

**Tape Grass (*Vallisneria americana*)
Restoration Projects in
the Caloosahatchee River Ecosystem**

By David W. Ceilley, M.S. CSE



Acknowledgements

Previous Funding Partners

SFWMD, Peter Doering, Beth Orlando, Teresa Coley

West Coast Inland Navigation District

Lee County Marine Services &

West Coast Inland Navigation District

Research Partners

Sea & Shoreline Inc.

Florida Gulf Coast University

University of Florida

Lee County Hyacinth Control District

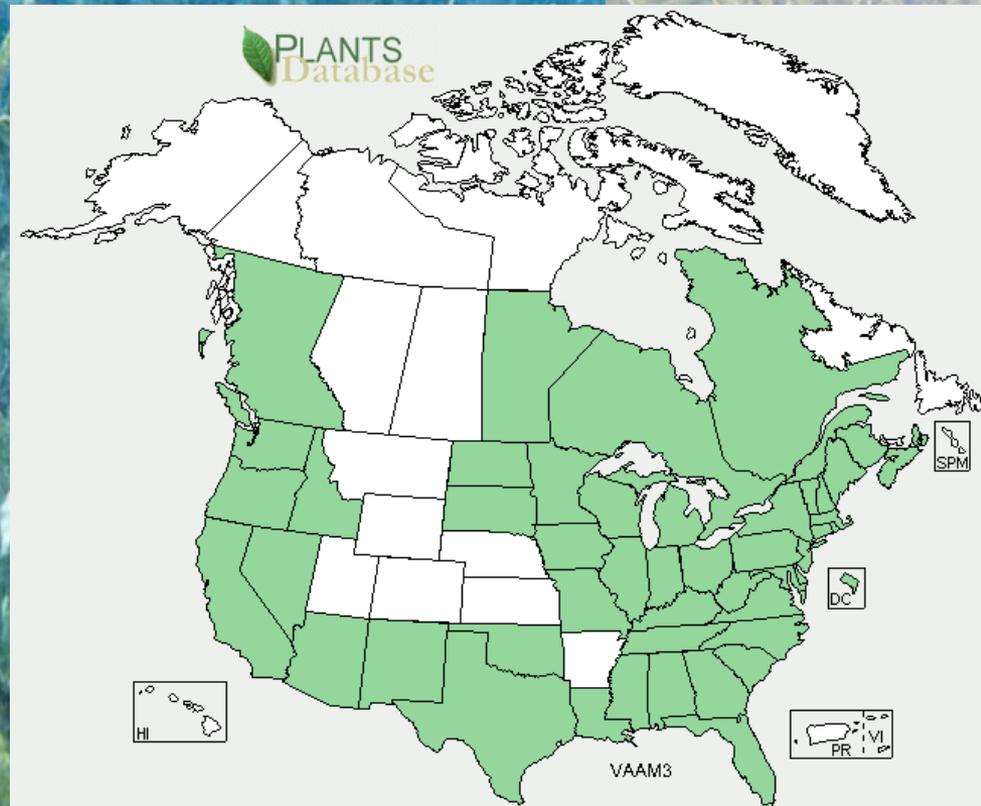


Ecosystem Services of Tape Grass (*Vallisneria americana*)

- **Habitat for fishes, crabs, shrimp, crayfish, bivalves, epiphytes, and numerous aquatic insects**
- **Forage for endangered manatees, freshwater turtles, waterfowl, fish, crayfish and snails**
- **Stabilizes sediments, attenuates wave action improves improves water clarity, and removes nutrients**
- **Used by over 44 species of fishes including snook, seatrout, drum, bass, and sunfishes**

North Florida Springs & Rivers

South Florida Upper Estuaries





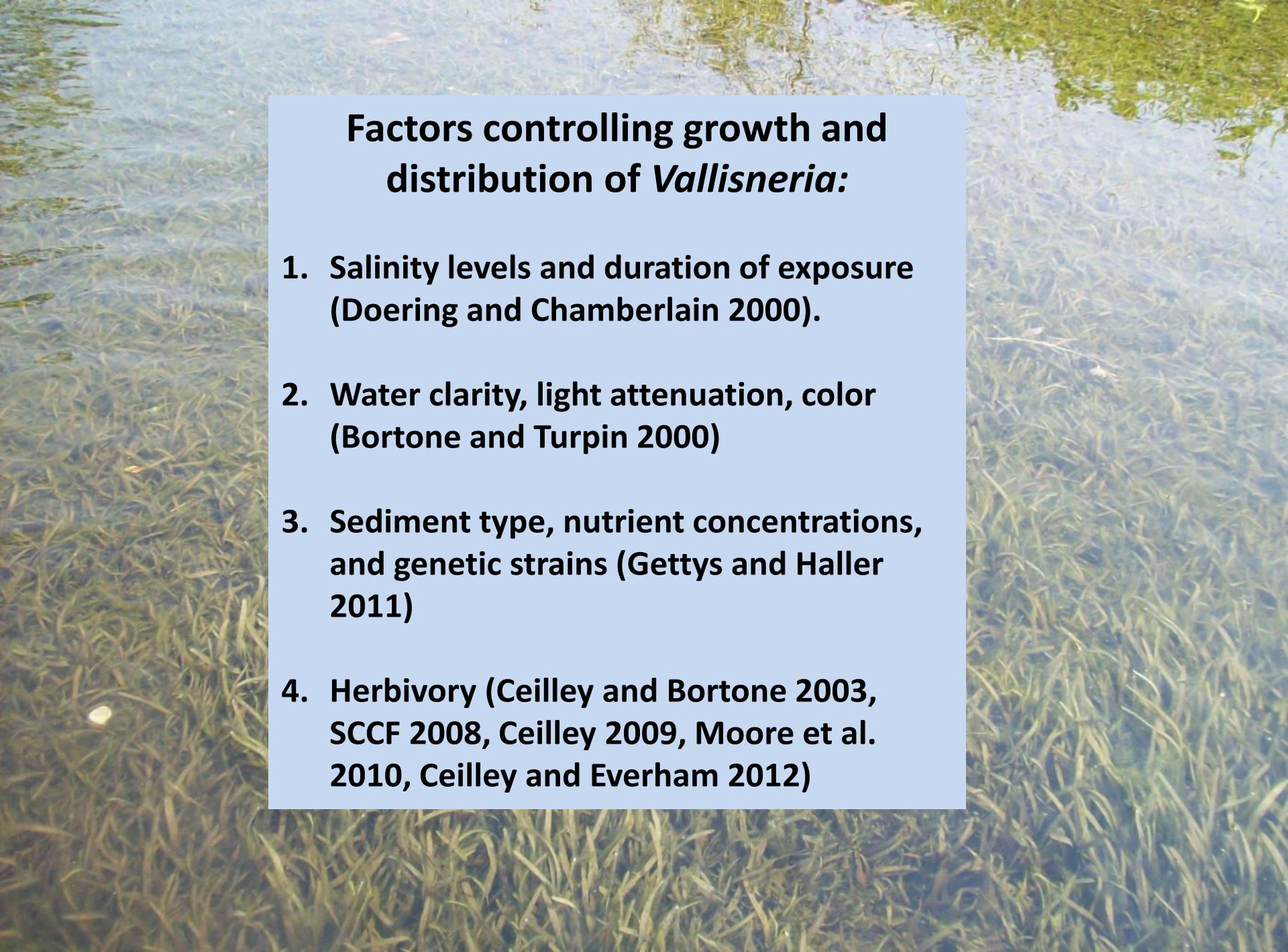
© Cat Smith



Why is *Vallisneria americana* a good indicator?

