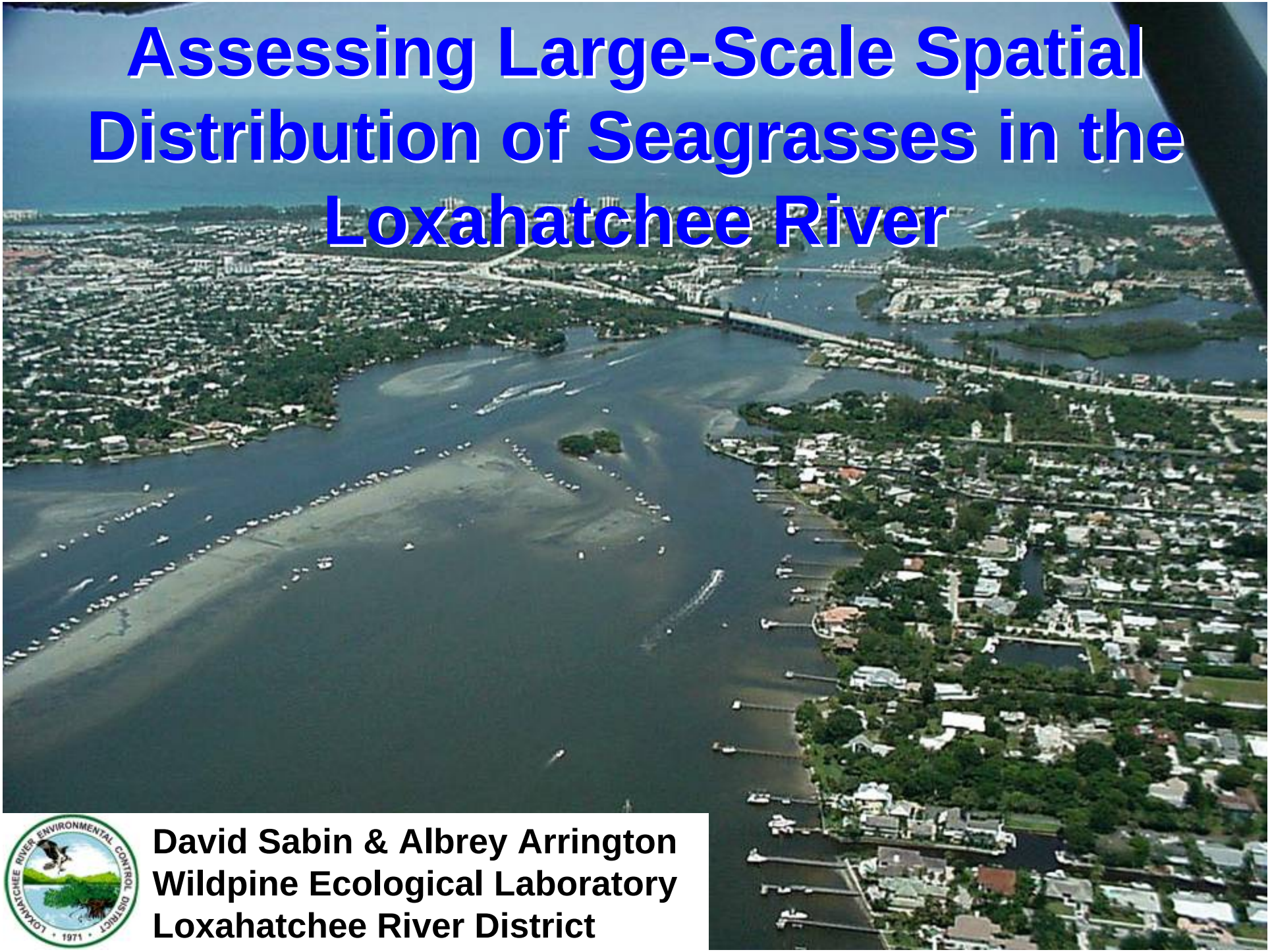
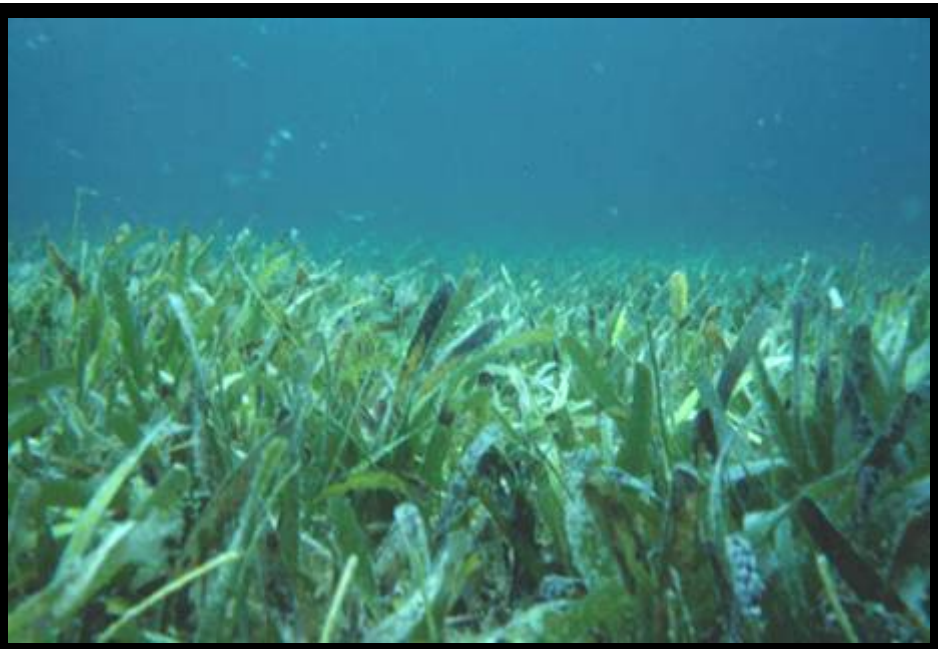
Assessing Large-Scale Spatial Distribution of Seagrasses in the Loxahatchee River



