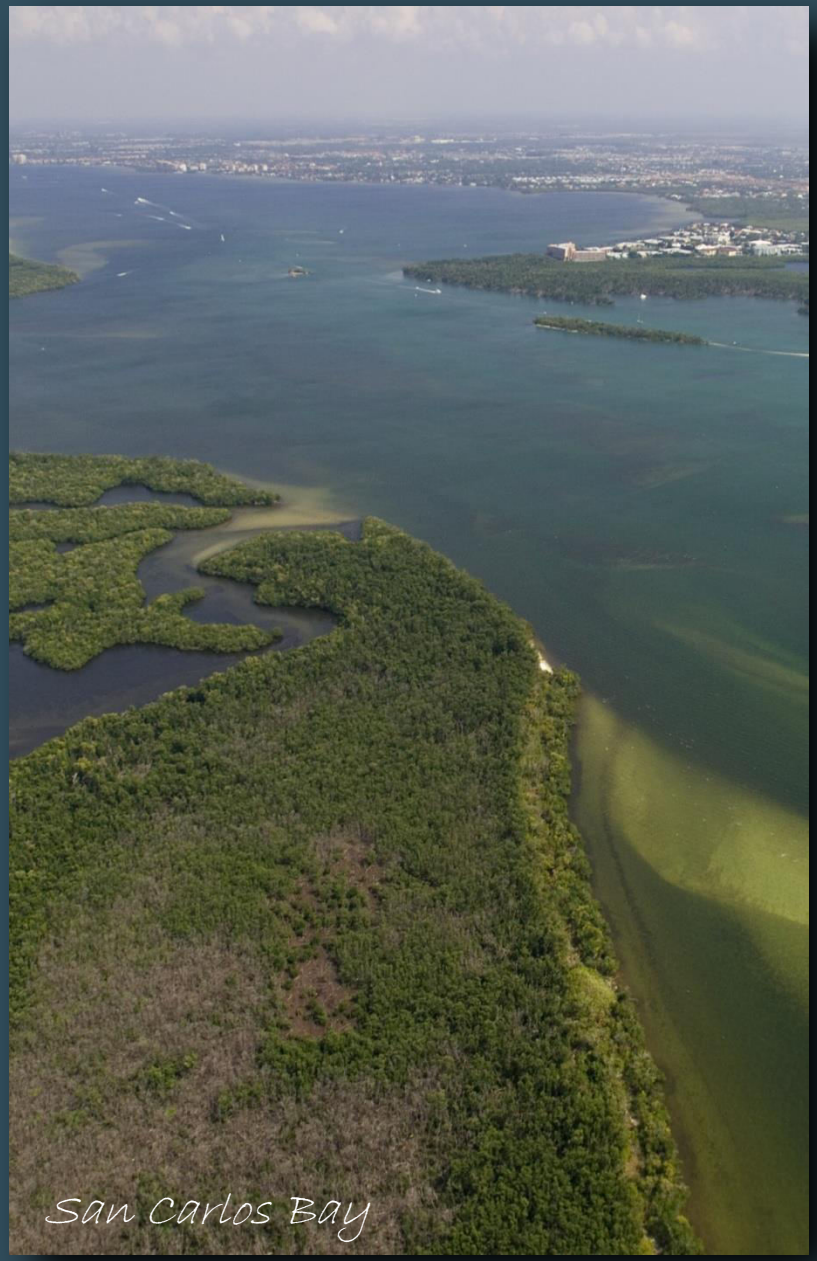


Project and System-Wide Monitoring in the Caloosahatchee River and Estuary

Peter Doering, Ph.D.
Section Administrator
Coastal Ecosystems
Water Resources Division
South Florida Water Management District