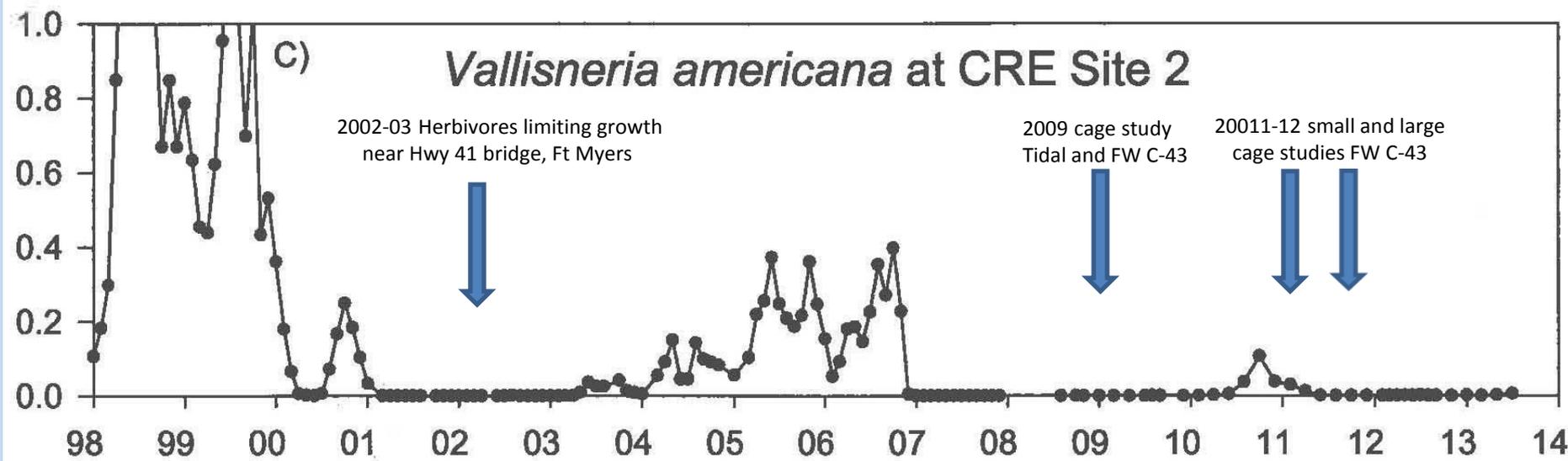
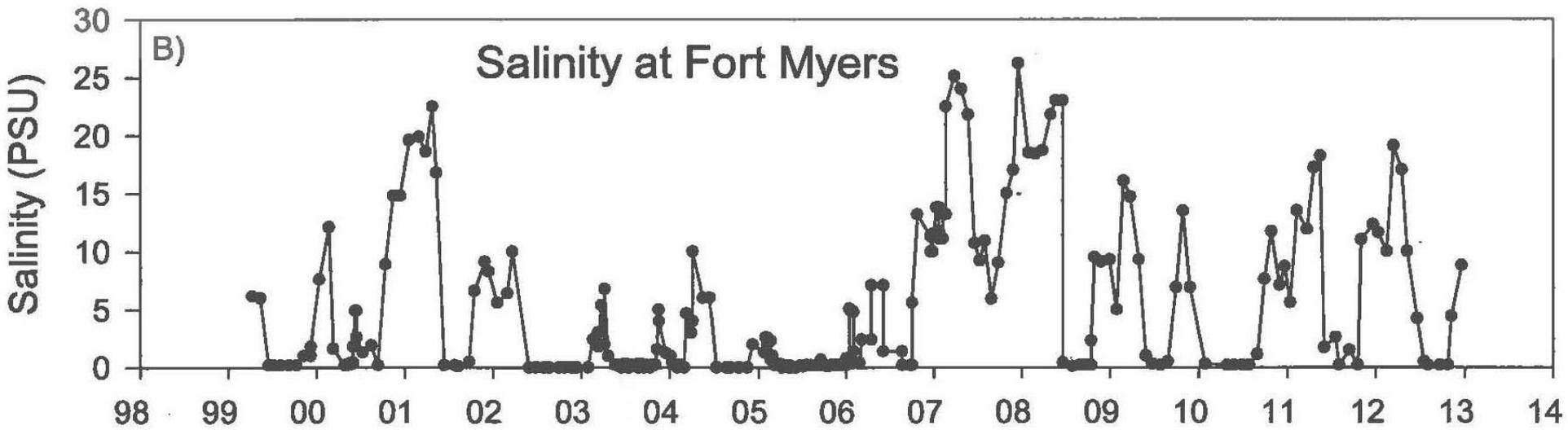
(Caloosahatchee River Science Workshop Nov. 2013)

- 1. Tolerant of oligohaline conditions (< 10ppt), natural fluctuations in water chemistry, sediments, and nutrients in upper estuaries.**
- 2. Historically important & considered as a *Valued Ecosystem Component* (VEC) in Caloosahatchee Ecosystem (Barnes 2005)**
- 3. Recently covered over 1,200 acres in the upper Caloosahatchee Estuary: Whiskey Creek to I-75 (Hoffacker 1994, SFWMD 2004)**
- 4. Sensitive to human caused disturbances: extreme unnaturally high salinity, turbidity, or color (tannins)**
- 5. Can respond quickly when conditions are restored (Lake Trafford & FGCU studies)**

The background of the slide is a photograph of a dense patch of Vallisneria spiralis (spikerush) growing in shallow, clear water. The plants have long, narrow, green leaves that fan out from a central point. The water is light blue and reflects the sky and the surrounding greenery. The overall scene is a natural, outdoor setting, likely a wetland or a pond.