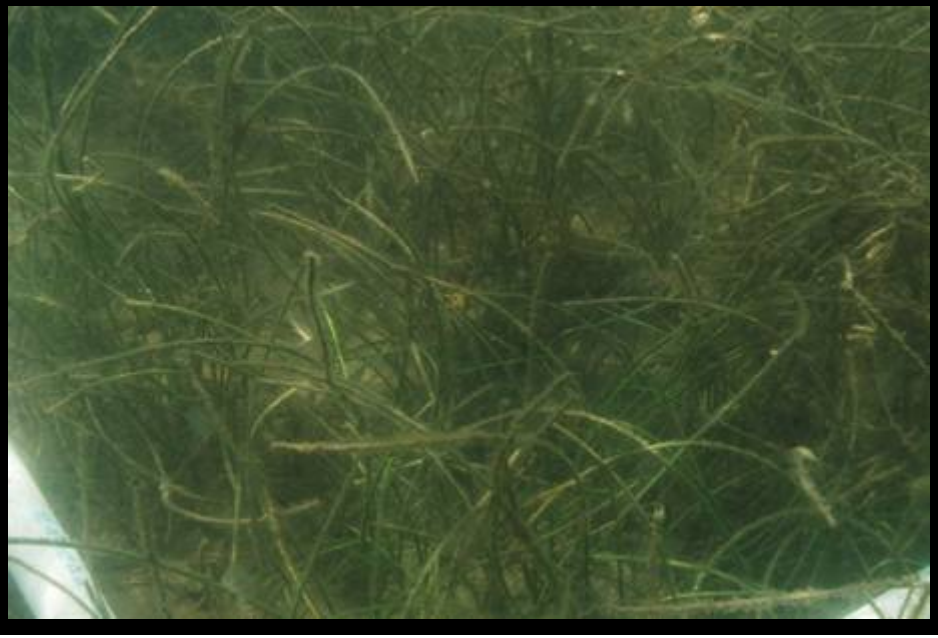
David Sabin & Albrey Arrington
Wildpine Ecological Laboratory
Loxahatchee River District

Why Assess Seagrass?

- Seagrass is:
  - an *essential fish habitat*, because they are necessary to ensure healthy fisheries;
  - a *valued ecosystem component*, because they are a dominant, habitat forming community;
  - excellent indicators.



Loxahatchee River Seagrass



Prior Seagrass Mapping Results

Seagrass mapping is a valuable approach to assess the spatial extent, distribution, and composition of existing seagrass beds.

Prior Efforts:

1980 USGS

1985 PBC Health Dept. (Gain)

1990 Jupiter Inlet District (Loss)

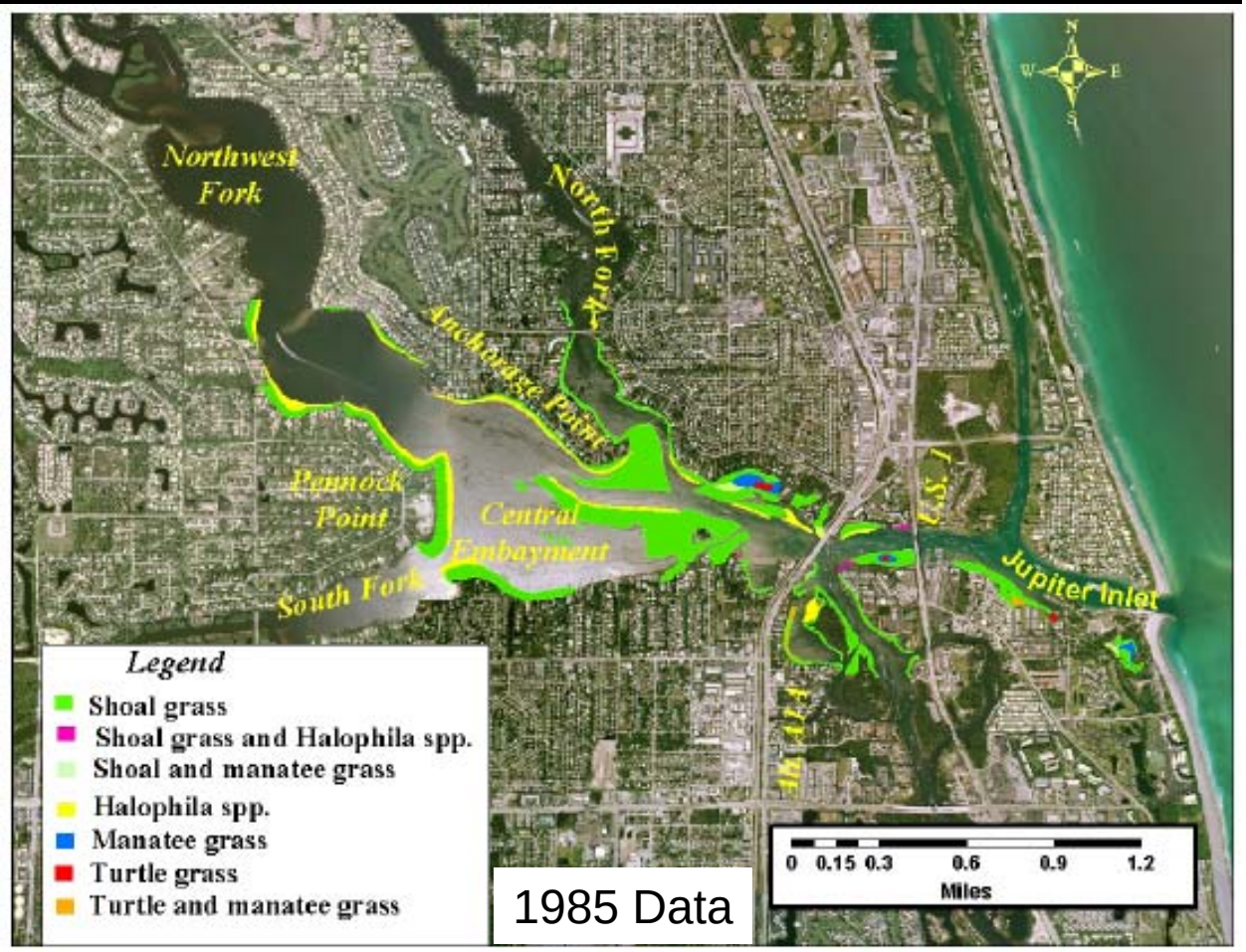
1996 Jupiter Inlet District (Loss)

