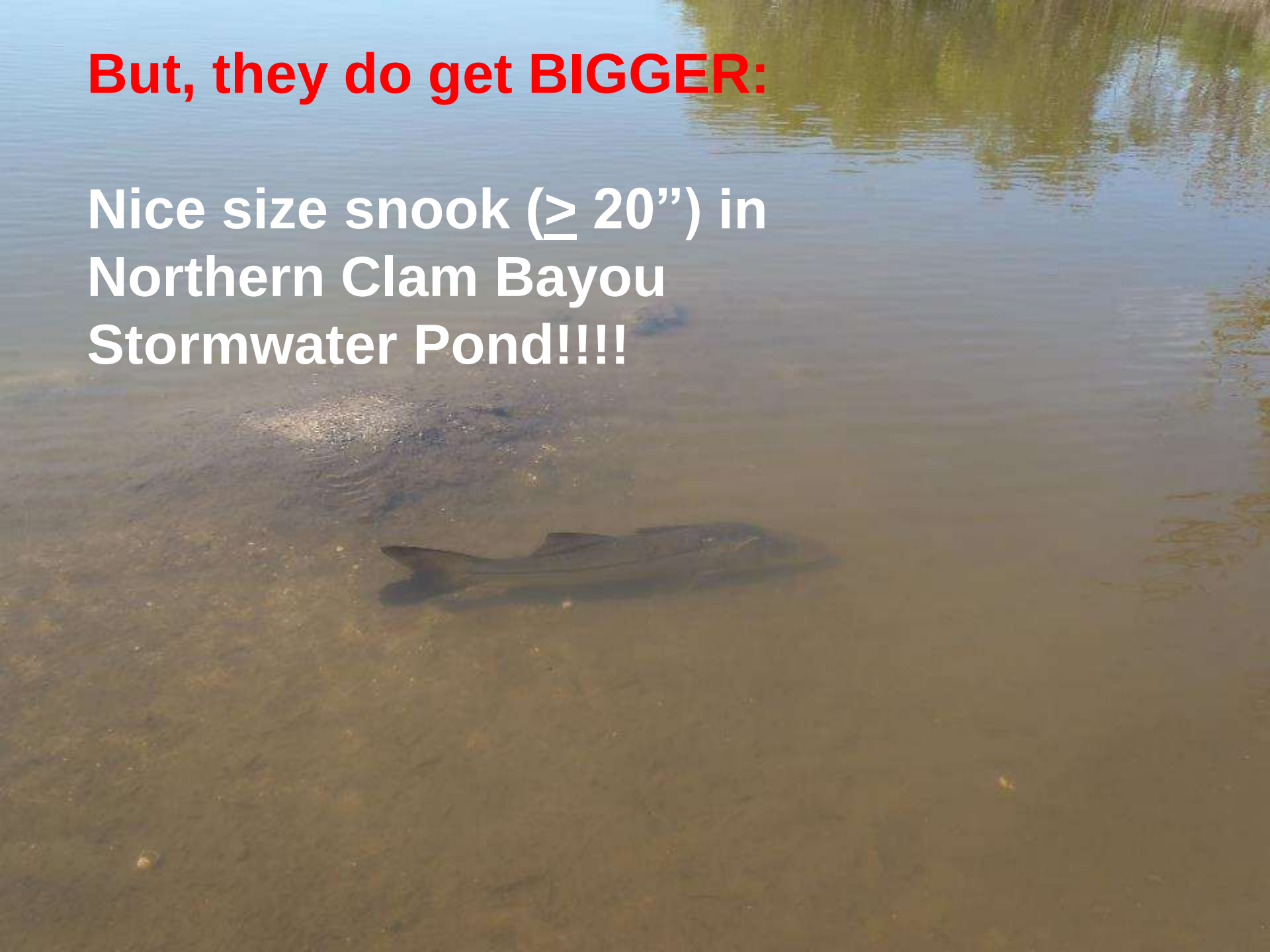

Schultz Preserve


Clam Bayou

Terra Ceia-Frog Creek

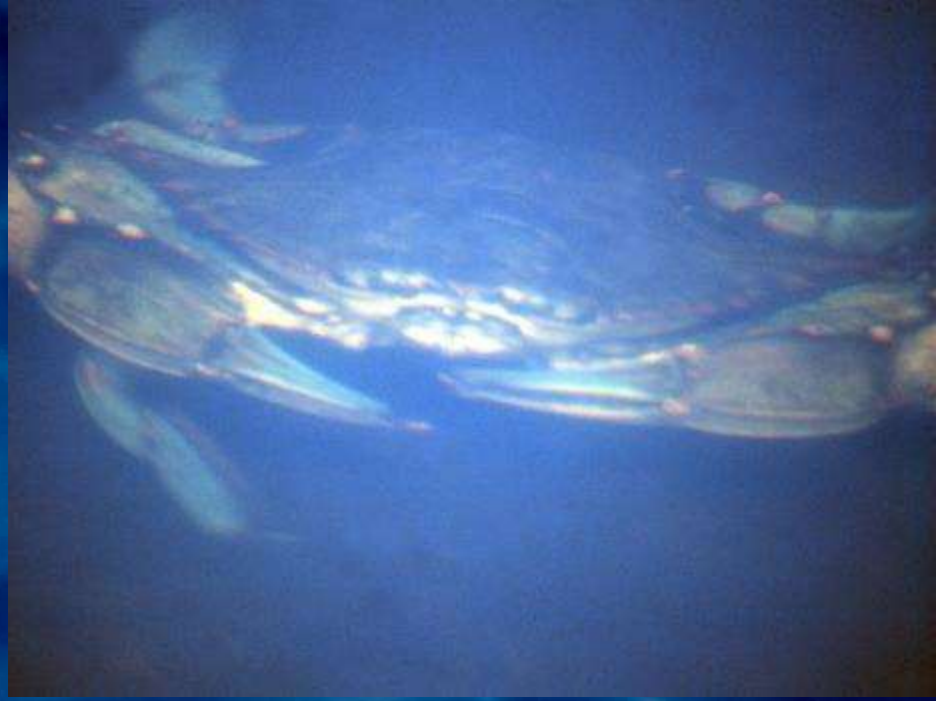

School of Killifishes
Blue Crabs

Juvenile snook caught in Clam Bayou Stormwater Pond


But, they do get BIGGER:
Nice size snook (≥ 20”) in Northern Clam Bayou Stormwater Pond!!!!

20” Snook Caught in Central Restoration Lagoon – Rock Ponds


Now, that's a snook!!! 28" worth of snook and a very happy fisherman!!
Cockroach Bay Lagoon



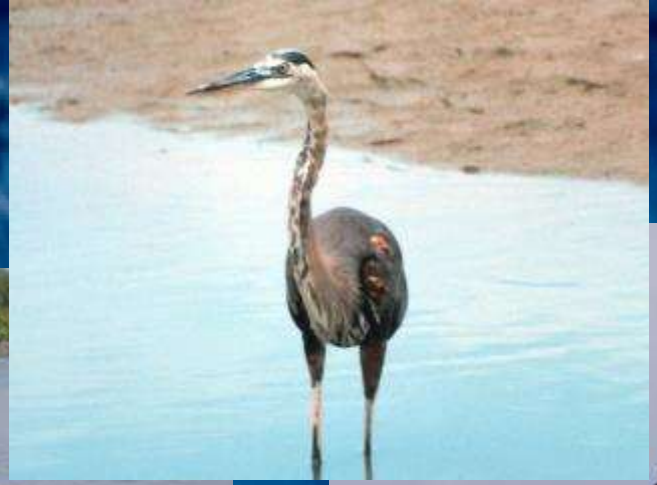


“Find Waldogator”: there are 21 baby alligators in this photo!!

Selected Bird Species of 107 Species Observed in Clam Bayou Area

Bald eagle	Osprey	Red-tailed hawk
American kestrel	Barn owl	Belted kingfisher
Great blue heron	Little blue heron	Great egret
Tri-color heron	Snowy egret	Yellow-crown night heron
Green heron	Wood stork	White ibis
Pileated woodpecker	Pine warbler	Blue-headed vireo
American oystercatcher	Willet	Brown pelican
Royal tern	spotted sandpiper	Roseate spoonbill
Anhinga	Reddish egret	Red knot

Southwest Florida
Water Management District



Southwest
Water Manager


Tree Swallows

Osprey with Sheepshead Lunch – Rock Ponds Restoration Site

Flowering Widgeon Grass

Blue Crabs – Rock Ponds Lagoon


Widgeon Seagrass


Bobcat


Bottlenose
Dolphin

On May 31, 2012, eight manatees were observed in the Central Restoration Lagoon of the Clam Bayou site, the majority grazing on marsh grasses

Three manatees grazing on marsh grasses while a Great Egret and a duck watch

There are 6 manatees in this picture in a restored tidal lagoon of Clam Bayou!!!


The End