Factors controlling growth and distribution of *Vallisneria*:

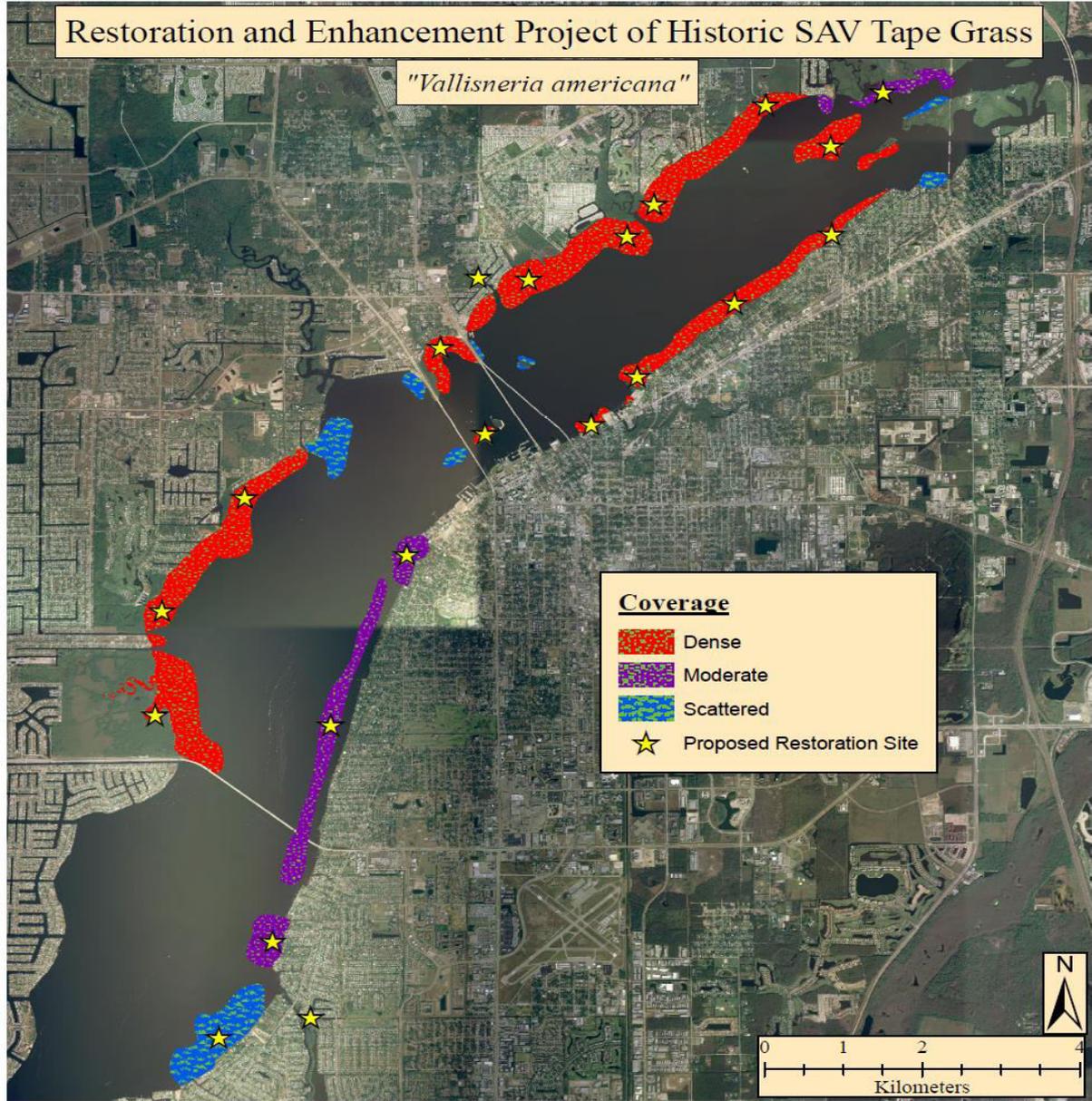
- 1. Salinity levels and duration of exposure (Doering and Chamberlain 2000).**
- 2. Water clarity, light attenuation, color (Bortone and Turpin 2000)**
- 3. Sediment type, nutrient concentrations, and genetic strains (Gettys and Haller 2011)**
- 4. Herbivory (Ceilley and Bortone 2003, SCCF 2008, Ceilley 2009, Moore et al. 2010, Ceilley and Everham 2012)**



Vallisneria "Average Proportion Vegetated/m²)" System Status Report 2013
 (J. Douglas. Ph.D. FGCU). *Vallisneria* appears to be "down for the count"

Restoration and Enhancement Project of Historic SAV Tape Grass

"Vallisneria americana"



Ft. Myers area has lost over 1,200 acres of dense Tape Grass since 2001.

Sea Grass (SAV) Valued By Charlotte Harbor National Estuary Program at \$26,583,333/acre = **\$31.9 Billion** in Economic Losses to the Local Economy

Acreage

Dense: 1292.40
Moderate: 397.09
Scattered: 322.95
Total Acreage: 2012.44



Data Sources:
2004 One Meter Ortho Imagery provided by USGS and NRCS for Lee County, FL
Coverage polygons digitized from USGS 2004 aerial