1998 Jupiter Inlet District (Gain)

2000 Jupiter Inlet District (Gain)

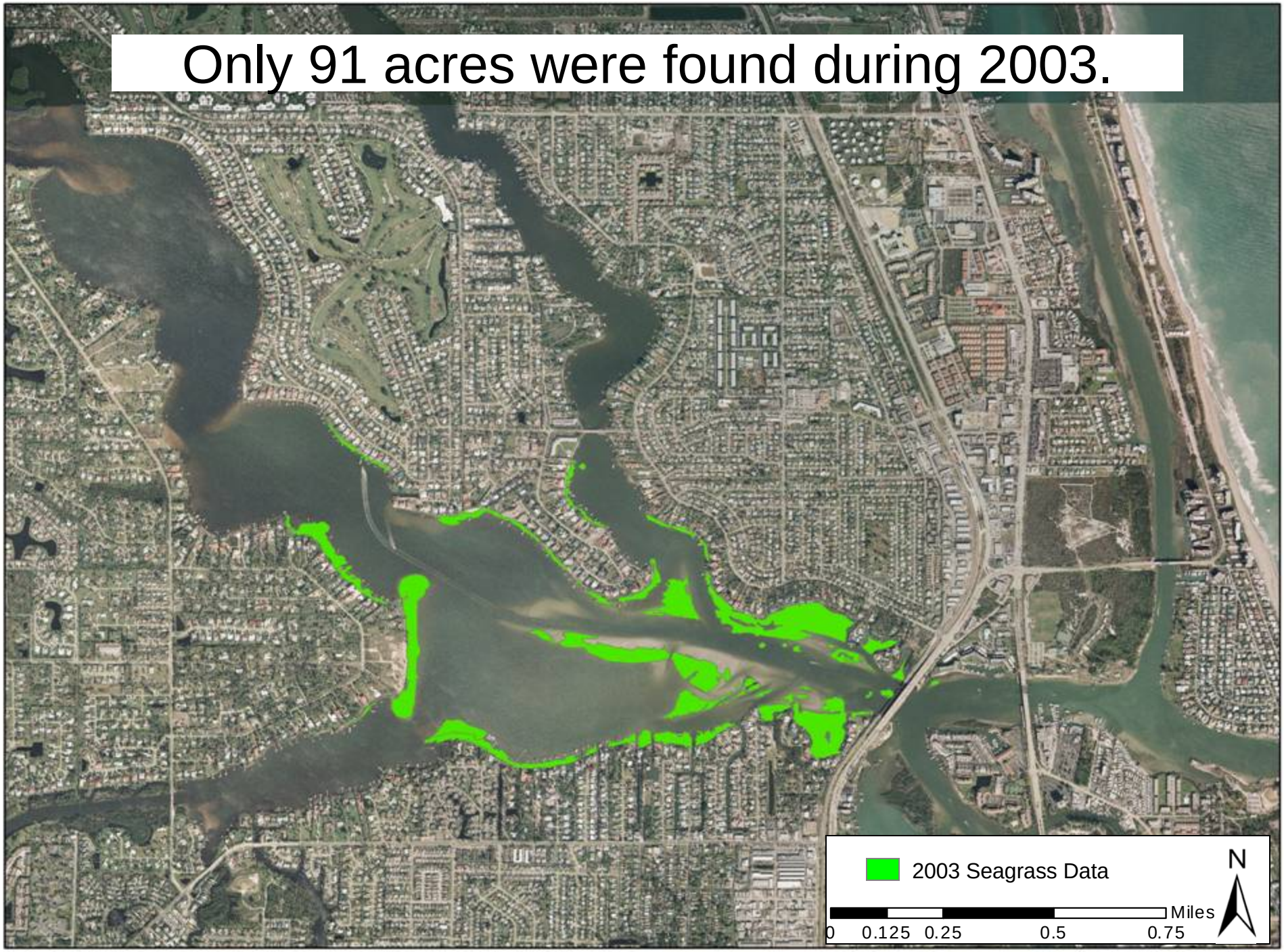
2003 Avineon (Gain)

2007 Loxahatchee River District (Gain)



We wanted more precise data than photo interpretation could provide.