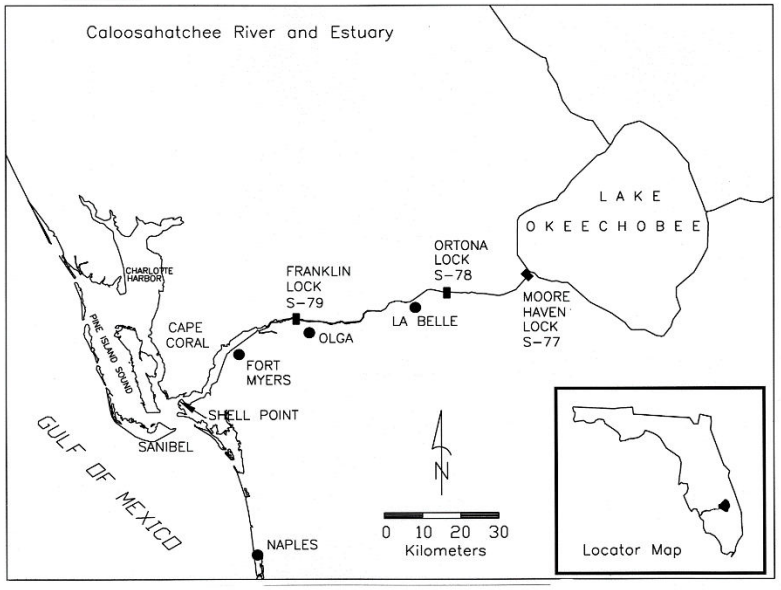
RECOVER
Science Meeting

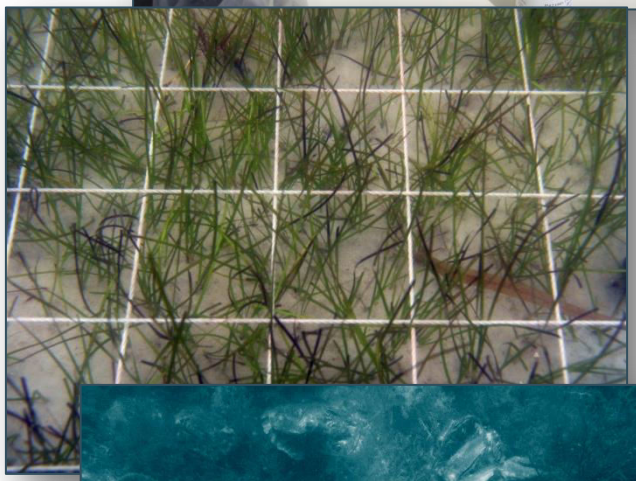
March 2, 2016

sfwmd.gov

C-43 West Basin Reservoir Project Monitoring

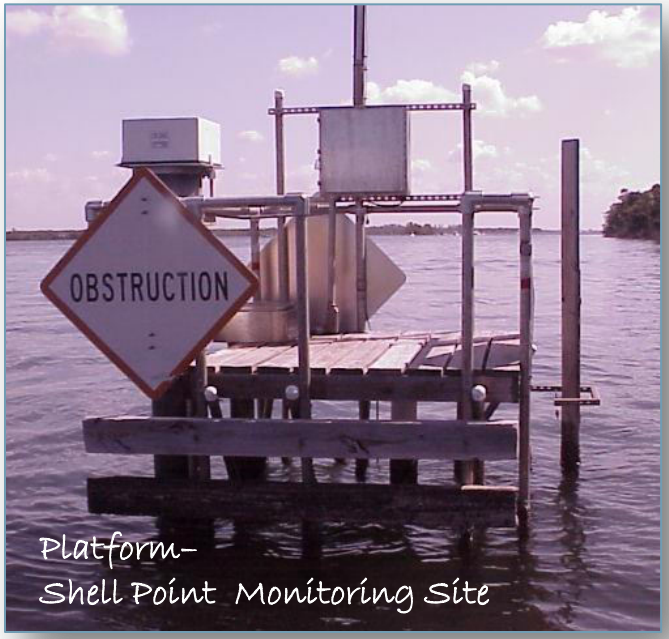
- Salinity
- Water Quality
- Ecological

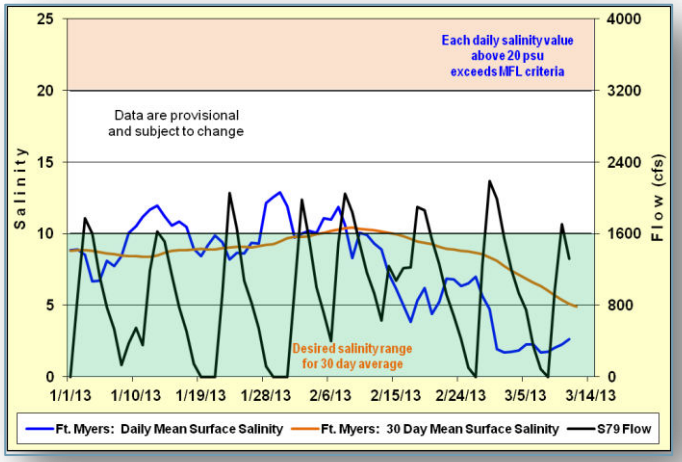




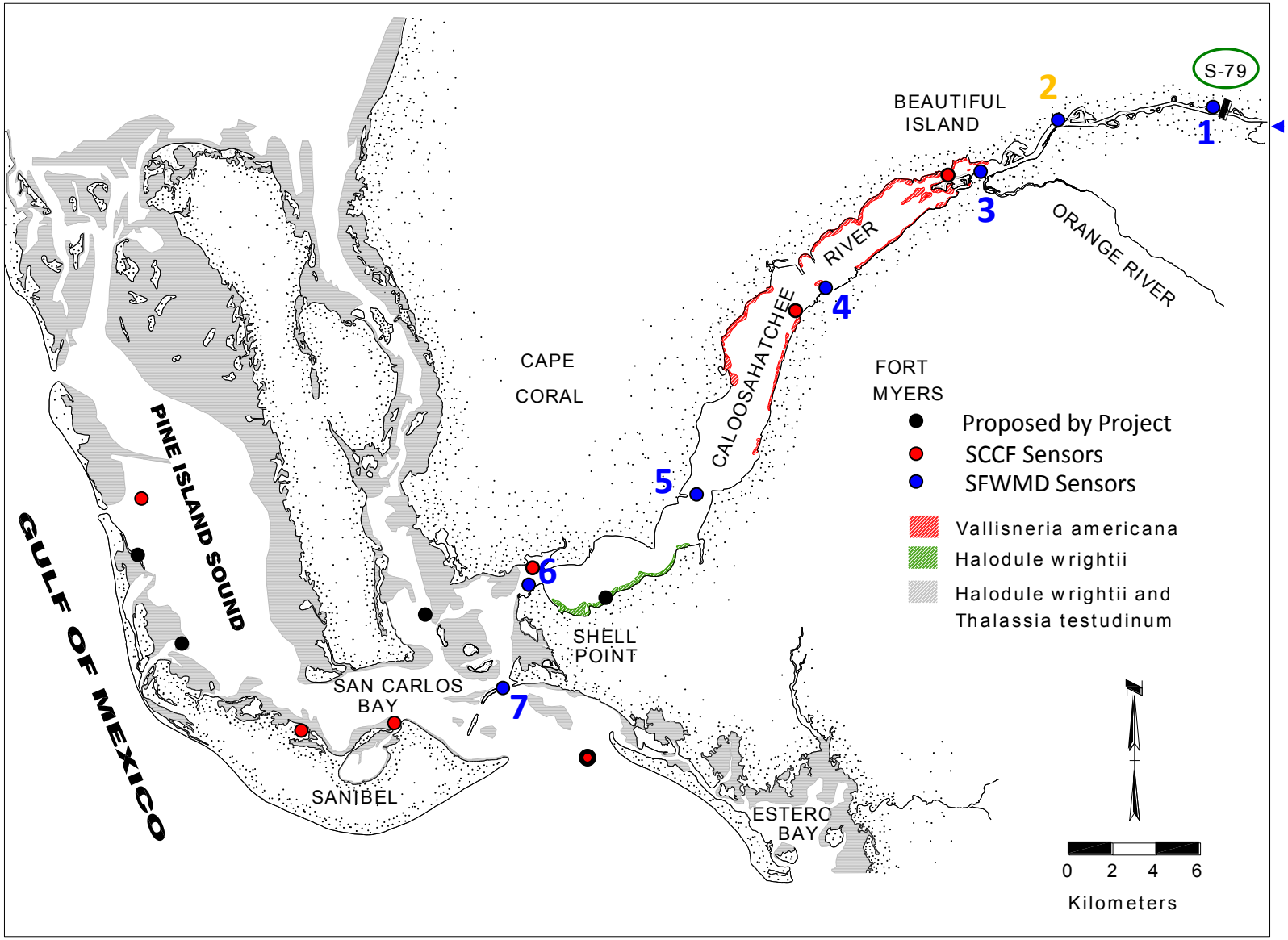
Salinity Monitoring

- Project Monitoring Based on Two Networks
  - South Florida Water Management
