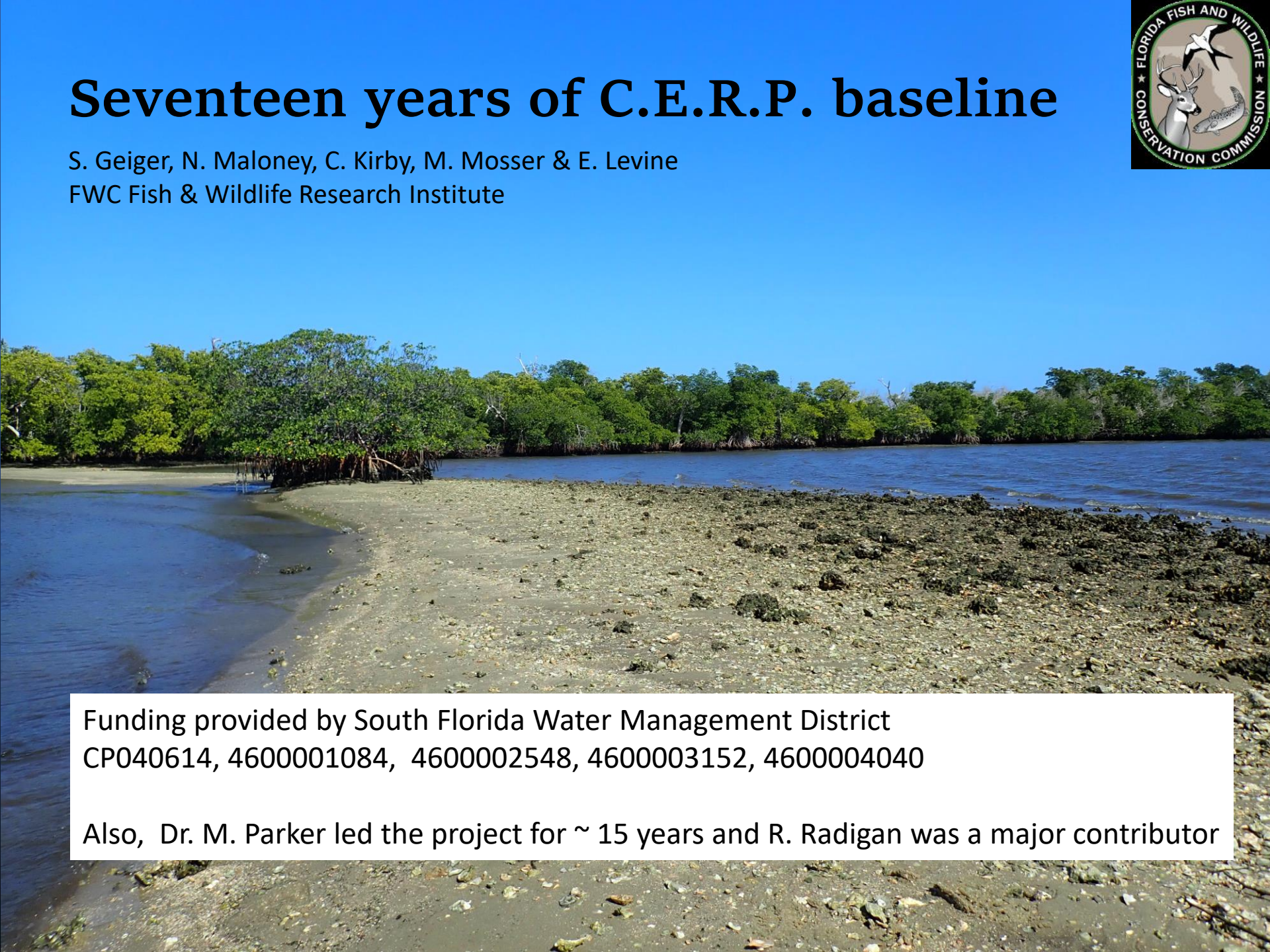
Seventeen years of C.E.R.P. baseline

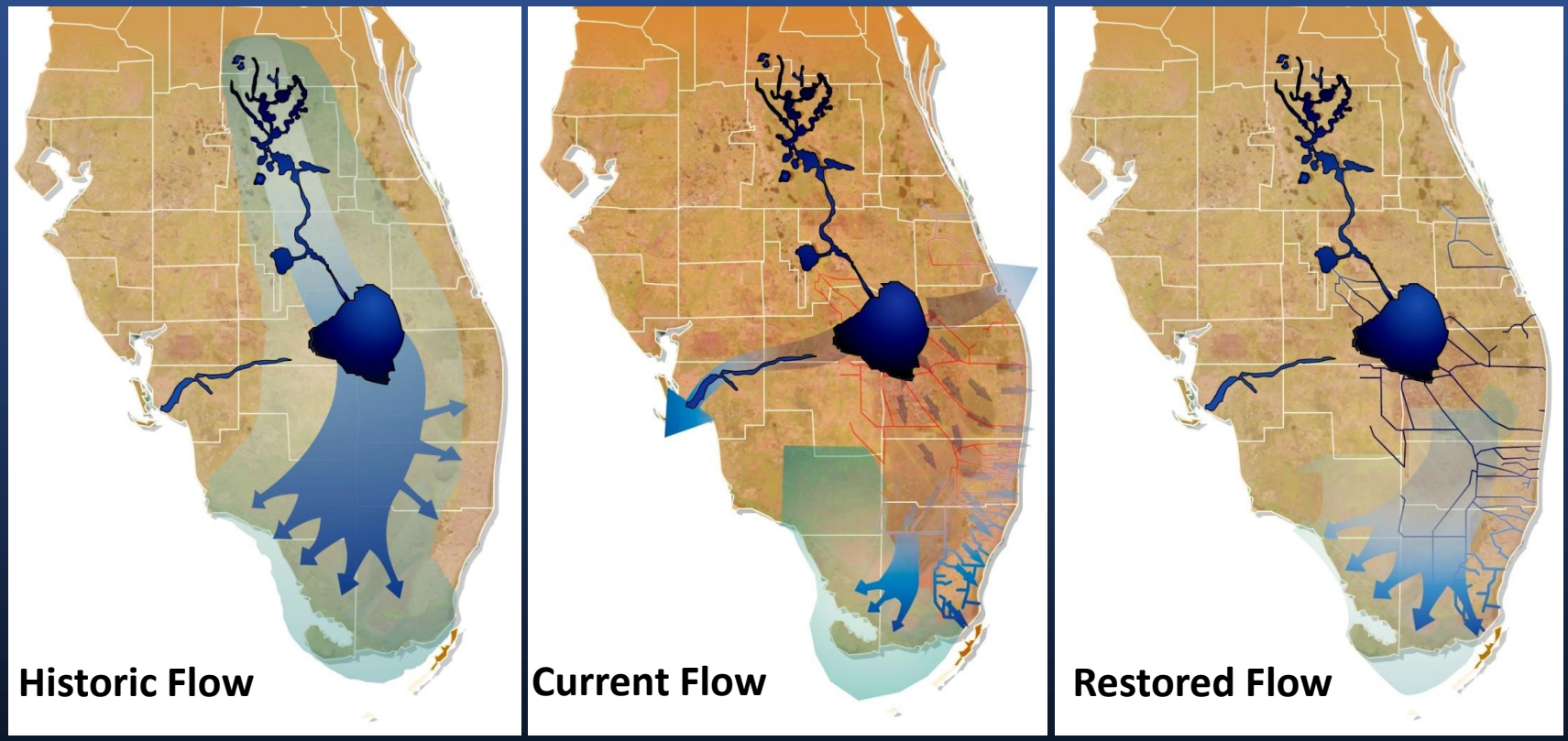
S. Geiger, N. Maloney, C. Kirby, M. Mosser & E. Levine
FWC Fish & Wildlife Research Institute