Sometimes you time the tide right and sometimes you're close

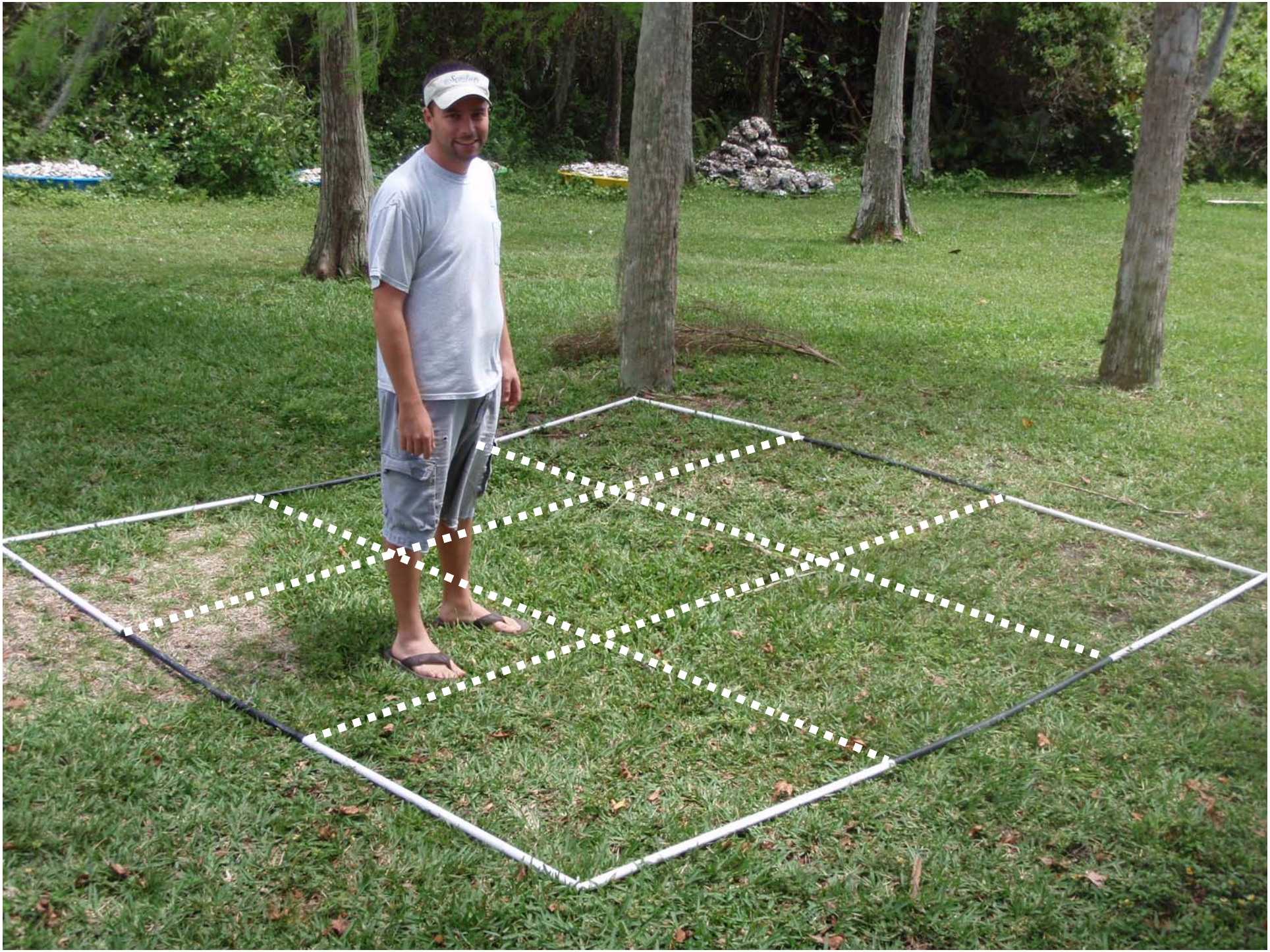

Only 91 acres were found during 2003.
2003 Seagrass Data
N
Miles
0
0.125
0.25
0.5
0.75

Our Quadzilla Approach

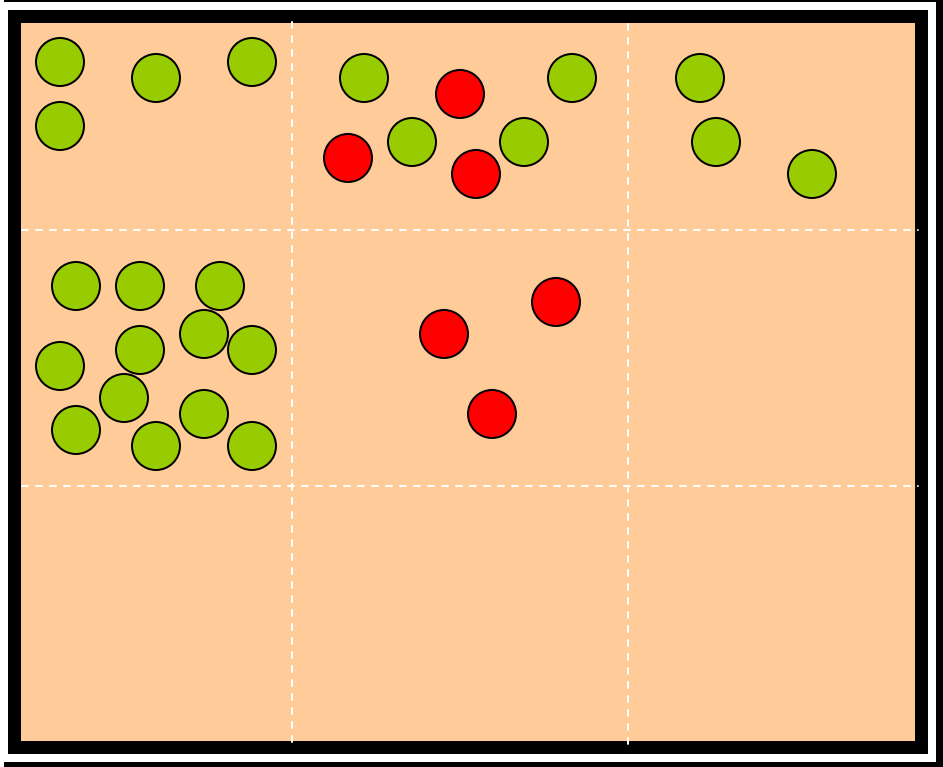
Additional Equipment

Data sheets

Location		
GPS File#		
Depth m		
Staff		
Date		
	Score 0-9	
Sand		
Hwri		
Hjon		
Sfil		
Ttes		
Hdec		
Heng		
Rmar		
SCHEME order		
% Algae		



Quadzilla Method



Example

- Shoal grass (HWRI)
- Turtle grass (Ttes)