2002-03 Restoration Study at CRE Site 2

Discovered that grazing was a problem and
two test enclosures were planted



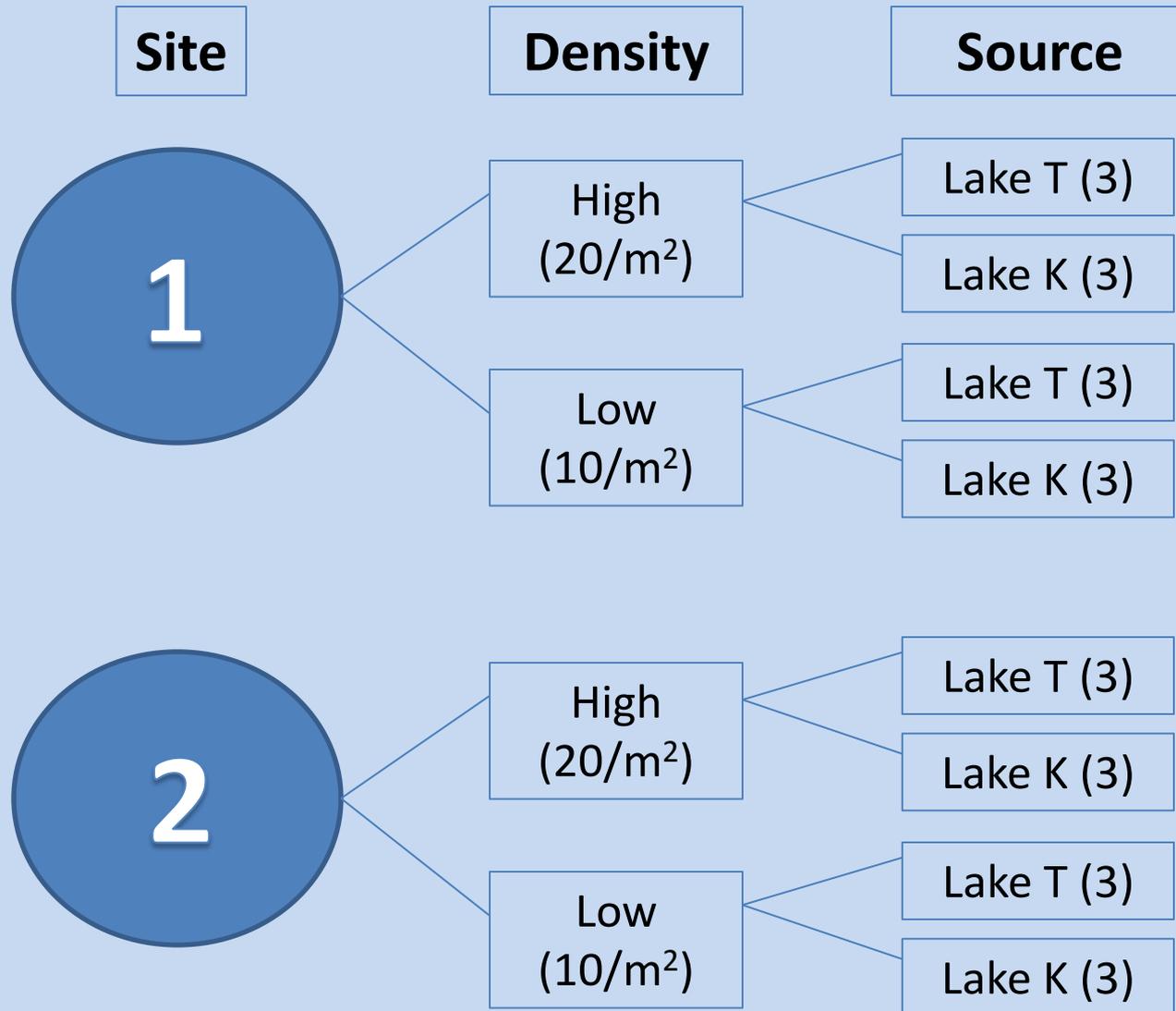
Caloosahatchee River

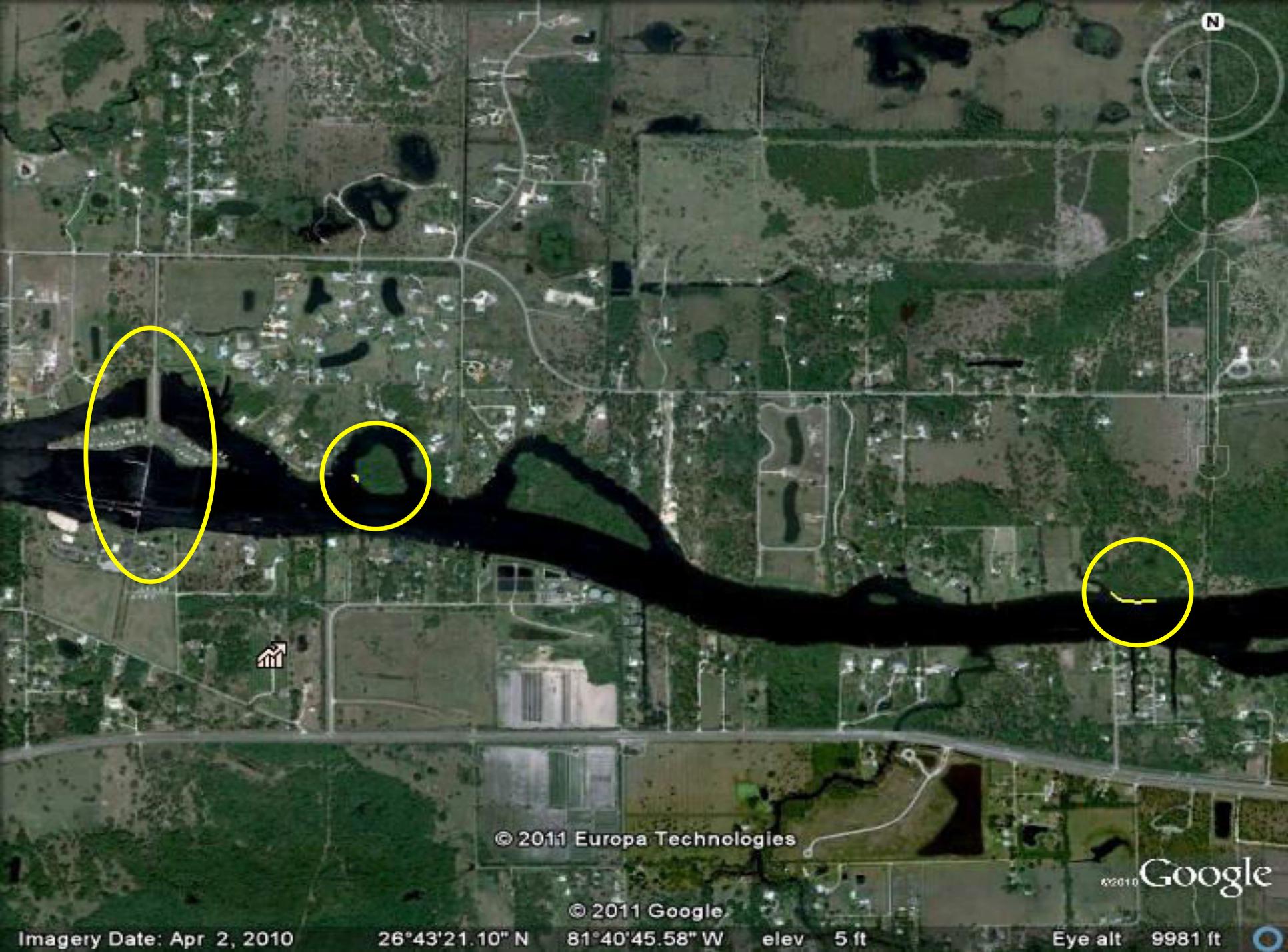
Tape Grass Restoration Project

South Florida Water Management District &
FGCU Ecology Lab: June 2011 to Dec 2012