Funding provided by South Florida Water Management District
CP040614, 4600001084, 4600002548, 4600003152, 4600004040

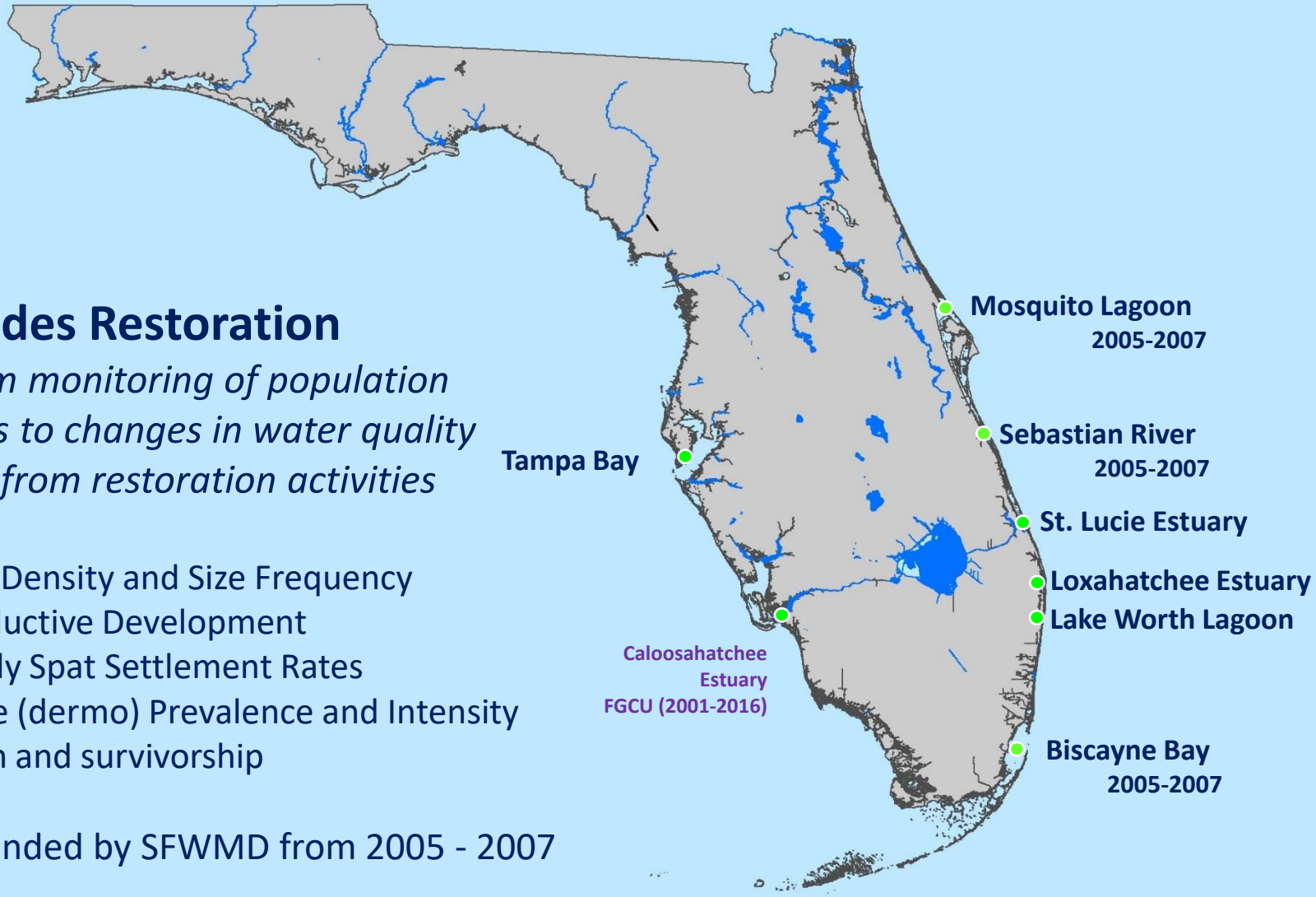
Also, Dr. M. Parker led the project for ~ 15 years and R. Radigan was a major contributor