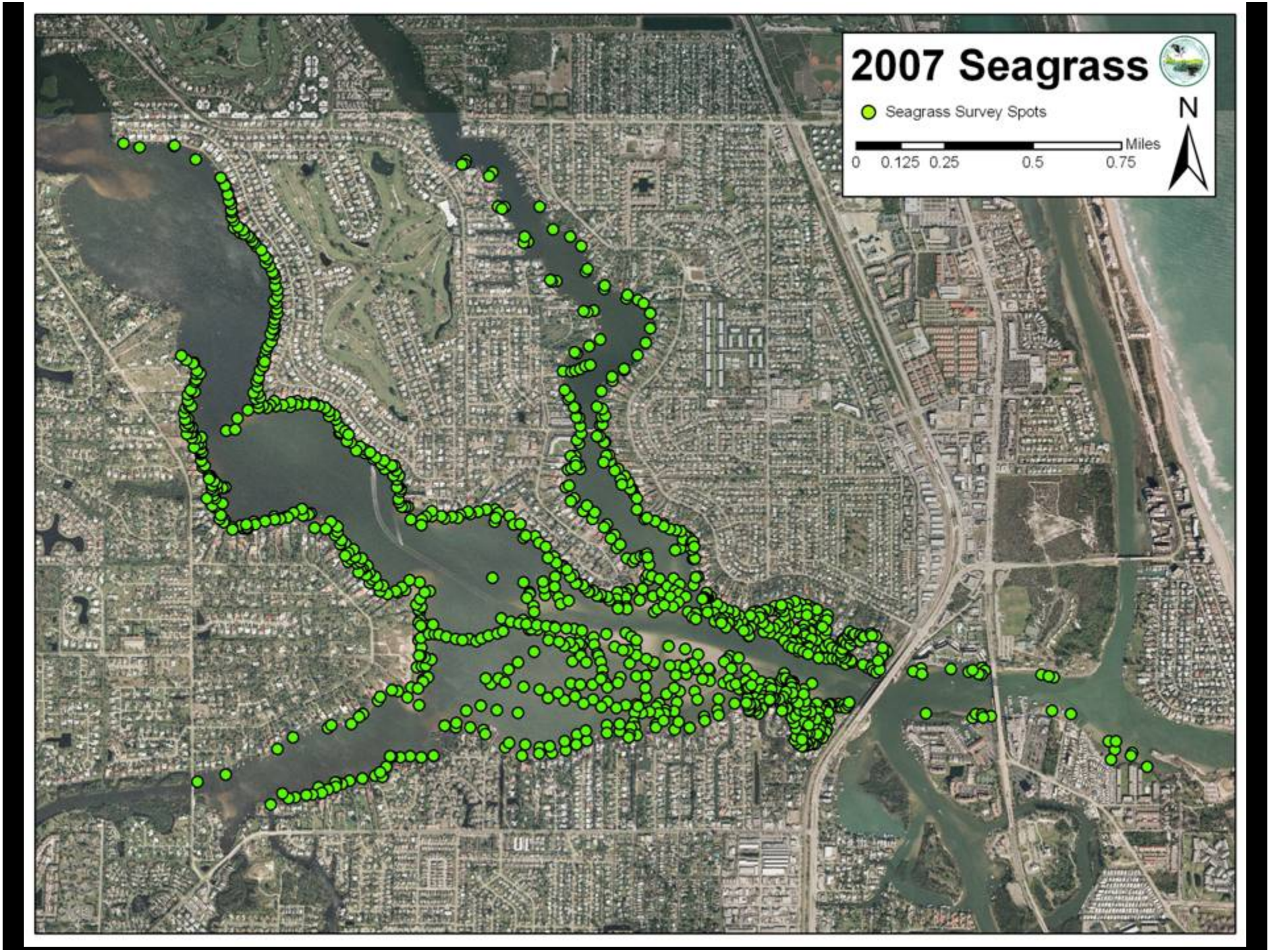
Data

Location	PP	
GPS File#	5	
Depth m	3	
Staff	DS	
Date	8/7/07	
	Score 0-9	
Sand	4	
Hwri	4	
Hjon		
Sfil		
Ttes	2	
Hdec		
Heng		
Rmar		
SCHEME order		
% Algae		

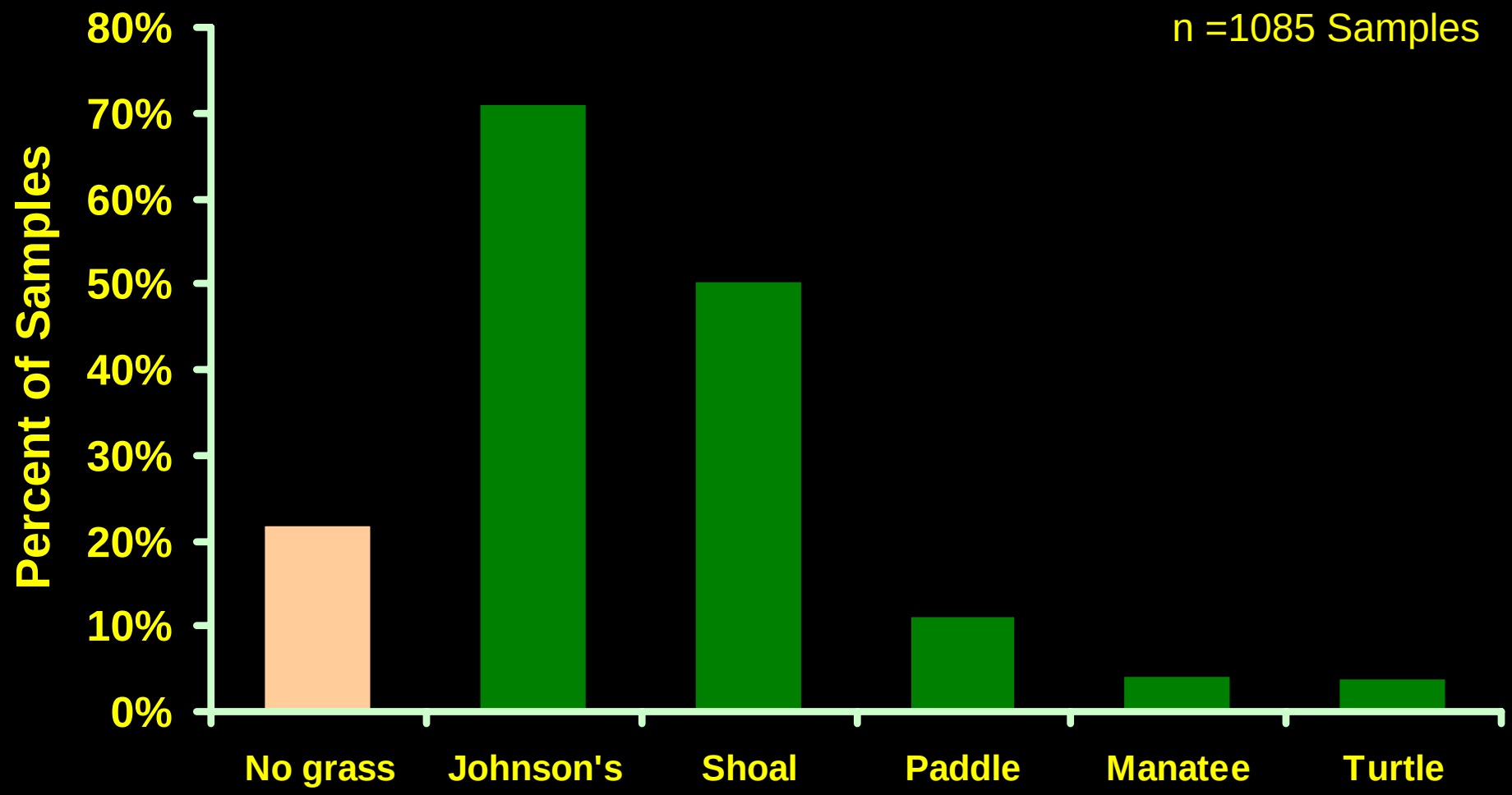
1. 9m^2 quadrat was deployed using a random stratified design.
2. Each species was scored according to the number of 1m^2 cells in which it was present, and bare substrate was scored as the total number of 1m^2 cells in which no seagrass was present.
3. Spatial coordinates and ancillary data were recorded.