Project Details





© 2011 Europa Technologies

© 2010 Google

Imagery Date: Apr 2, 2010

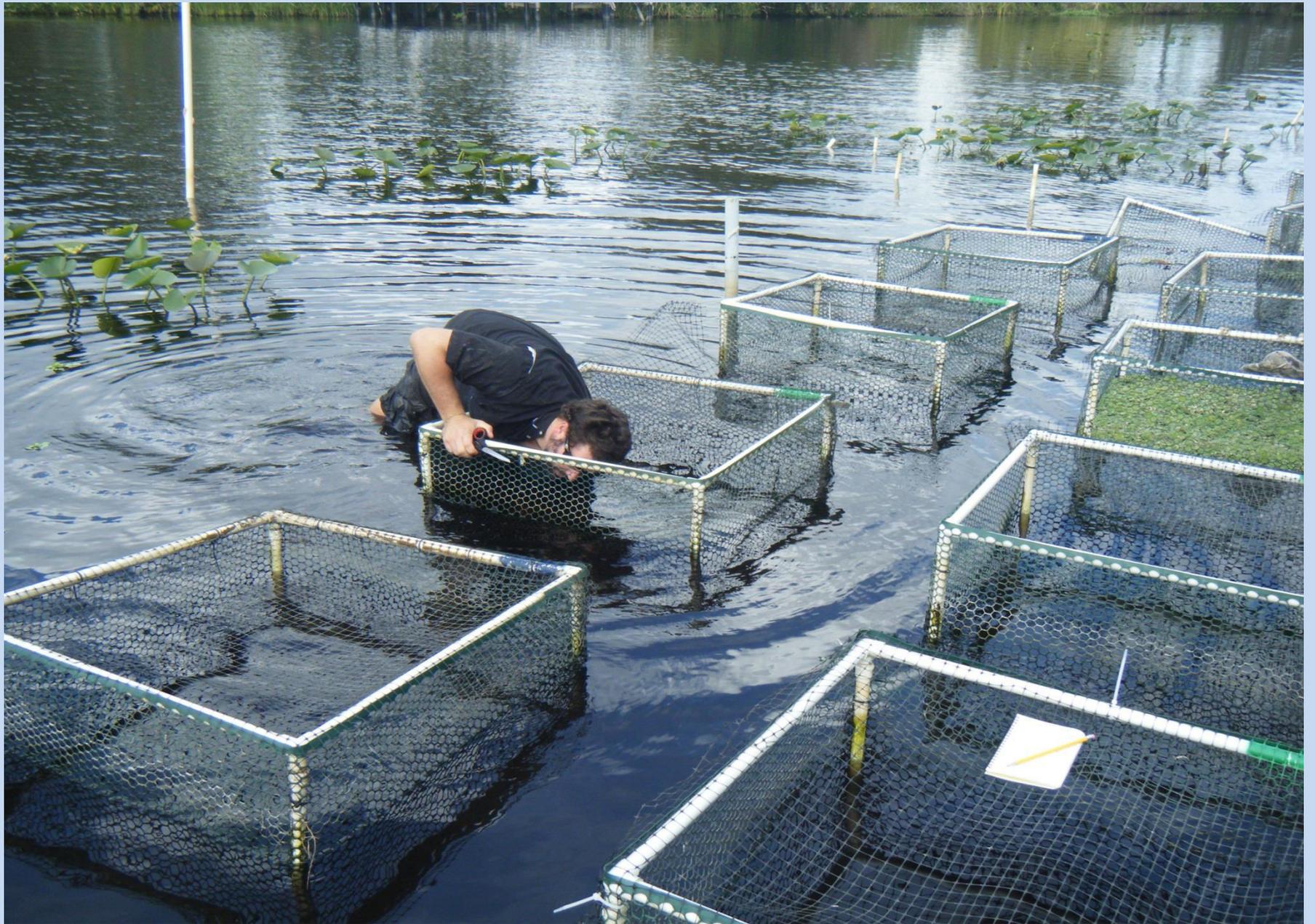
26°43'21.10" N

81°40'45.58" W

elev 5 ft

Eye alt 9981 ft







Site 1 Small Cages

Site 2 Small Cages

Site 3 Large Cage

Site 5 Large Cage

Site 4 Large Cage

Site 6 Large Cage



Phase II: Large Cage Experiments May –Dec 2012





In 2011 The Invasive exotic apple snail, *Pomacea insularum/maculata* found inside cages.



Table 1. Mean % cover and mean # shoots/m² for large exclosures on August 22, 2012 (< 90 days)

<u>Site</u>	<u>% Cover</u>	<u># Shoots/m²</u>
Site # 6 Lake Kennedy	100%	119
Site # 6 Lake Trafford	94%	36
Site # 5 Lake Kennedy	98%	92
Site # 5 Lake Trafford	96%	56
Site # 4 Lake Kennedy	100%	68
Site # 4 Lake Trafford	96%	23
Site # 7 Lake Kennedy	93%	33
Site # 7 Lake Trafford	96%	30

Conclusions:

- Herbivory is controlling factor both upstream and downstream of Franklin Locks
- Chesapeake Bay: *“Using mesh exclosures to protect the plants from herbivory was critical to restoration success.”*
Moore et al. 2010 Restoration Ecology [Volume 18, Issue 4](#), pp 596–604
- Exclosure cages allowed for flowering and seed production.
- *Vallisneria* plants outside the cages were grazed & short (2-3cm). No flowering or seed pods observed during the study
- Growth habits of 2 strains differed:
 - Lake Trafford = larger plants but fewer
 - Lake Kennedy = smaller and more numerous

Problems Encountered Phase II: Large Cages 2012

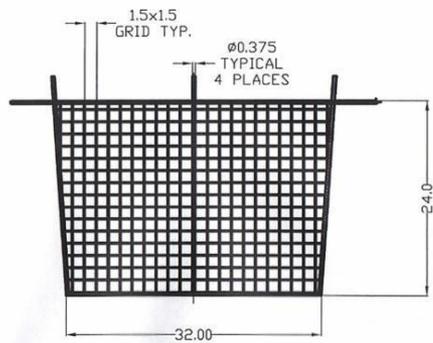
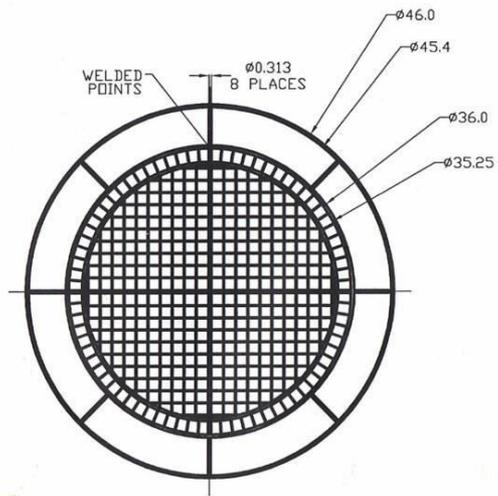
- Damage to cages as a result of vandalism and/or extreme wave action.

Solution: reinforced cages with PVC and add rebar to the bottom of the Vexar mesh.

- The large wakes (4-5' high) by large vessels traversing the main channel.
Herbivory by non-native apple snails, *Pomacea insularum*

Proposed Solutions:

1. Eradicate egg masses and remove adult snails during routine maintenance
 2. Leave cages open on top with perches for limpkins and snail kites
- Damage to cages and herbivory by Manatees and *Pseudemys* spp. Turtles
 1. Plant large protected founder colonies and remove grazers
 2. Use hardened anchored small cages for dockside projects



THE PROPERTY OF MAGNUM AND UNAUTHORIZED USE OR REPRODUCTION IS PROHIBITED.