    - Temp, SpCond, Salinity (calc)
    - 6 active sites
  - Sanibel-Captiva Conservation Foundation
    - Temp, Salinity and additional WQ parameters
    - 7 active sites





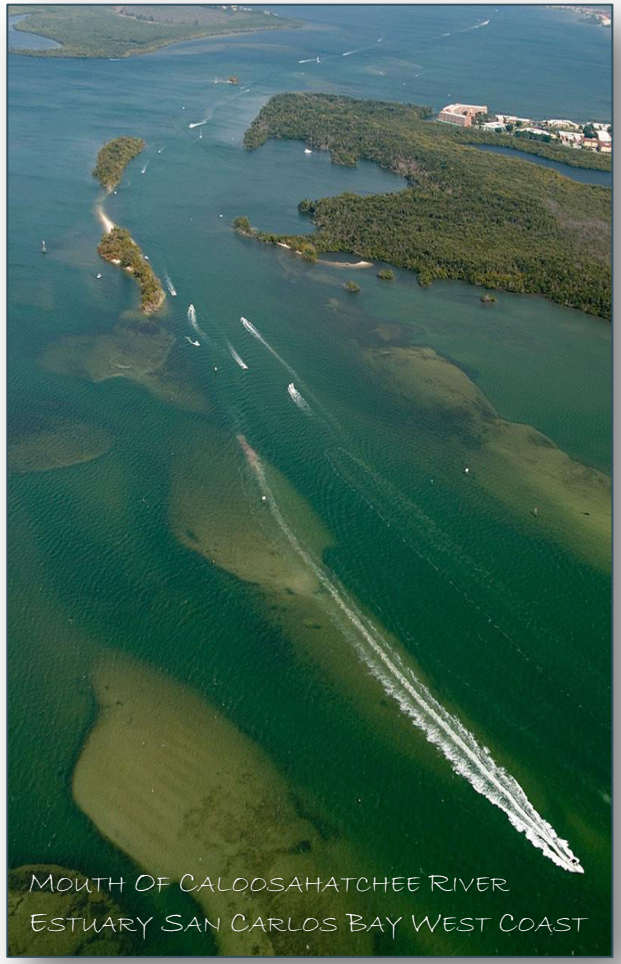
Salinity Sensor Locations



Water Quality Monitoring

Existing SFWMD Programs

- **CRFW: 4 Stations**
  Caloosahatchee Fresh Water
- **CESWQ: 8 Stations**
  Caloosahatchee Estuary – San Carlos Bay
- **ROOK: 4 Stations**
  San Carlos Bay – Pine Island Sound