Water Flow in South Florida



U.S. Army Corps of Engineers, Jacksonville District

Oysters as estuarine indicator species



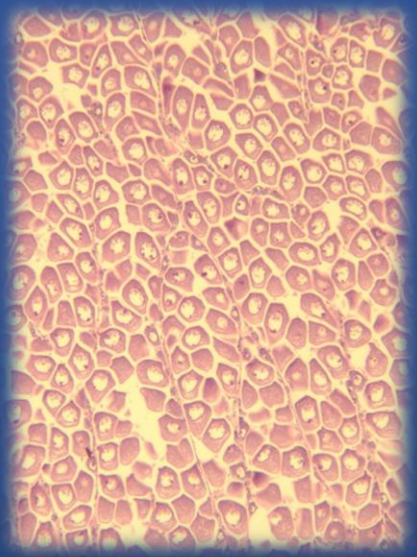
Everglades Restoration

Long-term monitoring of population responses to changes in water quality resulting from restoration activities

- Oyster Density and Size Frequency
- Reproductive Development
- Monthly Spat Settlement Rates
- Disease (dermo) Prevalence and Intensity
- Growth and survivorship

Initially funded by SFWMD from 2005 - 2007

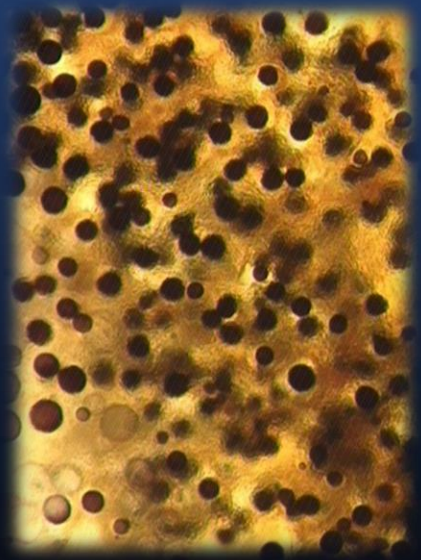
Density



Reproduction

Settlement

Disease



Growth

Table 4 – Component score for oysters in the Caloosahatchee Estuary for translating performance measures into a stoplight display

Component	Parameter value	Parameter value stoplight	Index score	Trend	Trend stoplight	Trend score	Average component score	Component stoplight
Oysters								
Living density (per m^2)	1029		1	±		0.5	(1 + 0.5)/2 = 0.75	
Condition index	2.96		0.5	±		0.5	(0.5 + 0.5)/2 = 0.5	
Gonadal Index	2.61		1	±		0.5	(1 + 0.5)/2 = 0.75	
Spat recruitment per shell	6.43		0.5	±		0.5	(0 + 0.5)/2 = 0.5	
Juvenile growth (mm/month)	2		0.5	±		0.5	(0.5 + 0.5)/2 = 0.5	
Perkinsus marinus prevalence	49.5		0.5	–		0	(0.5 + 0)/2 = 0.25	
Perkinsus marinus intensity	0.83		1	–		0	(1 + 0)/2 = 0.5	
Geometric mean of oyster component scores $(0.75 \times 0.5 \times 0.75 \times 0.5 \times 0.5 \times 0.25 \times 0.5)^{1/7} = 0.508$								
Final Eastern oyster index score = 0.5								

ECOLOGICAL INDICATORS 9S (2009) S120–S136

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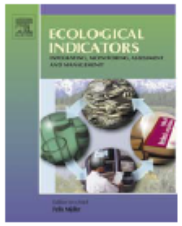
journal homepage: www.elsevier.com/locate/ecolind



Eastern oysters (*Crassostrea virginica*) as an indicator for restoration of Everglades Ecosystems

Aswani K. Volety [a,*], *Michael Savarese* [a], *S. Gregory Tolley* [a], *William S. Arnold* [b], *Patricia Sime* [c], *Patricia Goodman* [c], *Robert H. Chamberlain* [c], *Peter H. Doering* [c]

[a] *Coastal Watershed Institute, Florida Gulf Coast University, 10501 FGCU Boulevard South, Fort Myers, FL 33965, United States*
[b] *Fish and Wildlife Research Institute, 100 Eighth Avenue SE, St. Petersburg, FL 33701, United States*
[c] *South Florida Water Management District, 3301 Gun Club Road, West Palm Beach, FL 33406, United States*

The original stoplight score has now been adjusted so each estuary has its own relative rating scale

EVERGLADESRESTORATION.GOV

LEADERSHIP • PARTNERSHIP • RESULTS

GENERATION 1 (WRDA 2007):

- Decomp Physical Model
- Indian River Lagoon - South (C-44 Reservoir & STA)
- Melaleuca Eradication and Other Exotic Plants
- Picayune Strand Restoration
- Site 1 Impoundment Project