REVISION	BY	DATE	REFERENCE DRAWINGS

MAGNUM COMPANIES

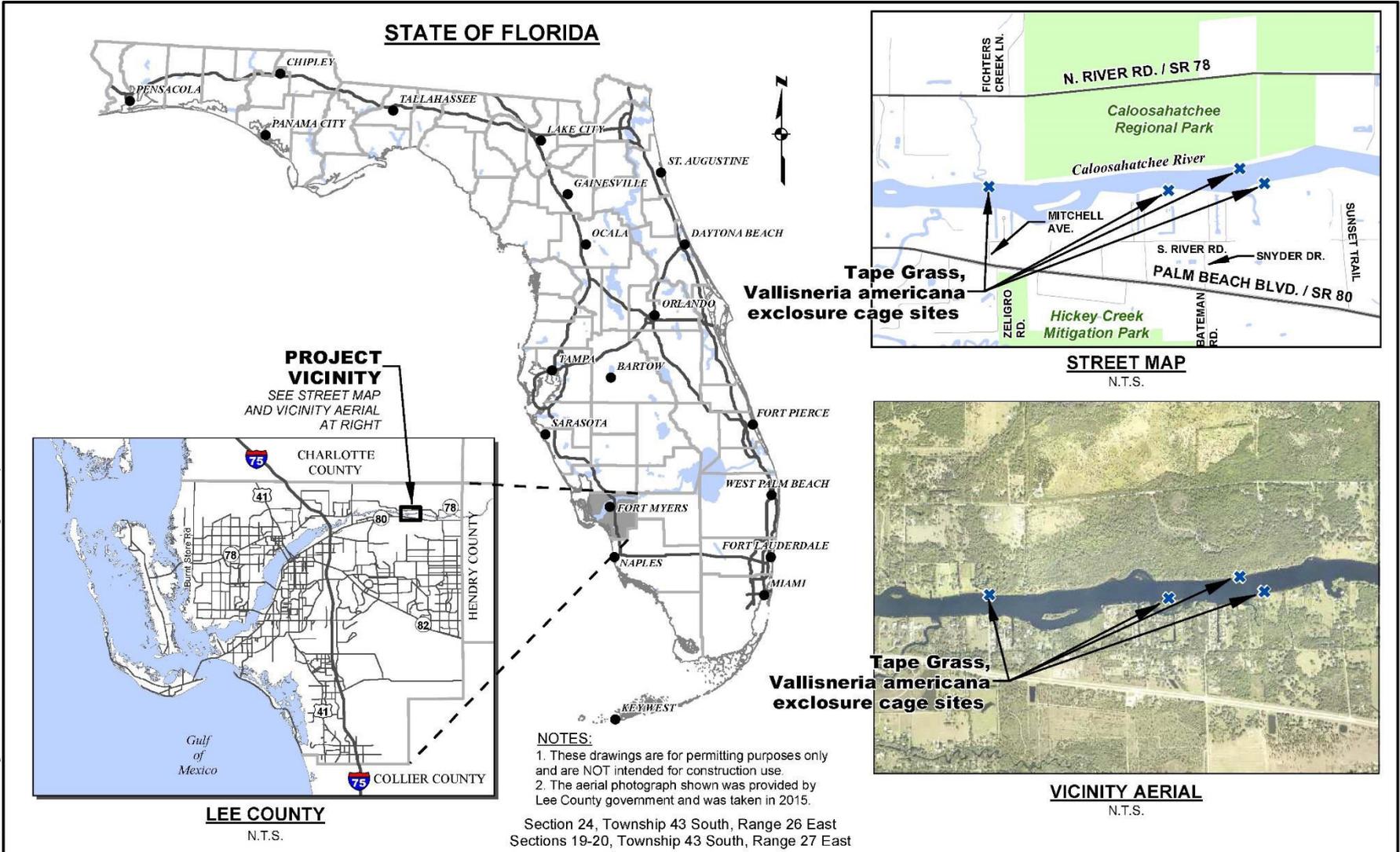
2402 5TH AVENUE
P.O. BOX 75466
TAMPA, FLORIDA 33675
1-800-722-2407
FAX: 813-247-3686

TITLE	
BASKET	
MATERIAL: STAINLESS STEEL	
DRAWN BY: GR	DATE: 0
DESIGNED BY:	
CHECKED BY:	

June 22, 2015: Replanted four permitted sites with funding from SFWMD and Lee County Division of Natural Resources using new cage design.



\\ftms01\Drawings\2015\20150028-000\Environmental\arcgis\locmap.mxd



SFWM Tape Grass Restoration
Lee County, Florida



2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
FAX (239) 334-3661
E.B. #642 & L.B. #642

Location Map

DATE	PROJECT NO.	FILE NO.	SCALE	SHEET
July 2015	20150028-000		Not to Scale	1







**Tape Grass (*Vallisneria americana*)
Fish & Wildlife Habitat Restoration Project**
Please Do Not Disturb

This project is funded by the South Florida Water Management District and Lee County
Questions? Please Call David W. Cullley, Ecologist at Johnson Engineering Inc. @ (239) 334-0016