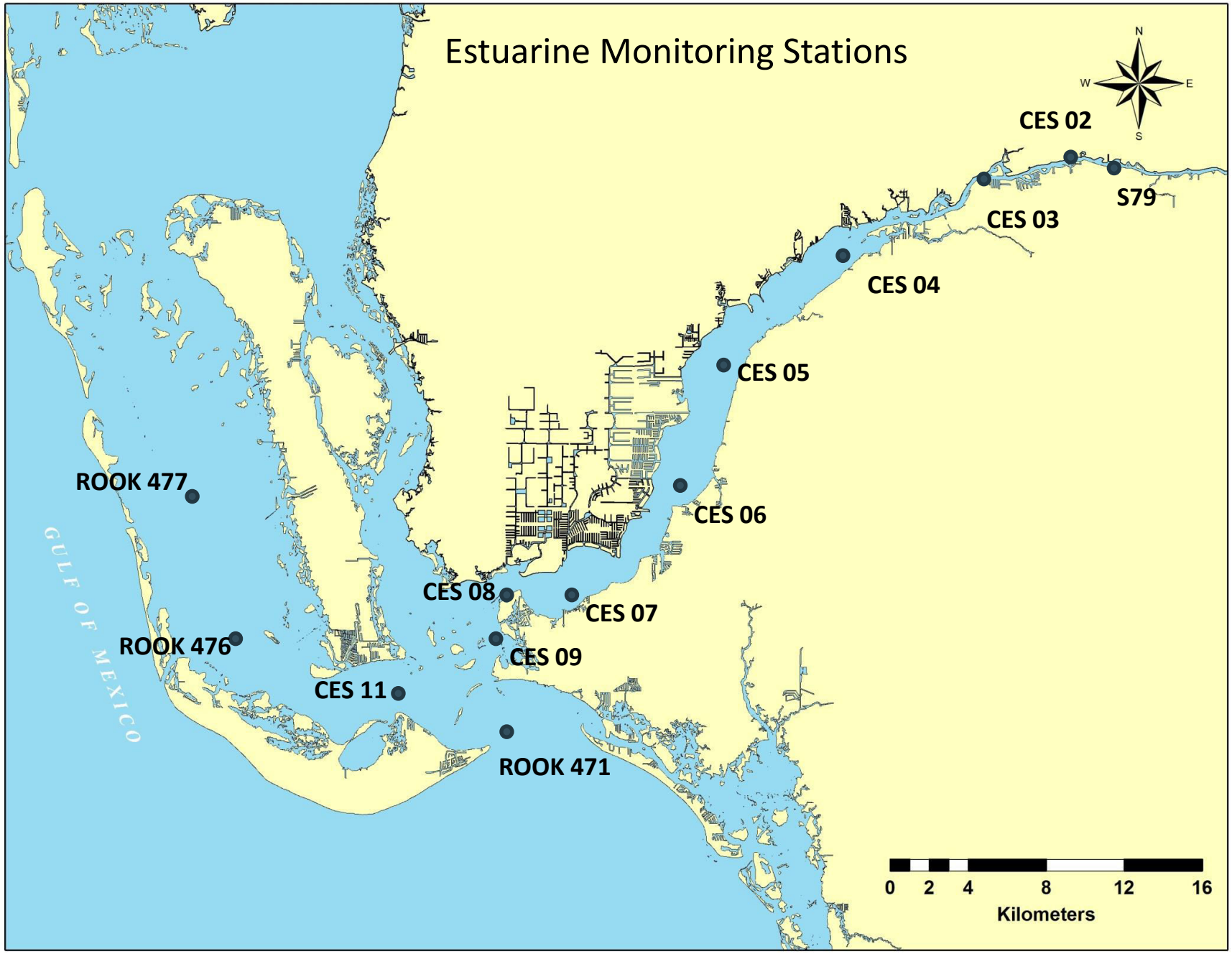


Stations Sampled

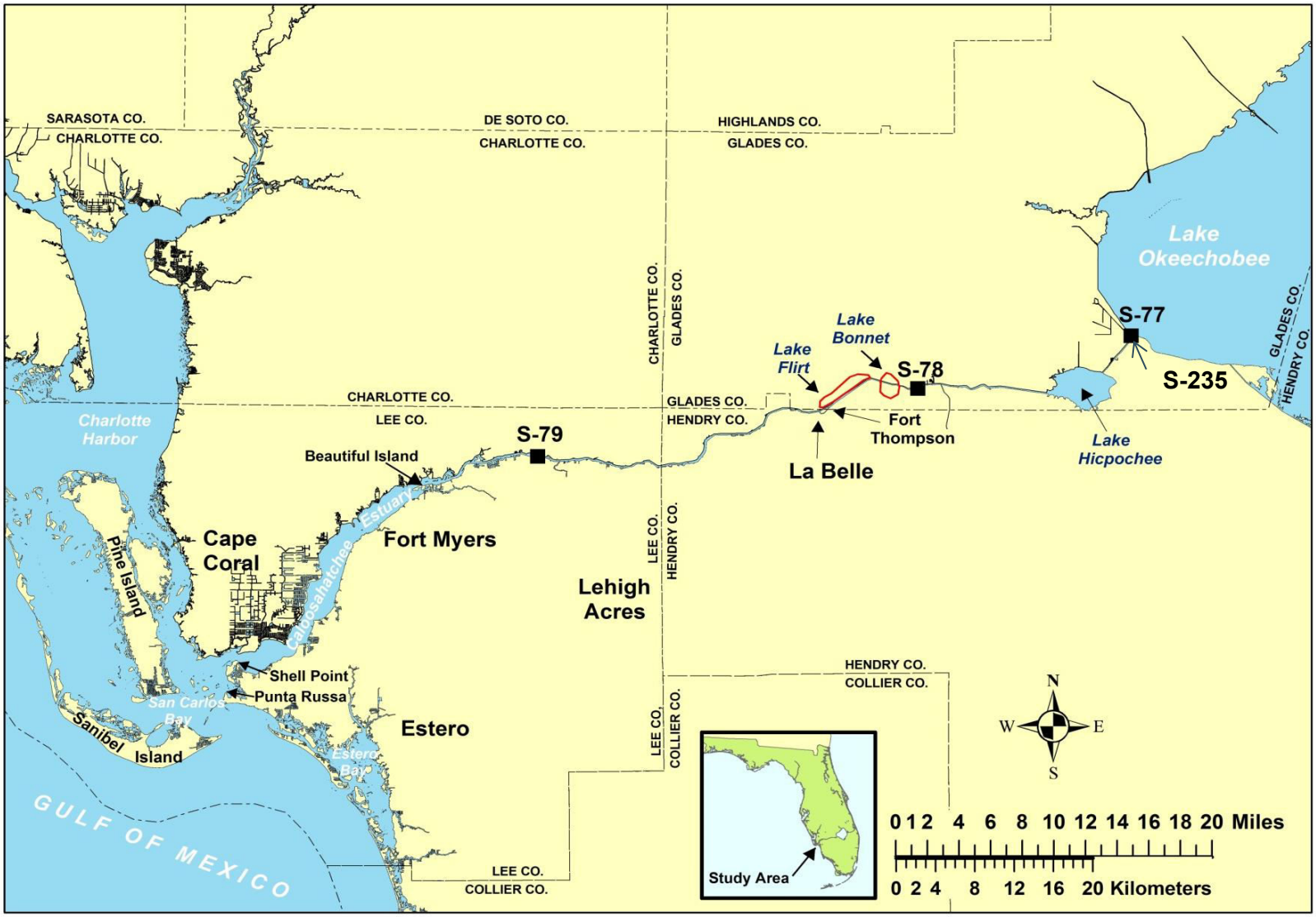
	Project	Station	Frequency
1	CRFW	S79	Bi-weekly, Quart
2	CESWQ	CES 02	Bi-monthly
3	CESWQ	CES 03	Bi-monthly
4	CESWQ	CES 04	Bi-monthly
5	CESWQ	CES 05	Bi-monthly
6	CESWQ	CES 06	Bi-monthly
7	CESWQ	CES 07	Bi-monthly
8	CESWQ	CES 08	Bi-monthly
9	CESWQ	CES 09	Bi-monthly
10	ROOK	CES 11	Bi-monthly
11	ROOK	ROOK 471	Bi-monthly
12	ROOK	ROOK 476	Bi-monthly
13	ROOK	ROOK 477	Bi-monthly
14	CRFW	S77	Bi-weekly, Quart
15	CRFW	S235	Bi-weekly, Quart
16	CRFW	S78	Bi-weekly, Quart