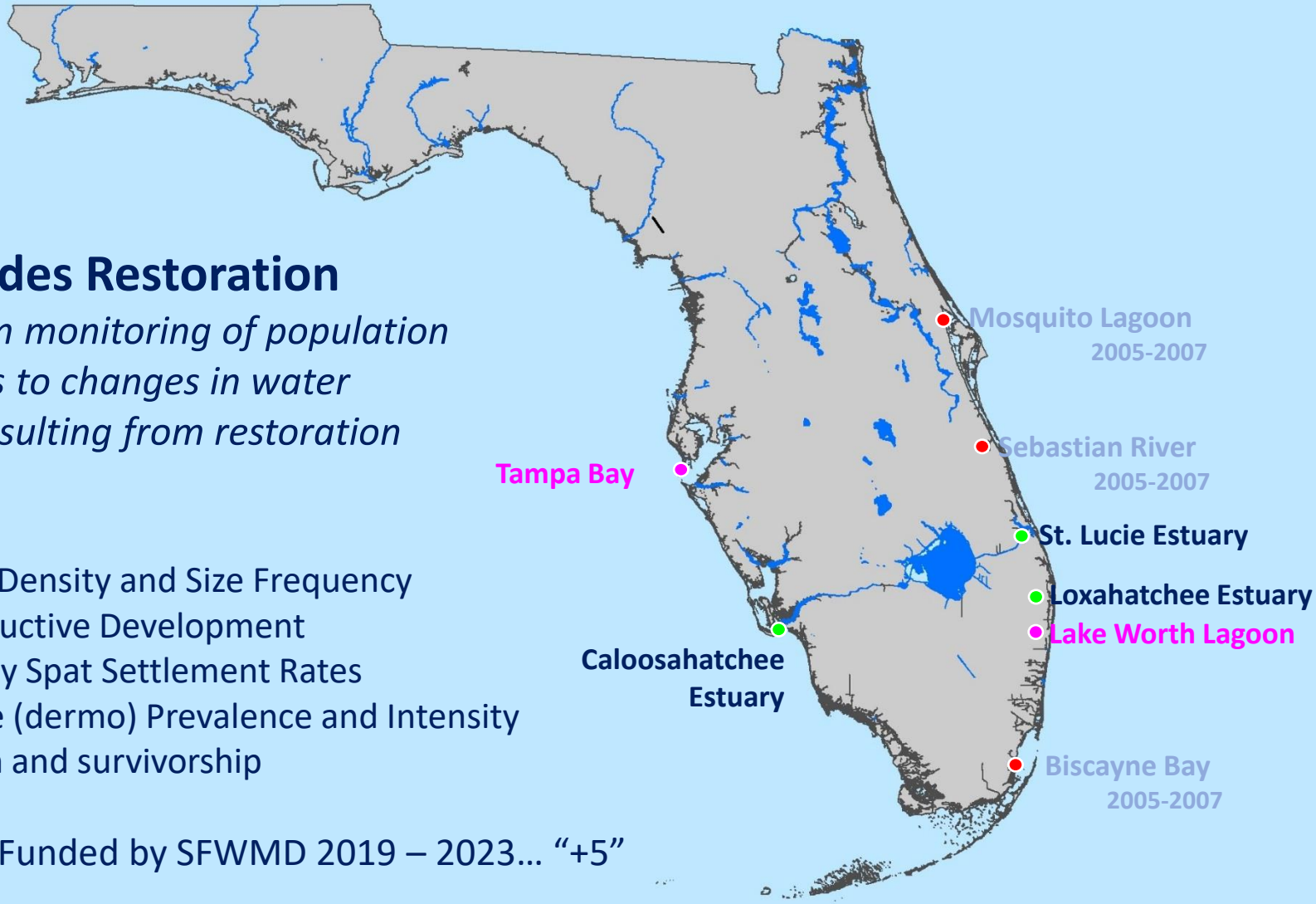
GENERATION 2 (WRRDA 2014):

- Biscayne Bay Coastal Wetlands-Phase 1
- Broward County Water Preserve Areas
- C-111 Spreader Canal Western Project
- Caloosahatchee River (C-43) West Basin Storage

https://www.evergladesrestoration.gov/comprehensive-everglades-restoration-plan

There are starting to be projects completed that affect water flow.

Oysters as estuarine indicator species



Everglades Restoration

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- Oyster Density and Size Frequency
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- Disease (dermo) Prevalence and Intensity
- Growth and survivorship

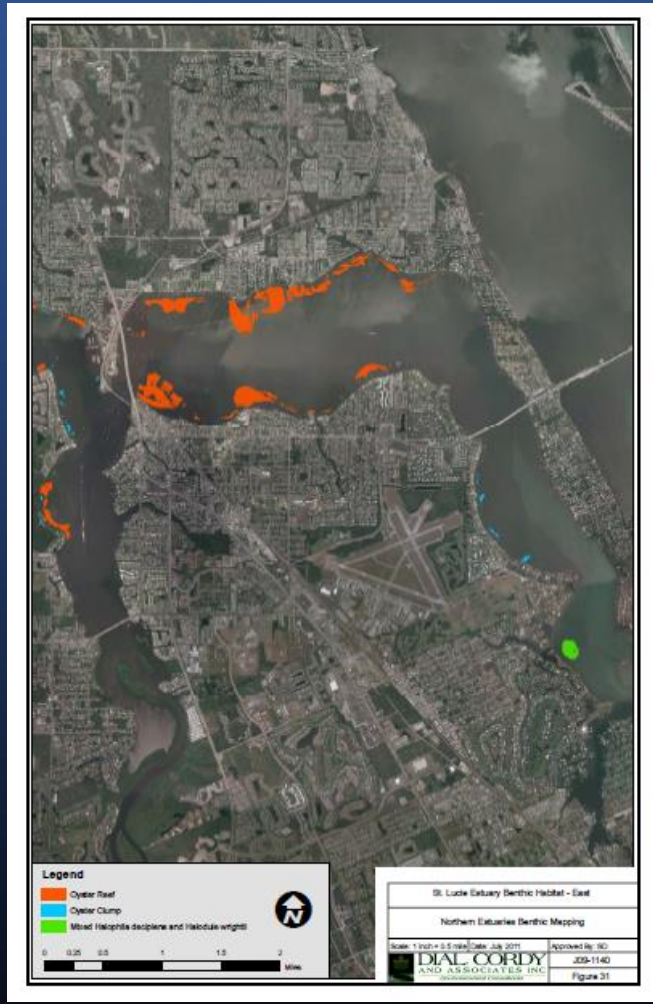
Currently Funded by SFWMD 2019 – 2023… “+5”