Notes

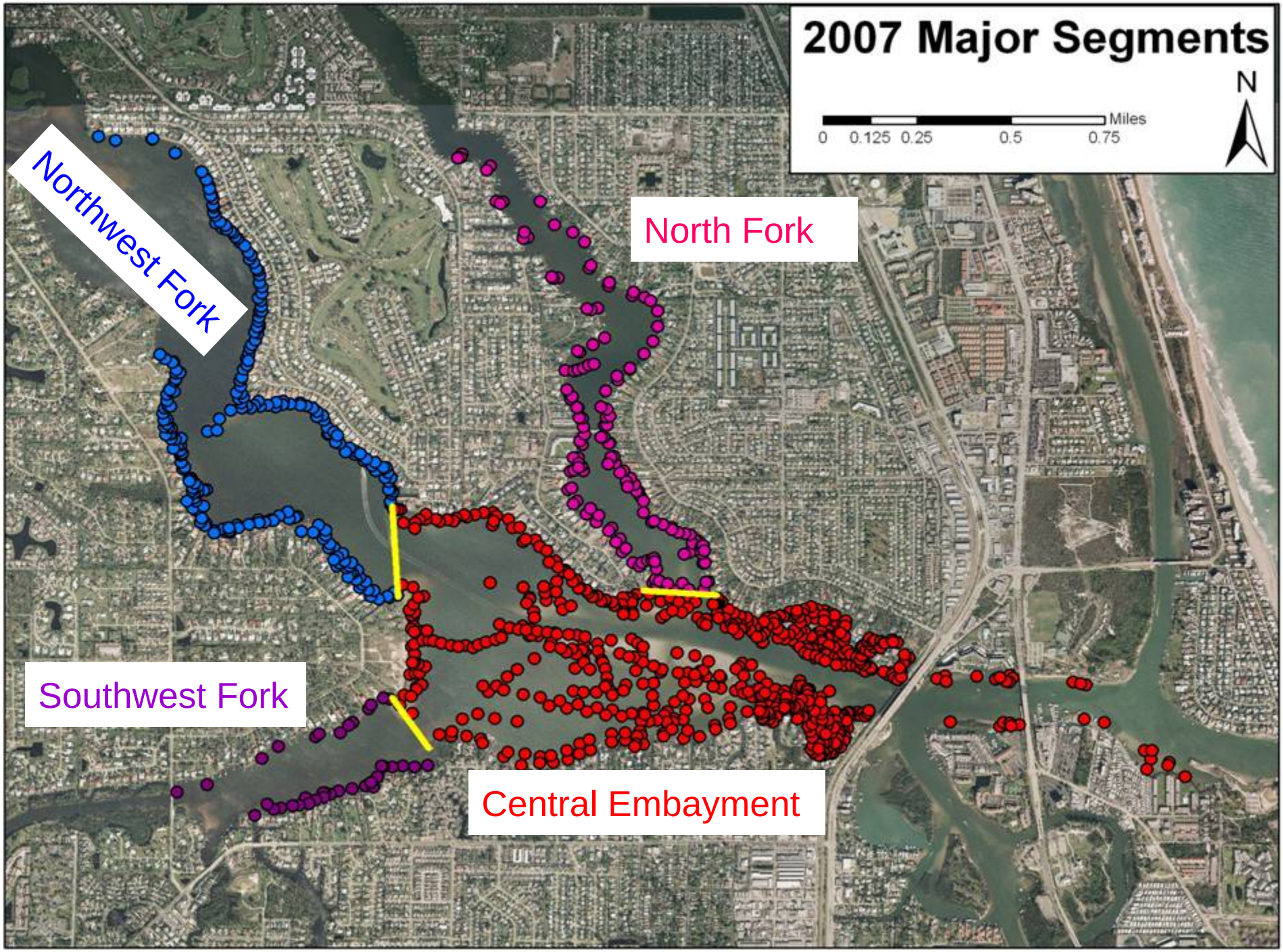
- Approximately 1100 sites were assessed during the summer of 2007
- River was segmented to make sure we had full coverage
- Historical data and thorough knowledge of river helped in looking in right areas