Water Quality Parameters

Parameter	CRFW	CES	Rook
Turbidity	✓	✓	✓
Color	✓	✓	----
Total Susp. Solids	✓	✓	----
Nitrate +Nitrite	✓	✓	✓
Nitrite	✓	✓	✓
Ammonia	✓	✓	✓
TKN	✓	✓	✓
Ortho-Phosphate	✓	✓	✓
Total Phosphate	✓	✓	✓
Dissolved Silica	✓	✓	----
Total Org. Carbon	✓	✓	✓
Chlorophyll a,b	✓	✓	✓
DO, pH, T, S, Secchi	----	✓	✓
PAR	----	----	✓


Estuarine Monitoring Stations
N
W
E
S
CES 02
S79
CES 03
CES 04
CES 05
CES 06
CES 07
CES 08
CES 09
CES 11
ROOK 477
ROOK 476
ROOK 471
GULF OF MEXICO
0 2 4 8 12 16
Kilometers

Caloosahatchee River Fresh Water Stations

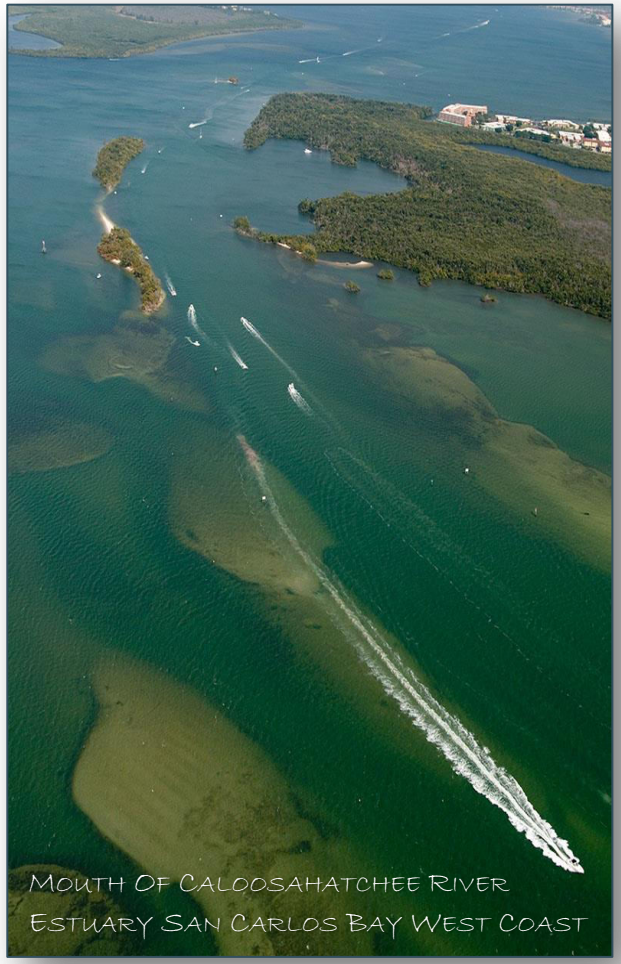


All stations associated with a water control structure

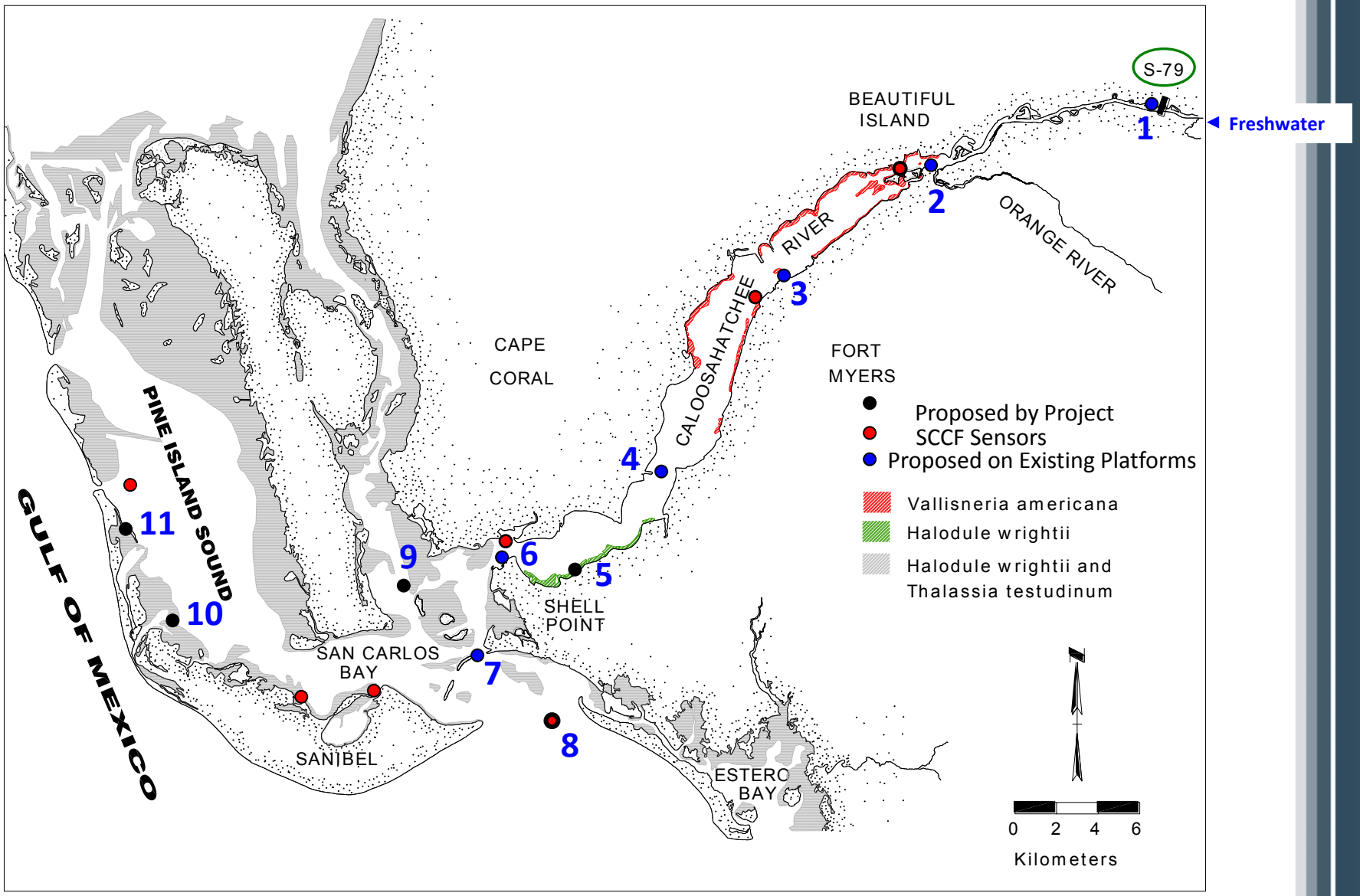
Water Quality Monitoring

C-43 West Basin Storage Reservoir

- **Collection of grab samples inadequate**
- **Propose network of continuous samplers**
  Electronic sensors and deployable wet chemical units
- **Light Extinction**
  At five stations



Water Quality Sensor Locations



Proposed Continuous Water Quality Monitoring Network

Proposed Parameters

- TN
- DIN
- TP
- SRP
- Chl *a*
- Color
- Turbidity
- D. O.
- PAR

Nutrients -2X /day
DO,PAR -30 min interval

Station -Location	Proposed Parameters	Current	Comment
1-S79	TN	TN Grab	
2-Val I-75	TN, inorg N, TP inorg P, Chl a, color, turbidity, D.O.	SCCF- Beautiful Island : Chla, D.O., Color, turbidity	SCCF station near 2-Val I75
3- Ft Myers Yacht Basin	TN, inorg N, TP inorg P, Chl a, color, turbidity, D.O., PAR	SCCF- Sensor Marker 52 : Chla, D.O., Color, turbidity	SCCF station near 3-Ft. Myers Yacht Basin
4-Cape Coral Bridge	TN, inorg N, TP inorg P, Chl a, color, turbidity, D.O.	None	
5-Iona Cove	TN, inorg N, TP inorg P, Chl a, color, turbidity, D.O., PAR	None	
6-Shell Point	D.O.	SCCF- Sensor Shell Point : Chla, D.O., Color, turbidity	SCCF Station near 6-Shell Point
7-Sanibell Causeway	TN, inorg N, TP inorg P, Chl a, color, turbidity	None	
8- GOM	TN, inorg N, TP inorg P, Chl a, color, turbidity	SCCF- Sensor GOM: Chla, D.O., Color, turbidity	This is an SCCF Station
9-Matlacha Pass	TN, inorg N, TP inorg P, Chl a, color, turbidity, D.O., PAR	None	
10- Blind Pass	TN, inorg N, TP inorg P, Chl a, color, turbidity, D.O., PAR	SCCF- Sensor McIntyre Creek: Chla, D.O., Color, turbidity	SCCF Station at McIntyre Creek
11- Redfish Pass	TN, inorg N, TP inorg P, Chl a, color, turbidity, D.O., PAR	SCCF- Sensor Redfish Pass : Chla, D.O., Color, turbidity	This is an SCCF Station

Ecological Monitoring

- Oysters
- Submerged Aquatic Vegetation
  - Aerial Photography
  - Hydroacoustic Monitoring
  - Manual In-water
- Fish