The FWRI program has changed slightly over the years

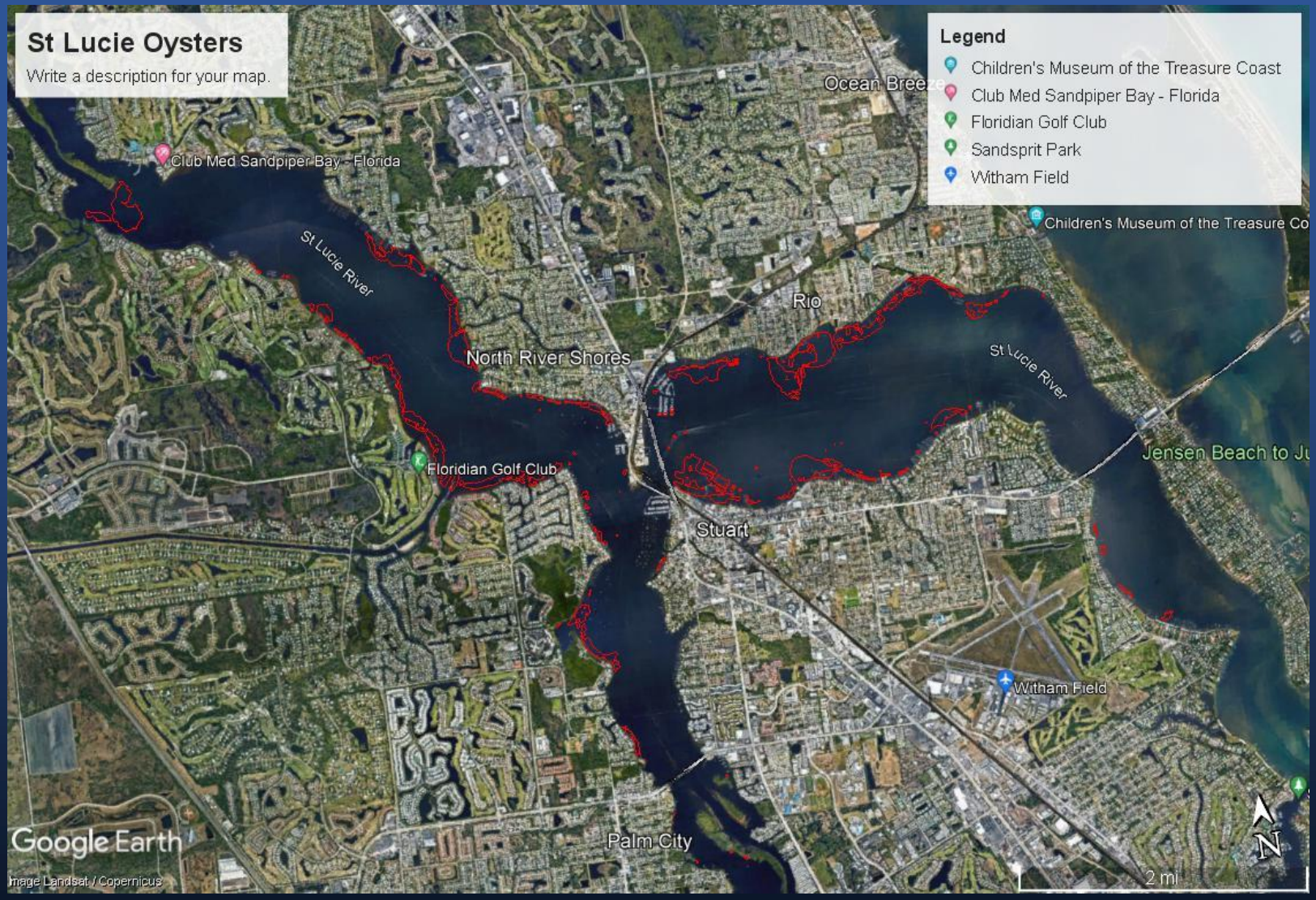
Benthic Habitat Mapping and Substrate Characterization in the Northern Estuaries, Florida
FINAL August 2011

Prepared for:
Jacksonville District, US Army Corps of Engineers
701 San Marco Boulevard
Jacksonville, FL 32207-8175