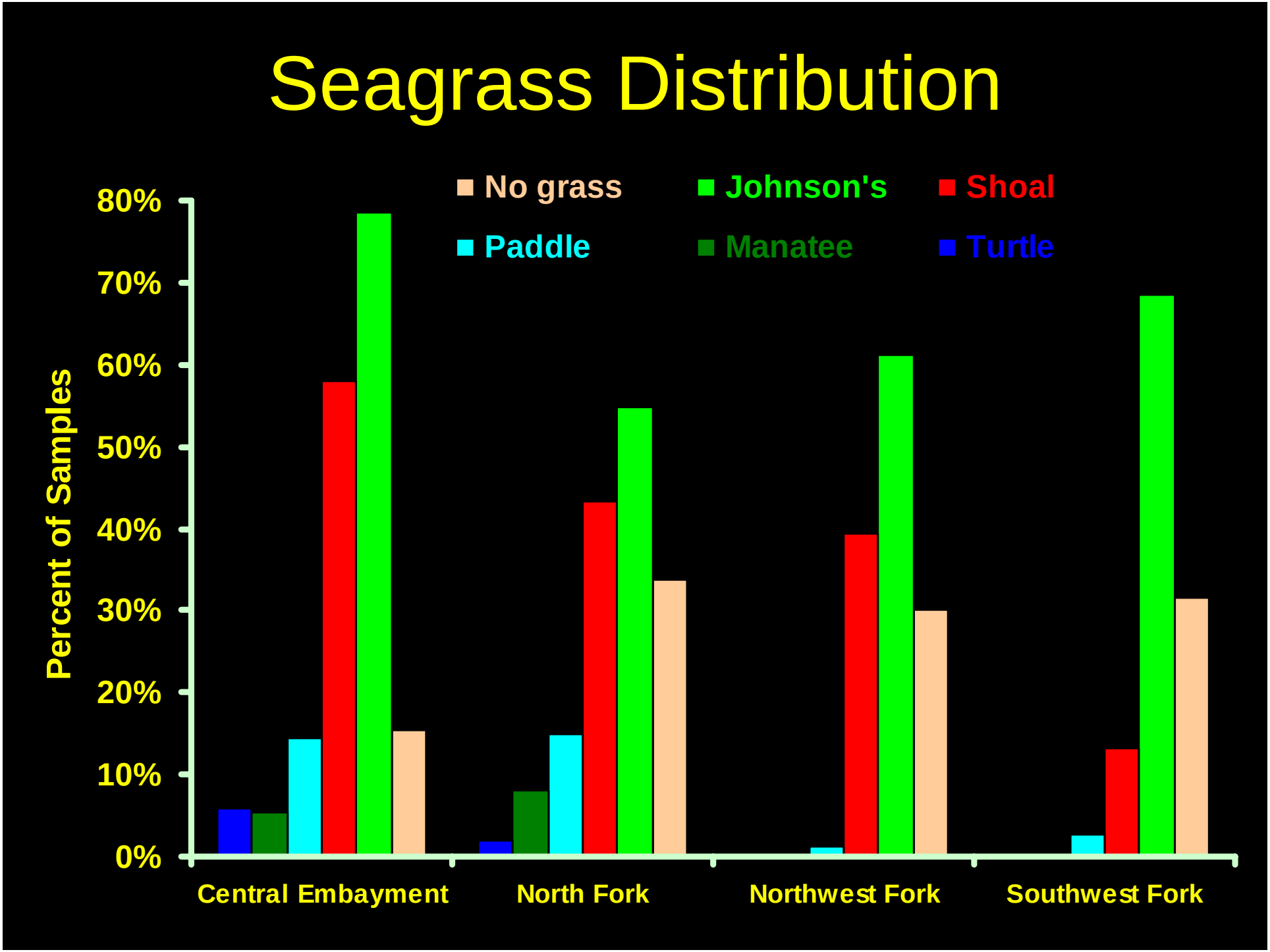

2007 Seagrass
Seagrass Survey Spots
N
Miles
0 0.125 0.25 0.5 0.75

Seagrass Distribution: All Samples



Star grass not found in 2007


2007 Major Segments
N
Miles
0 0.125 0.25 0.5 0.75
Northwest Fork
North Fork
Southwest Fork
Central Embayment

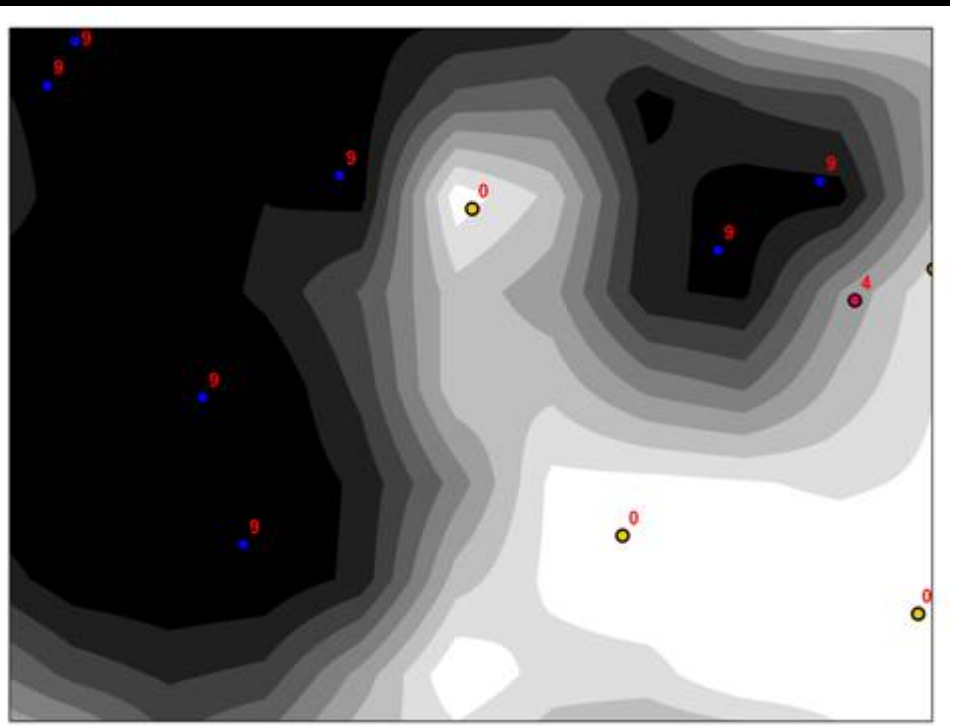

Seagrass Distribution
No grass
Johnson's
Shoal
Paddle
Manatee
Turtle
Percent of Samples
80%
70%
60%
50%
40%
30%
20%
10%
0%
Central Embayment
North Fork
Northwest Fork
Southwest Fork