Oyster Monitoring

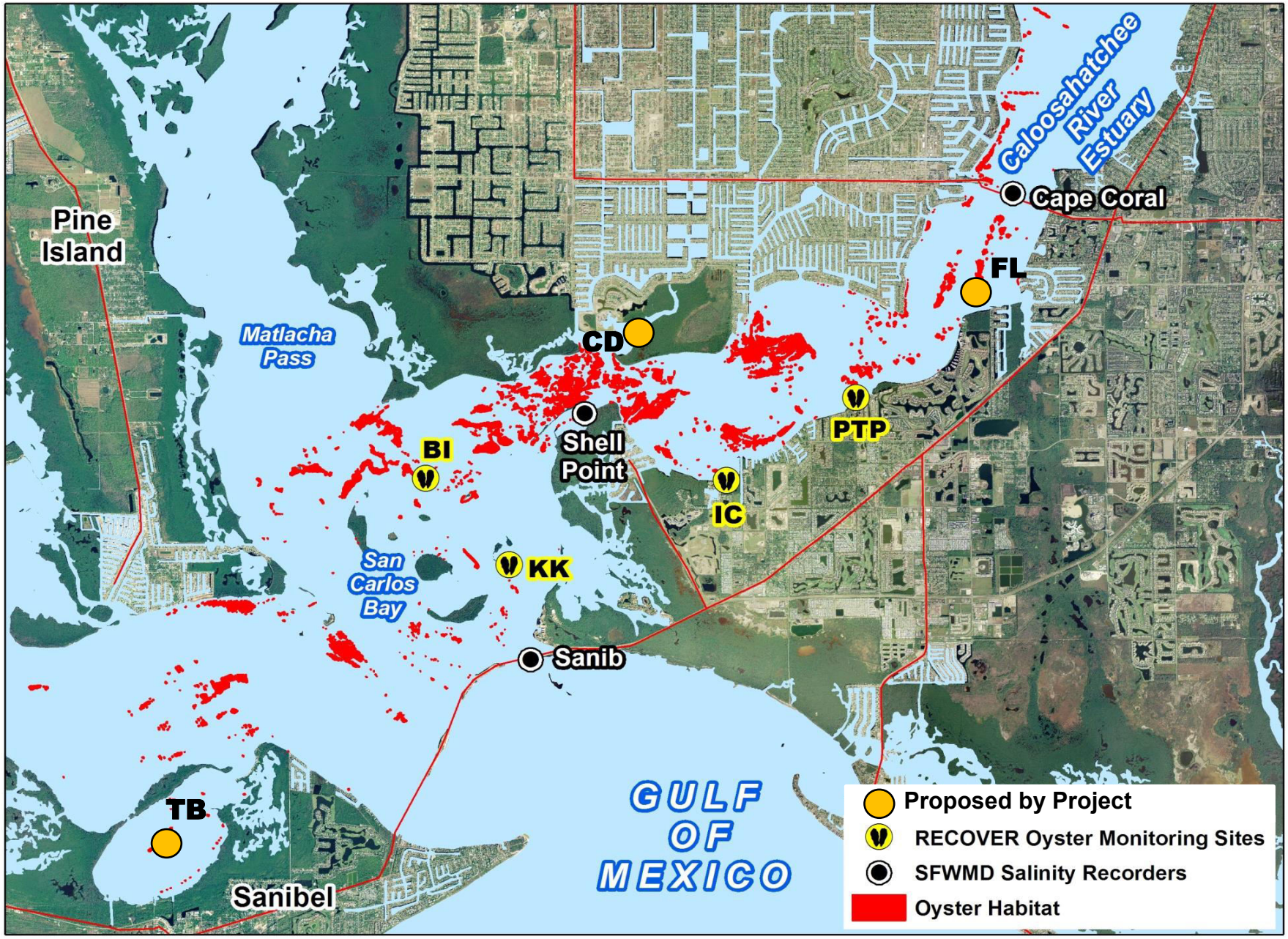
Proposed Project Monitoring

Added 1 station to existing RECOVER Program

- Monthly at 7 Stations
  - Condition Index
  - Reproductive Condition
  - Larval Settlement
  - Juvenile Growth
  - Predation
  - Disease
- Twice Per Year
  - Live Oyster Density
  - Dead Oyster Density
  - Size Distribution (Live and Dead)

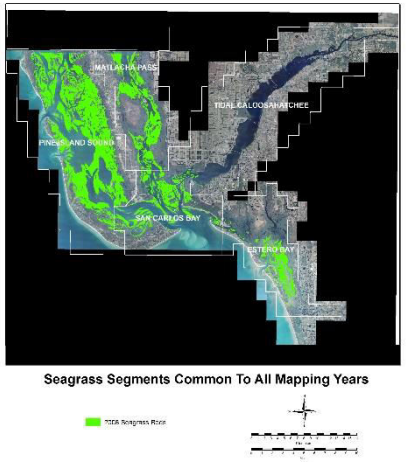
Current RECOVER Monitoring

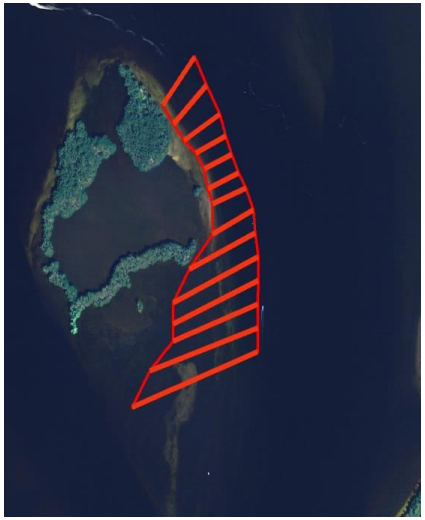
- Monthly at Four Stations
  - Reproductive Condition
  - Larval Settlement
  - Juvenile Growth
  - Predation
  - Disease
- Twice per Year
  - Live Oyster Density
  - Size Distribution

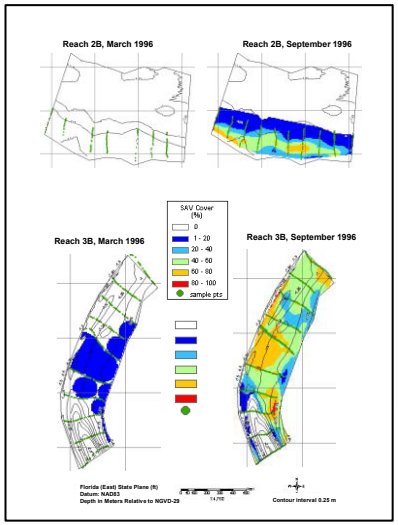

Pine Island
Matlacha Pass
San Carlos Bay
Caloosahatchee River Estuary
Cape Coral
FL
CD
Shell Point
PTP
BI
IC
KK
Sanib
TB
Sanibel
GULF OF MEXICO
Proposed by Project
RECOVER Oyster Monitoring Sites
SFWMD Salinity Recorders
Oyster Habitat

Submerged Aquatic Vegetation

- Project Monitoring on 3 Spatial Scales
  - Aerial Photography- System-wide, Every Two Years
  - Hydroacoustic - KM^2 Scale, 3X per year
  - In-Water Quadrat- Patch (M^2) Scale-Monthly

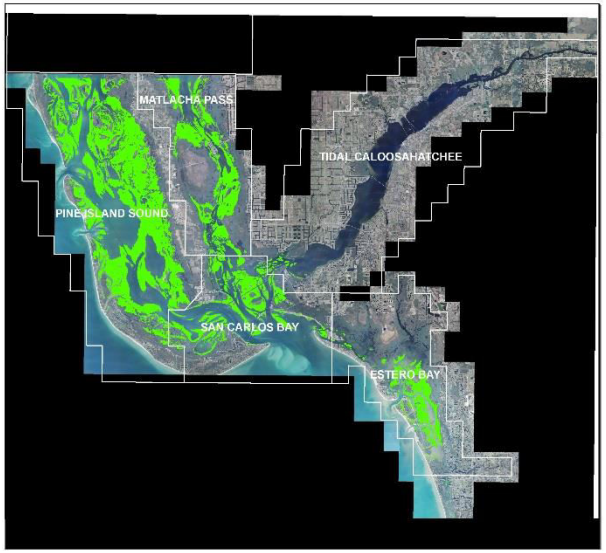






Aerial Photography

- Aerial Photography and Mapping
- Occurred in 1999, 2003, 2004, 2006, 2008, 2014
- Project Frequency- Every 2 years for 6-10 years
- RECOVER- Once every 5 years