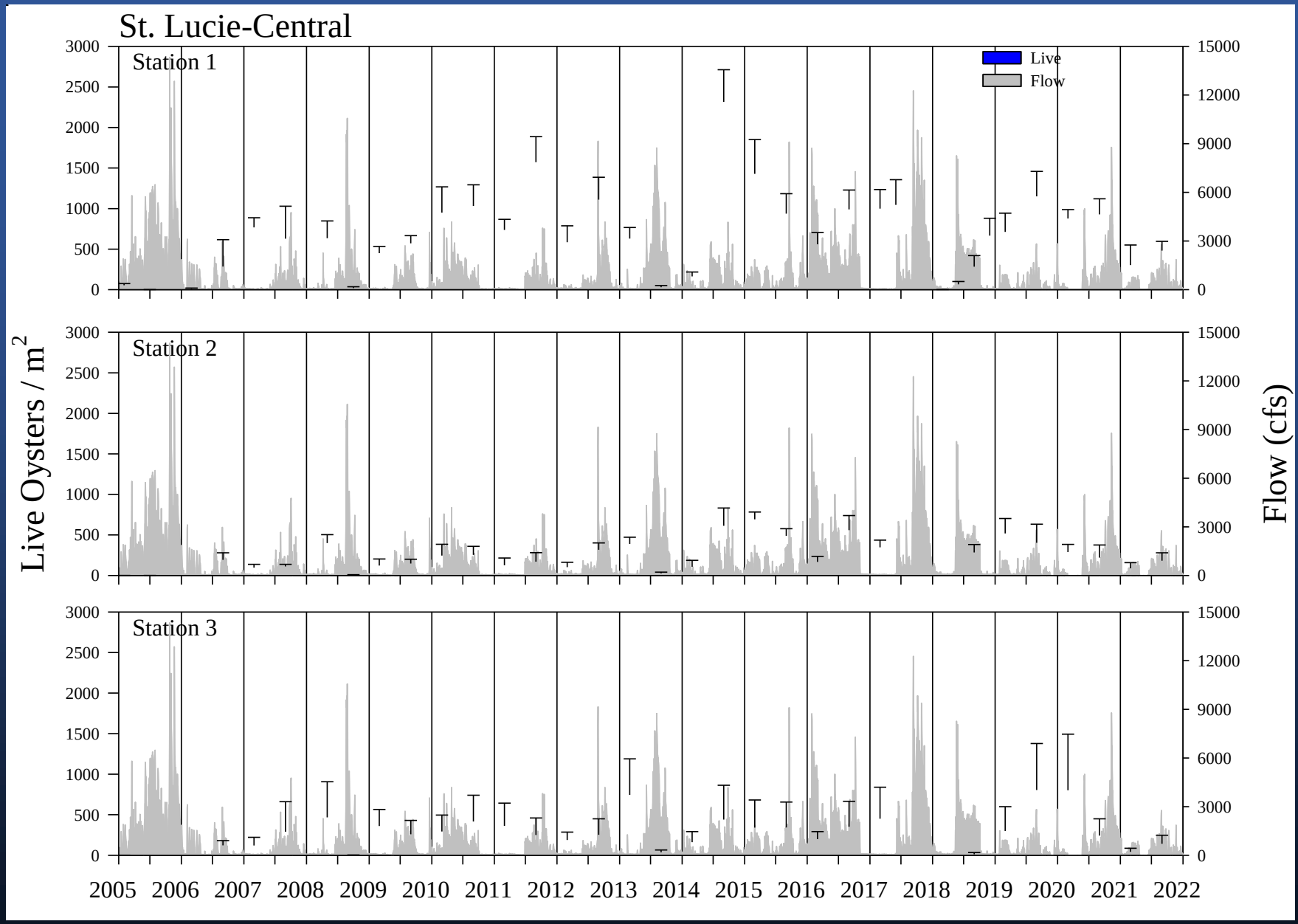
Prepared by:
Dial Cordy and Associates Inc.
490 Osceola Avenue
Jacksonville Beach, FL 32250



Mapping is typically done by contracting services



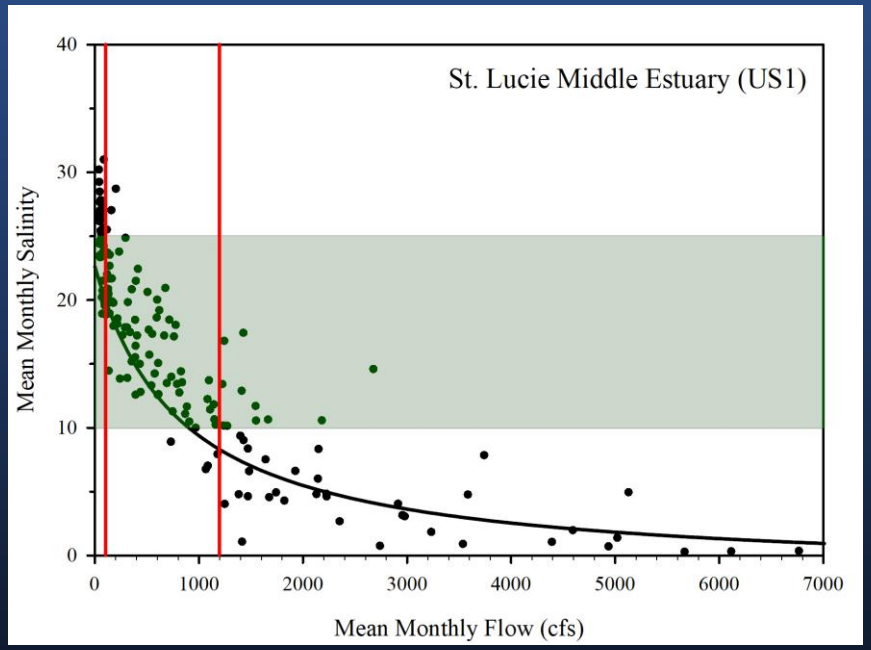
Those maps are added to the FWRI databases