JOHNSON
ENGINEERING

**GROW
SAV**

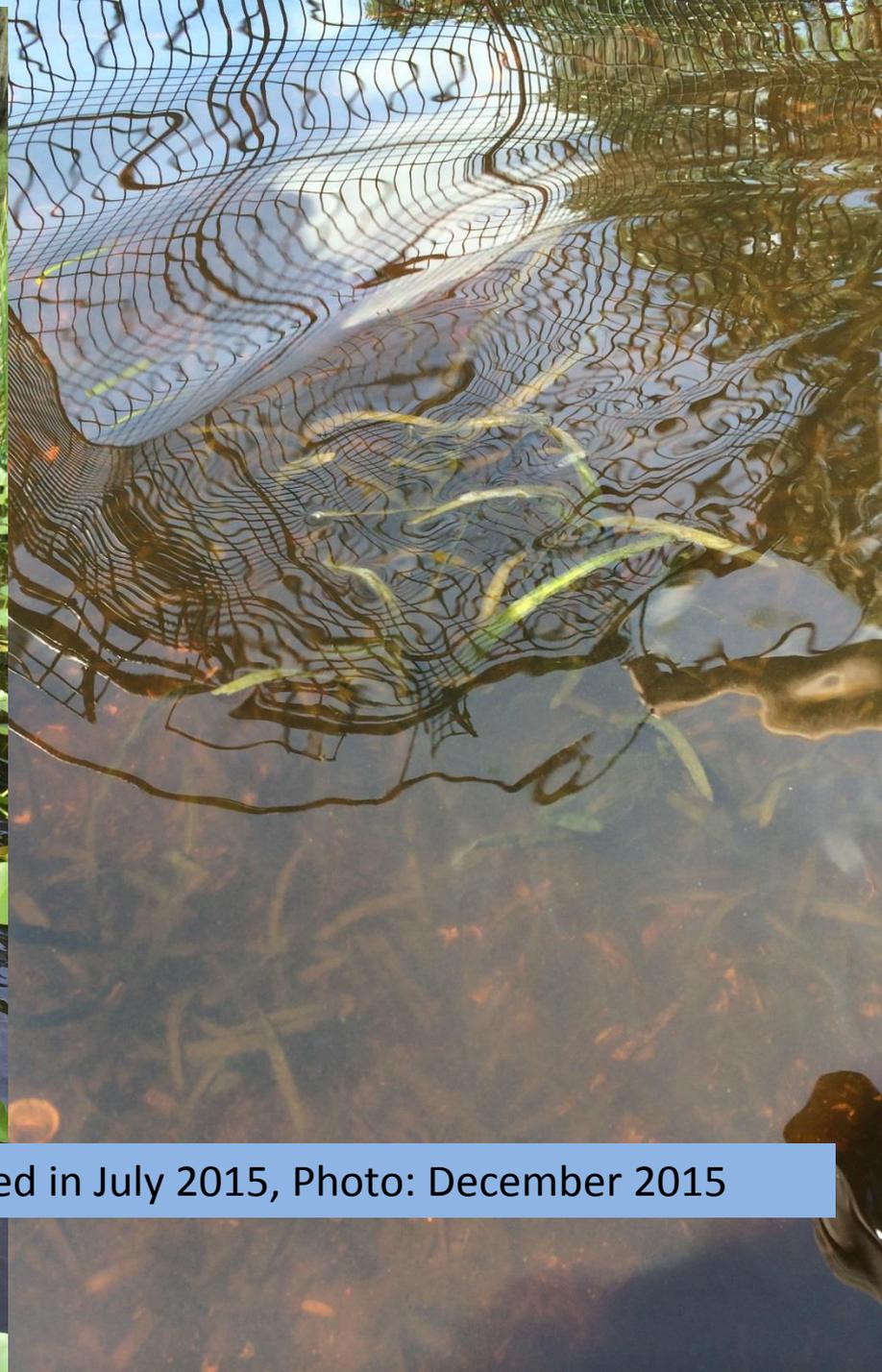
Planted June 22, 2015



Flowering by October 2015

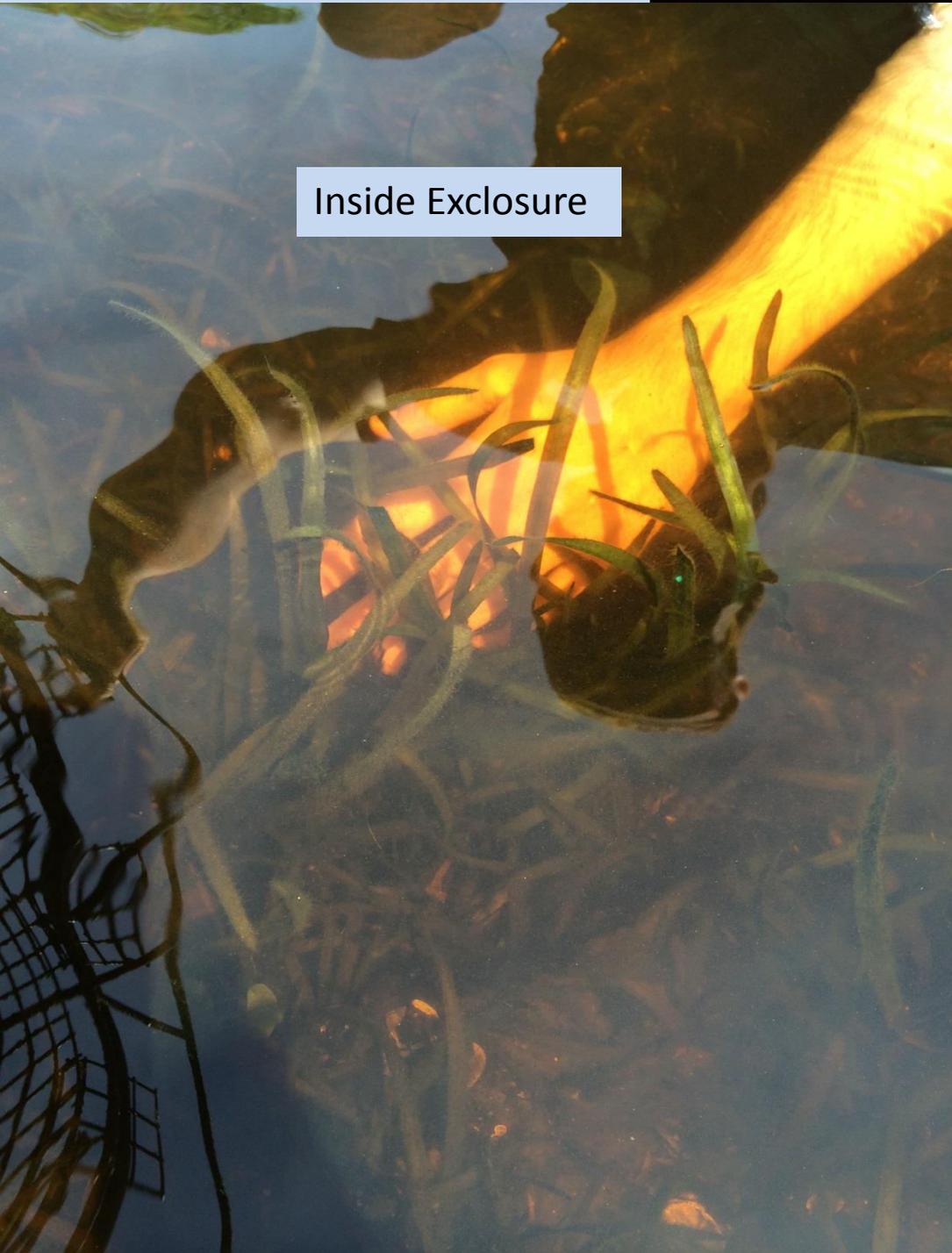


Site A: Control Enclosure with Natural Recruitment,
February 2016



2009 Planted Site with Exclosure installed in July 2015, Photo: December 2015

Inside Exclosure



Outside Exclosure





Some Grazing appears to be beneficial = dense root mats



Vandalism by Fishermen, Rednecks and/or Bovines?



Questions?



**GROW
SAV™**

**JOHNSON
ENGINEERING**

Partners for Restoration of the Caloosahatchee River Estuary (see attached NFWF proposal)

1. Lee County and SFWMD
2. City of Fort Myers (owns submerged lands along C-43)
3. Johnson Engineering Inc. (project management and oversight)
4. Charlotte Harbor National Estuary Program
5. Sea & Shoreline, LLC
6. Caloosahatchee River Citizen's Association ("RiverWatch")
7. Florida Gulf Coast University Coastal Watershed Institute
8. University of Florida: Center for Aquatic Plants

**National Fish & Wildlife Foundation
Gulf Of Mexico Benefit Fund Proposal:
Seagrass and Tape Grass Restoration of the
Caloosahatchee Estuary**

Caloosahatchee Estuary

Hw = *Halodule wrightii*
Tt = *Thalassia testudinum*
Rm = *Ruppis maritima*
Va = *Vallisneria americana*