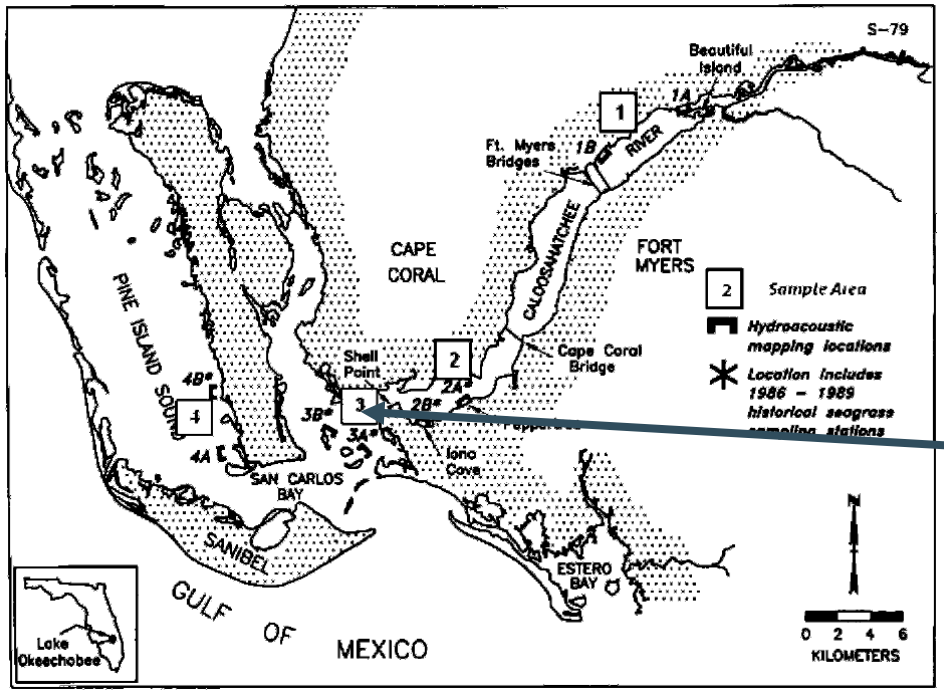


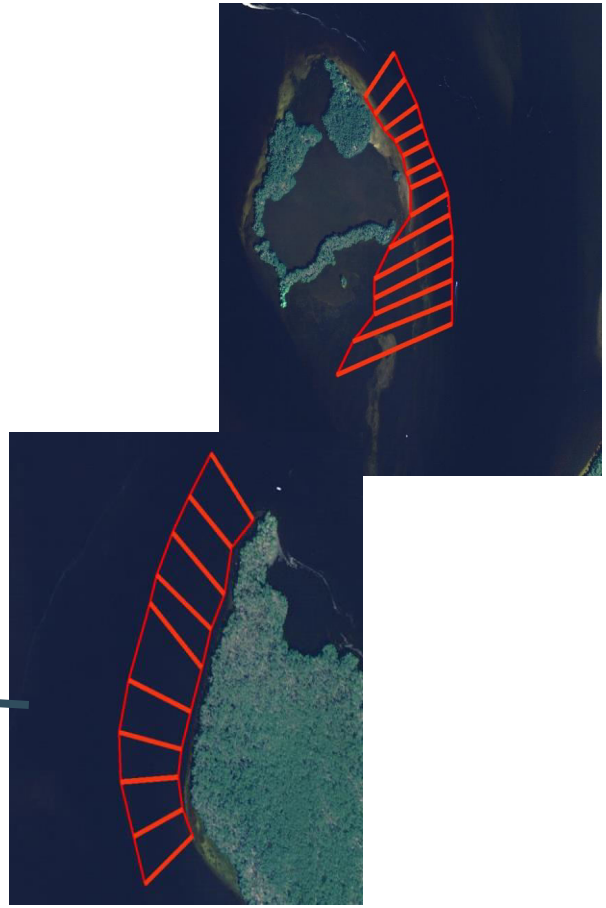
Seagrass Segments Common To All Mapping Years

2008 Seagrass Beds

Hydroacoustic Mapping

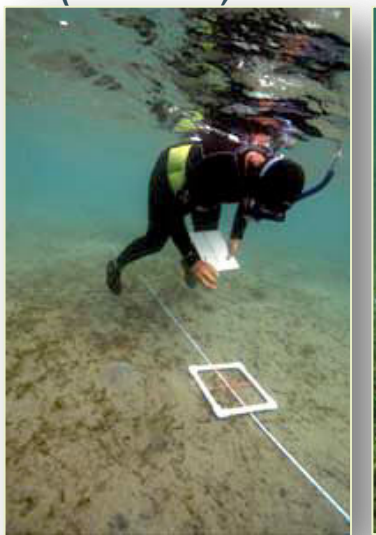
- Conducted by SFWMD 1996 – 2008
- Mapping 3x per year
- 4 Areas, Two Reaches per Area
- **Discontinued**



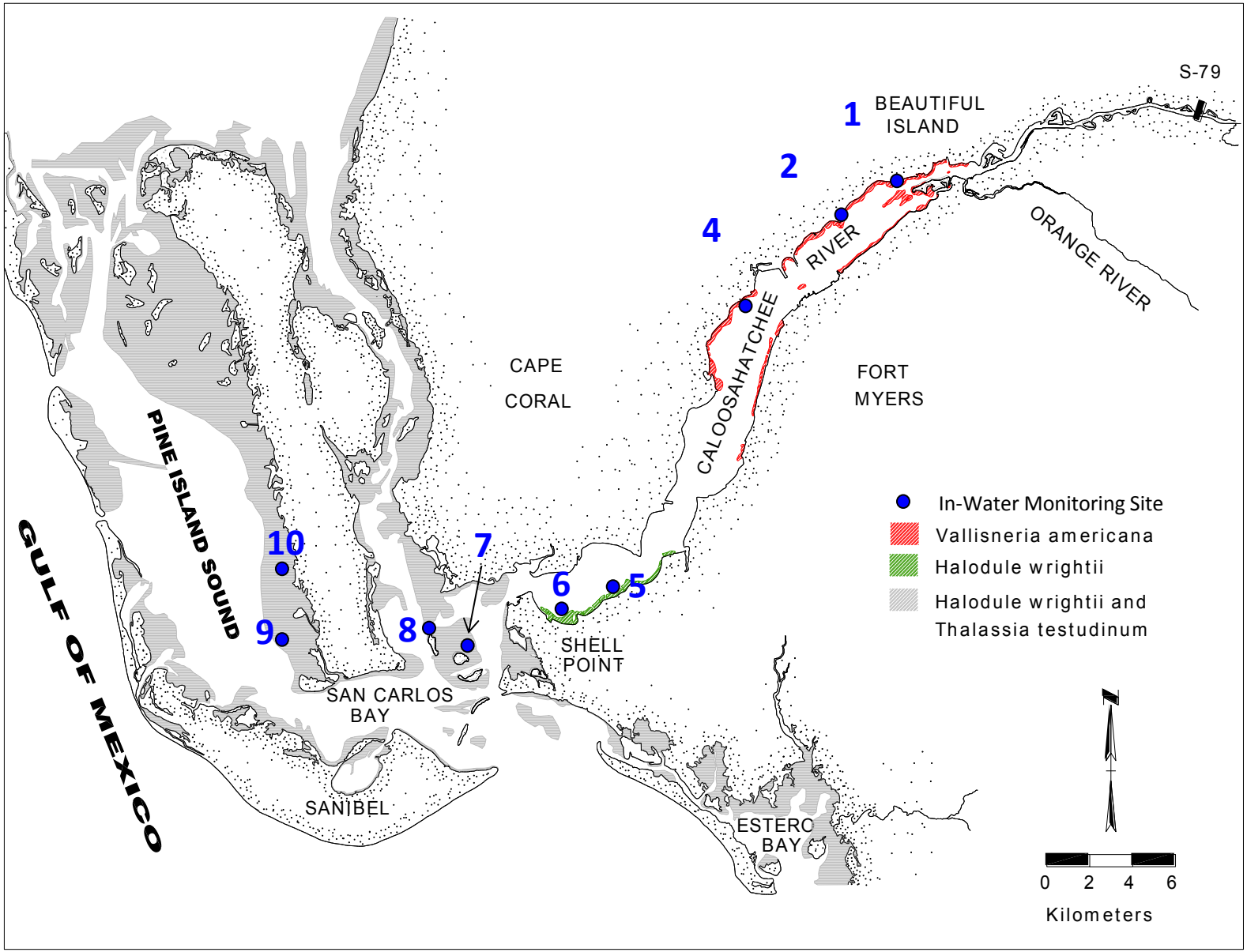


Patch Scale Quadrat Monitoring

- Project Calls for Monthly Sampling at 9 stations-*added two stations to existing RECOVER Program*
- RECOVER Samples 7 Stations- 5 Sta (4X/yr), 2 Sta (8X/yr)
  - Percent Occurrence (Total and by Species)
  - Visual Estimate of Percent Cover (Total and by Species)
  - Canopy Height
  - Visual Estimate of Epiphyte Density (0=none, 3=too dense to see SAV Blade)