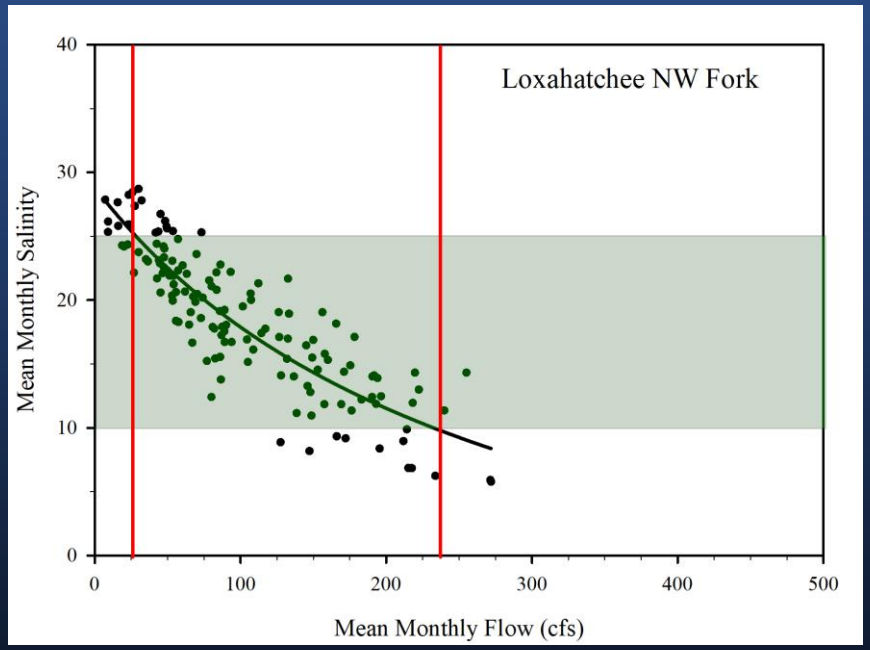


Just one examples. The data set is large enough we can begin more detailed analyses.

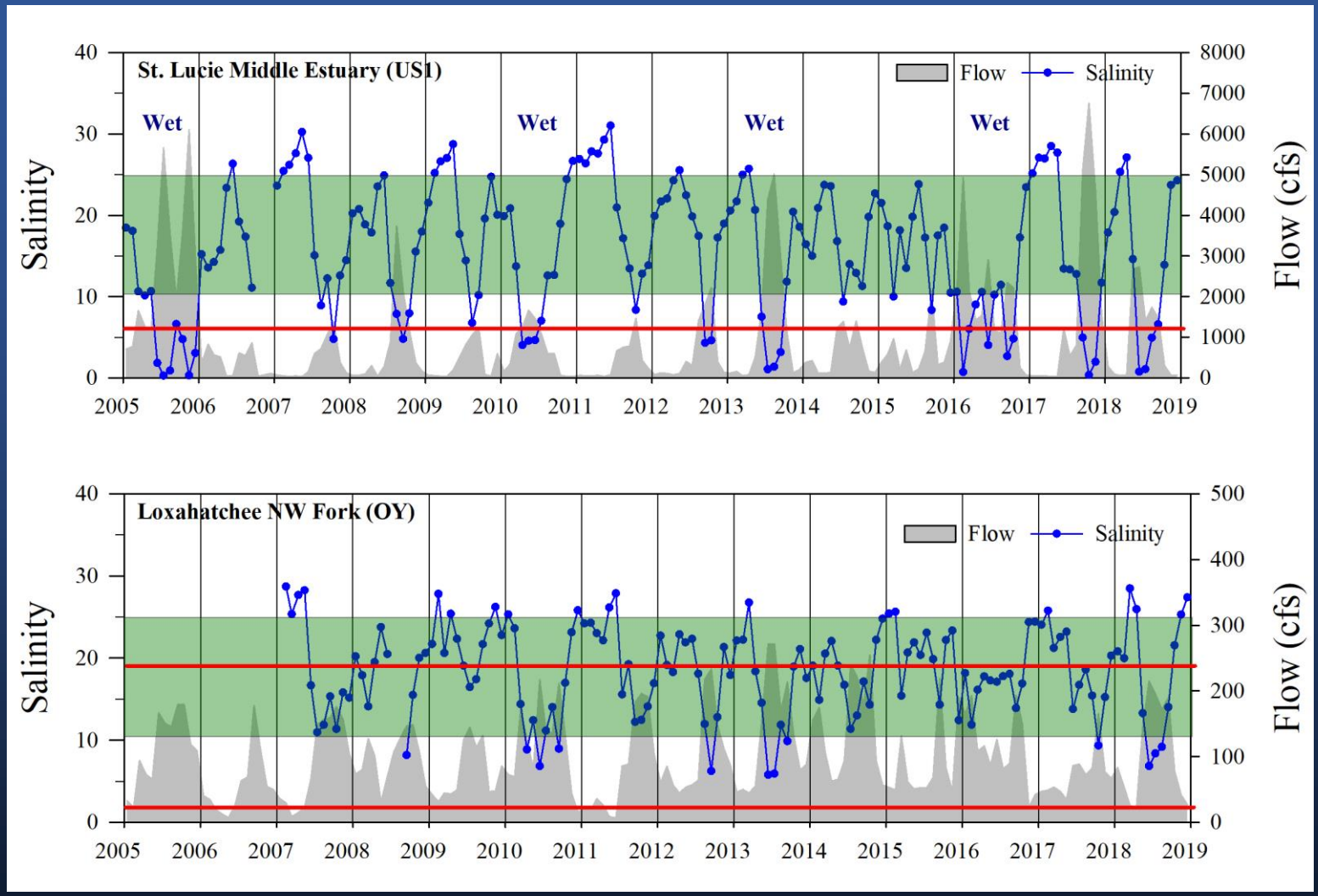
Parker, M.L & R. Radigan. 2020. Oyster monitoring in the northern estuaries on the southeast and southwest coasts of Florida. Final Report 2005 – 2018.

Final report to the South Florida Water Management District Grant # 4600003152.
102 pp plus appendices.





One tool is to match conditions like flow and salinity to biological metrics.