S = Scattered
M = Moderate
D = Dense

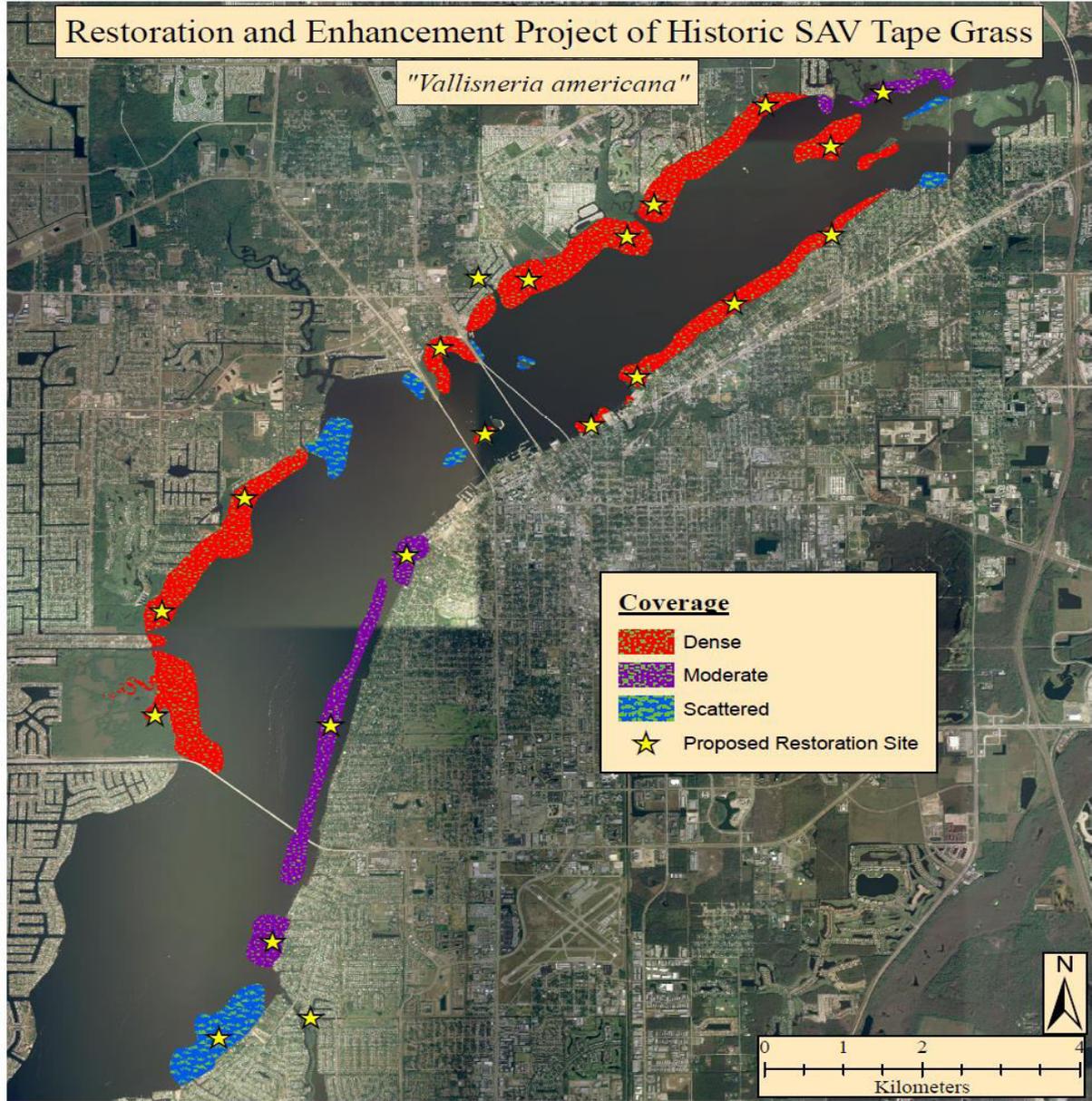
1993 SAV Density



An Autocad map was produced in 1994 by Dexter Bender & Associates using 1993 data. This was converted by Tim Lieberman into a polygon coverage, projected to NAD83.

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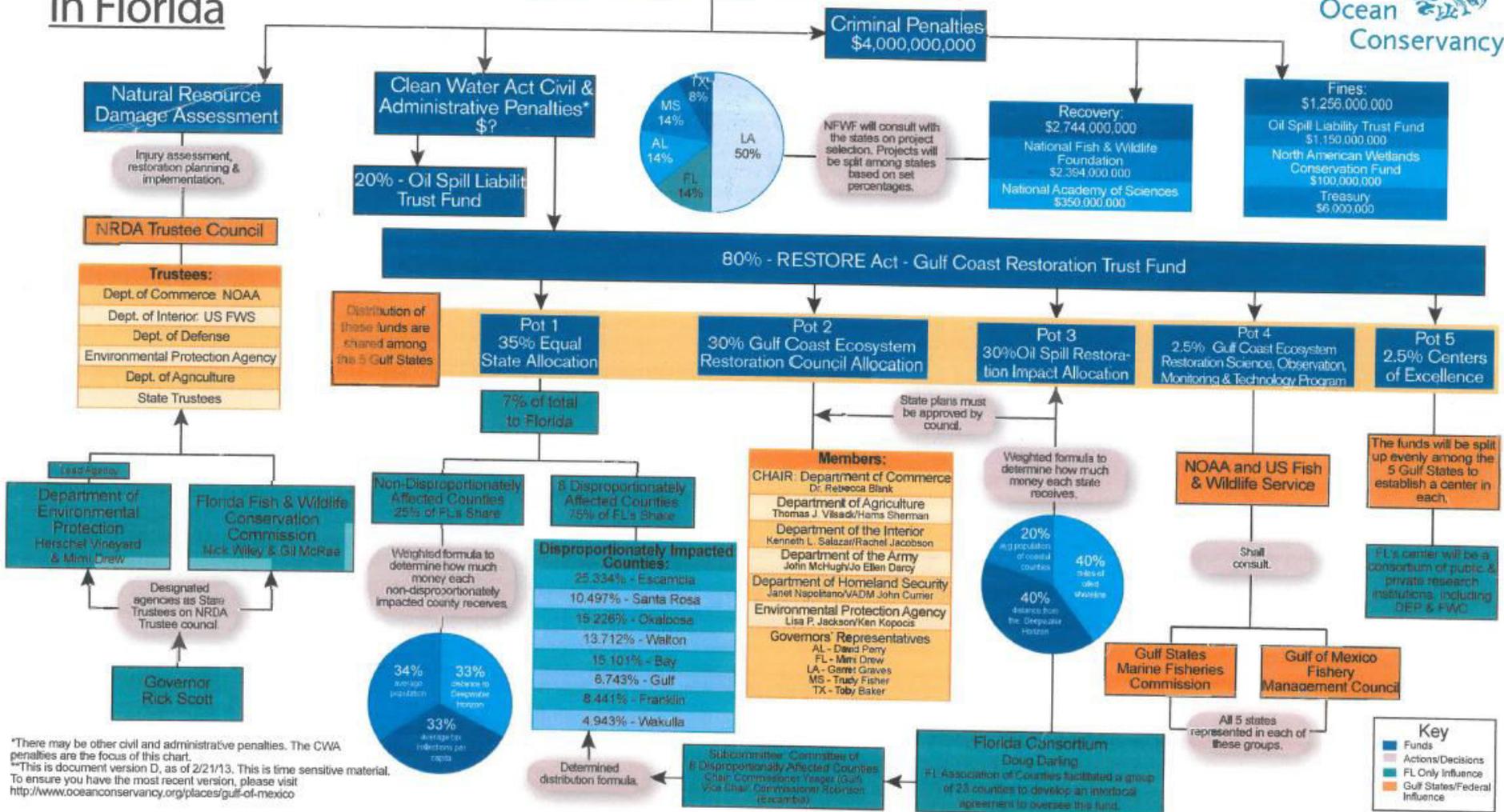
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Coverage polygons digitized from USGS 2004 aerial

Deepwater Horizon Oil Spill Penalties and Opportunities to Fund Restoration in Florida

Flow of Oil Spill Funds in Florida

Resolution of Criminal, Civil, Administrative & Natural Resource Claims

Contact: T.J. Marshall
Director, Constituent Outreach
tmarshall@oceanconservancy.org
727-369-6616



*There may be other civil and administrative penalties. The CWA penalties are the focus of this chart.
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Previous Work

30 Circular Exclosure Cages used in Pilot Study
at Lake Trafford during low water in 2008



Lake Trafford Planting Site in 2012

\$21,350,000 CERP dredging project 2004-2011