Submerged Aquatic Vegetation Monitoring Sites



FISH- FWC Fisheries Independent Monitoring

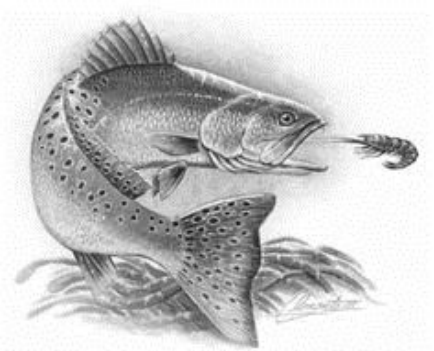
- Fish Sampled 2004-2007
- Relationships between freshwater inflow and fish populations were found
- These deemed not to be useful for management purposes

FWC/FWRI File Code: F2706-07-I2

RELATIONSHIPS BETWEEN FRESHWATER INFLOWS AND FISH POPULATIONS IN THE CALOOSAHATCHEE RIVER ESTUARY, FLORIDA

P.W., Stevens; M.F.D. Greenwood; T.C. MacDonald; C.F. Idelberger, R.H. McMichael, Jr.

Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute
100 Eighth Avenue Southeast
St. Petersburg, Florida 33701-5095



Prepared for

The South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

Draft, July 2008

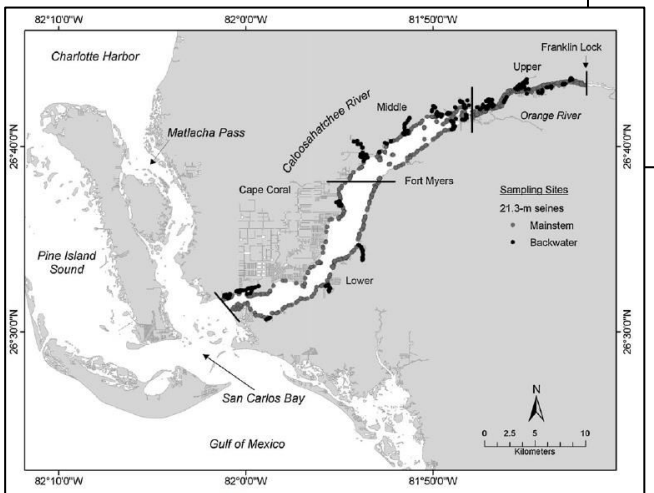
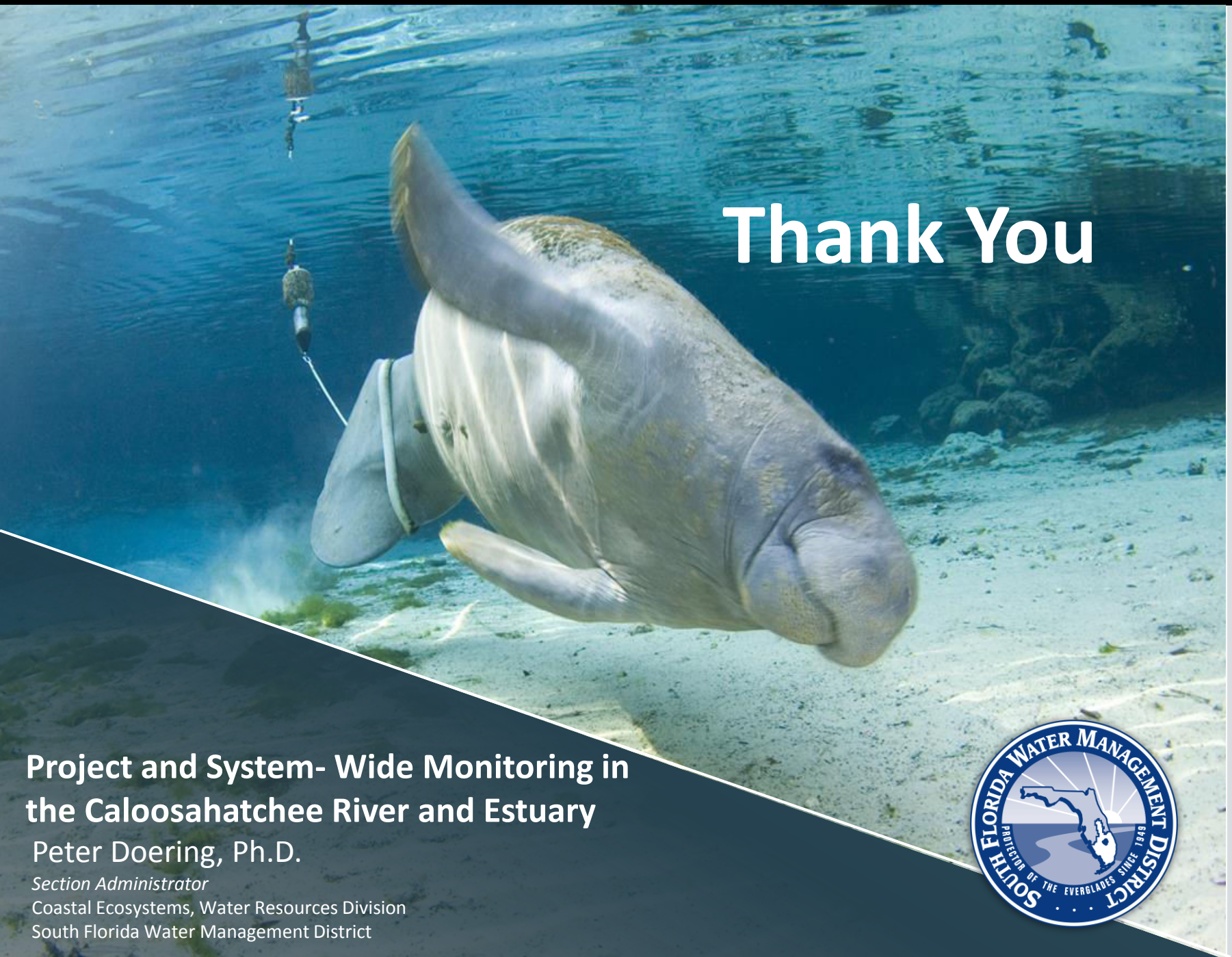


Fig. 1 Mainstem and backwater sampling sites in the Caloosahatchee River, Florida. River sections (lower, middle, upper) used in the analysis are delineated by vectors



Thank You

Project and System- Wide Monitoring in the Caloosahatchee River and Estuary

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