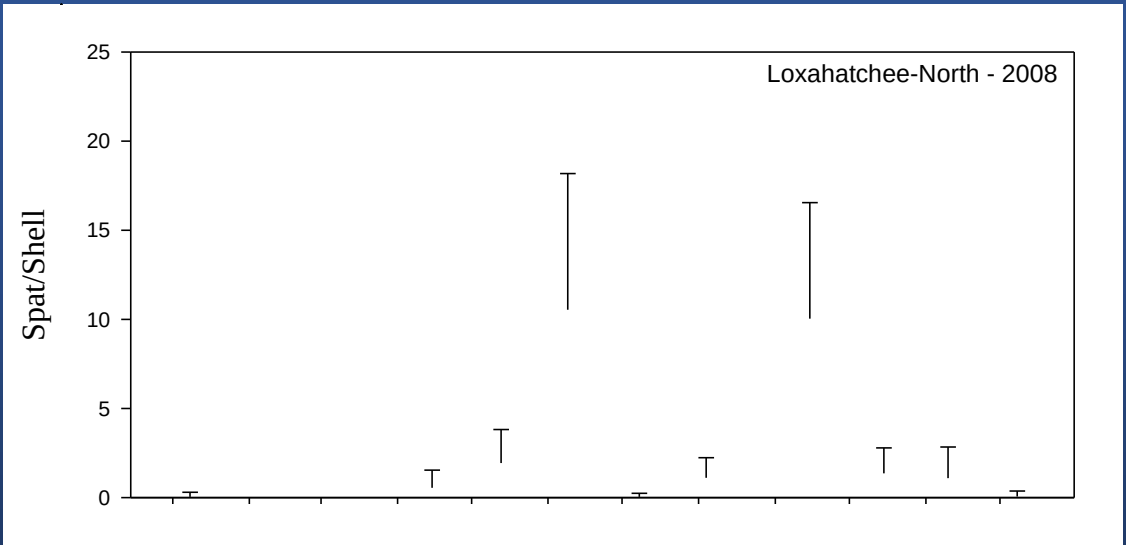
Salinity – Flow relationships can be used to estimate when conditions are in the ideal salinity envelope.

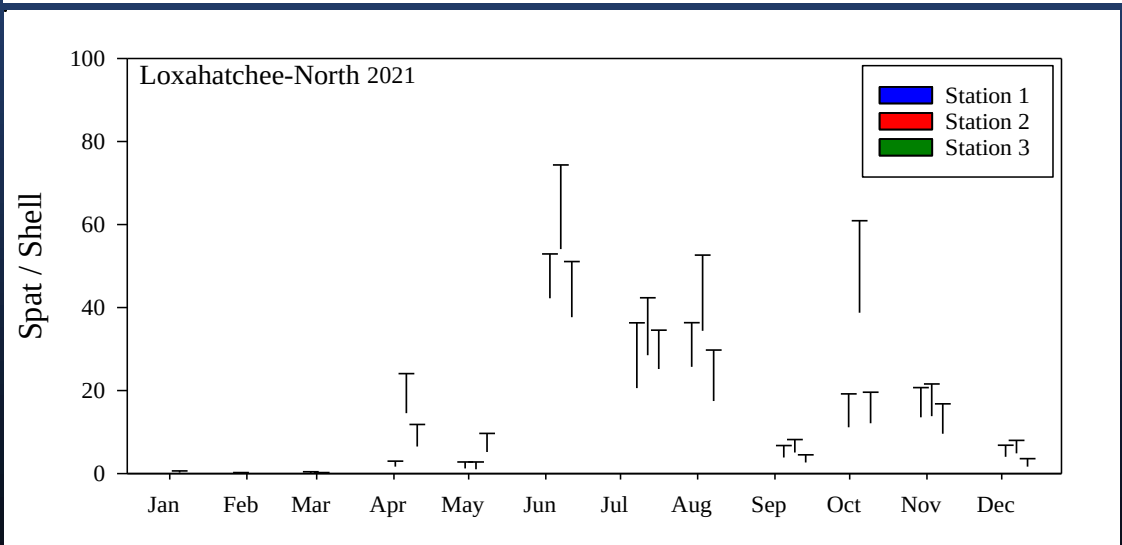
St. Lucie Estuary
US1 Roosevelt Bridge

Year	Classification	Dry Season Classification	Wet Season Classification	Salinity	Live Density	Dead Ratio	SH
2005	Wet	Wet	Extreme	**7.3**	**9.52**	**0.89**	44.97
2006	Moderate		Dry	17.3	101.55	**0.05**	30.30
2007	Dry		Dry	18.3	**336.15**	0.08	47.61
2008	Moderate			15.9	**254.67**	0.45	37.21
2009	Dry	Extreme		**20.2**	**318.49**	0.23	47.09
2010	Wet			14.7	**532.09**	0.11	**55.95**
2011	Dry	Extreme	Dry	**21.3**	**536.44**	0.11	49.70
2012	Moderate			18.2	**426.13**	0.32	40.85
2013	Wet		Extreme	14.8	**309.60**	0.37	34.25
2014	Moderate			17.2	**633.64**	0.14	32.27
2015	Moderate			16.5	**705.42**	0.07	42.55
2016	Wet	Wet	Extreme	**10.0**	**471.42**	0.10	39.42
2017	Both	Extreme		16.2	**599.29**	**0.05**	45.76
2018	Both		Extreme	18.2	96.84	0.65	**17.30**
2019	Moderate			19.8	**648.09**	**0.05**	39.37
2020	Wet		Extreme	**12.0**	**560.00**	0.13	41.05
2021	Moderate			16.1	206.71	0.12	45.94

Furthermore we can use the observed biological data to guide flow into the estuary

We now have enough data to start looking at meaningful trends. Are we seeing meaningful or detectable changes related to management practices (or climate)?





Finally, what do we do if our fixed station are failing?