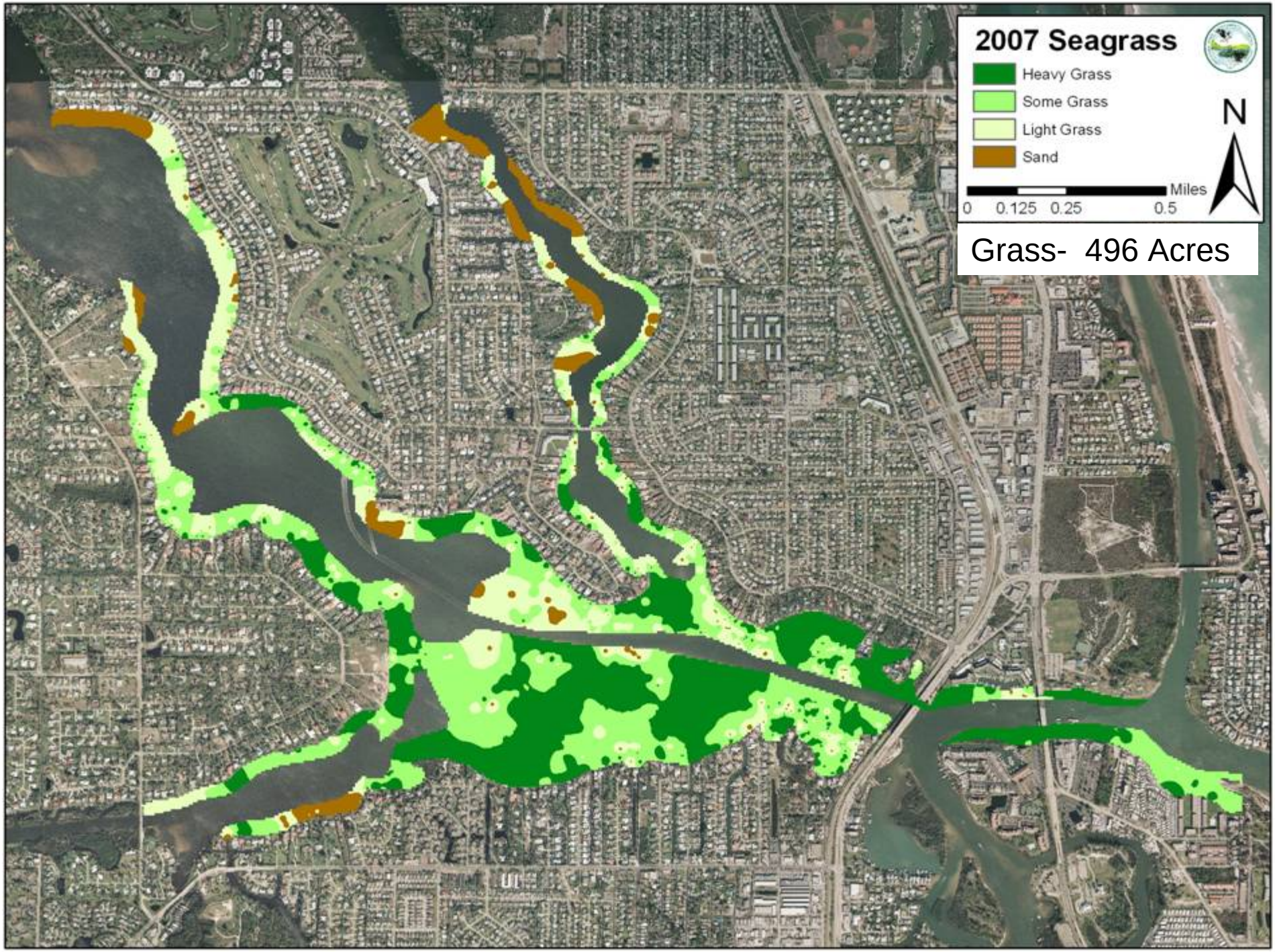
Spatial Analysis

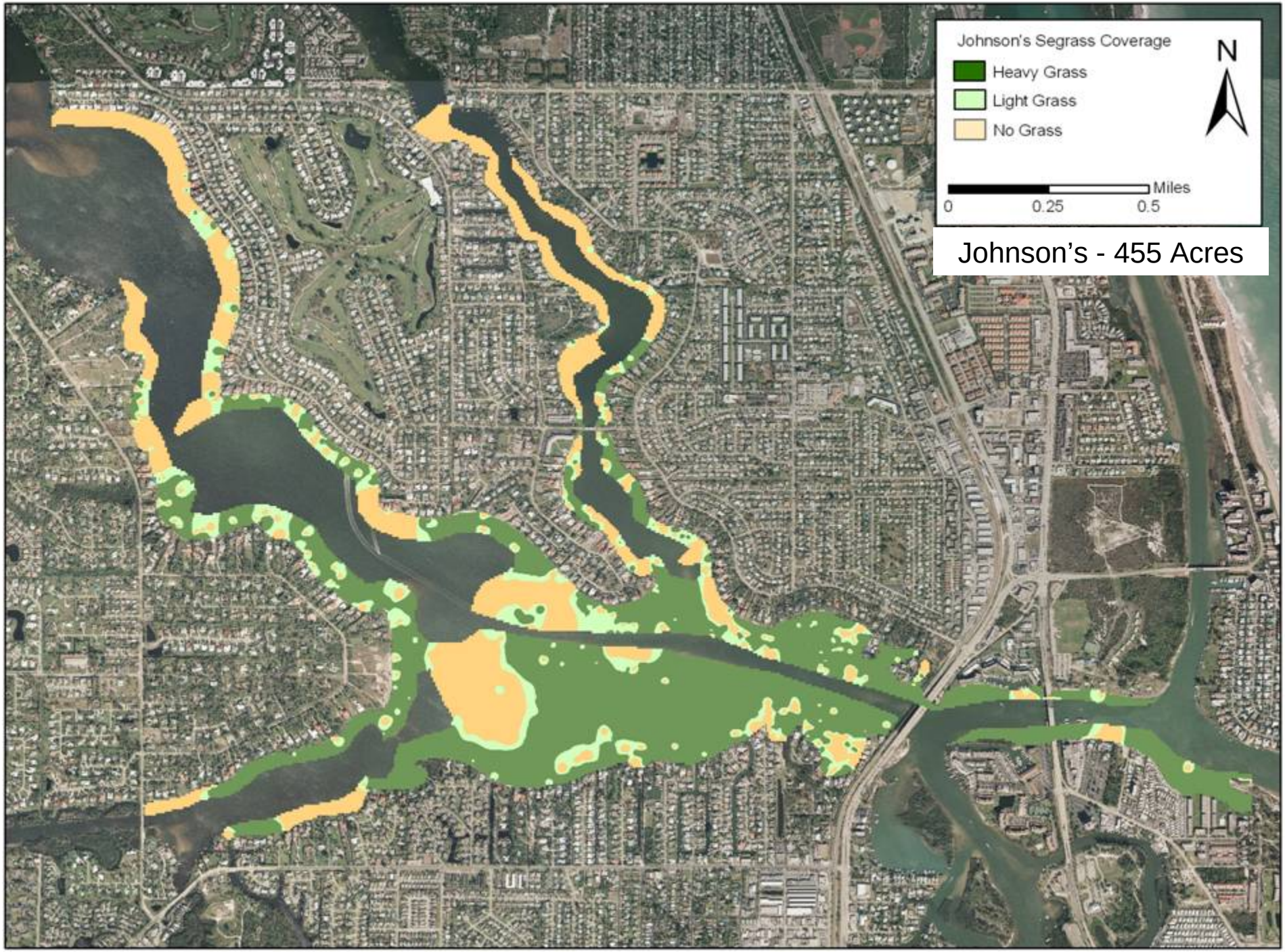
- ArcGIS 9.2 with Spatial Analysis extension was used.
- Inverse Distance Weighted (IDW) was used to analyze the whole area based on our actual samples.
- IDW estimates cell values by averaging the values of the data points (samples) in the neighborhood of each cell being estimated. The closer a point is to the center of the cell being estimated, the more influence, or weight, it has in the averaging process.

Example:

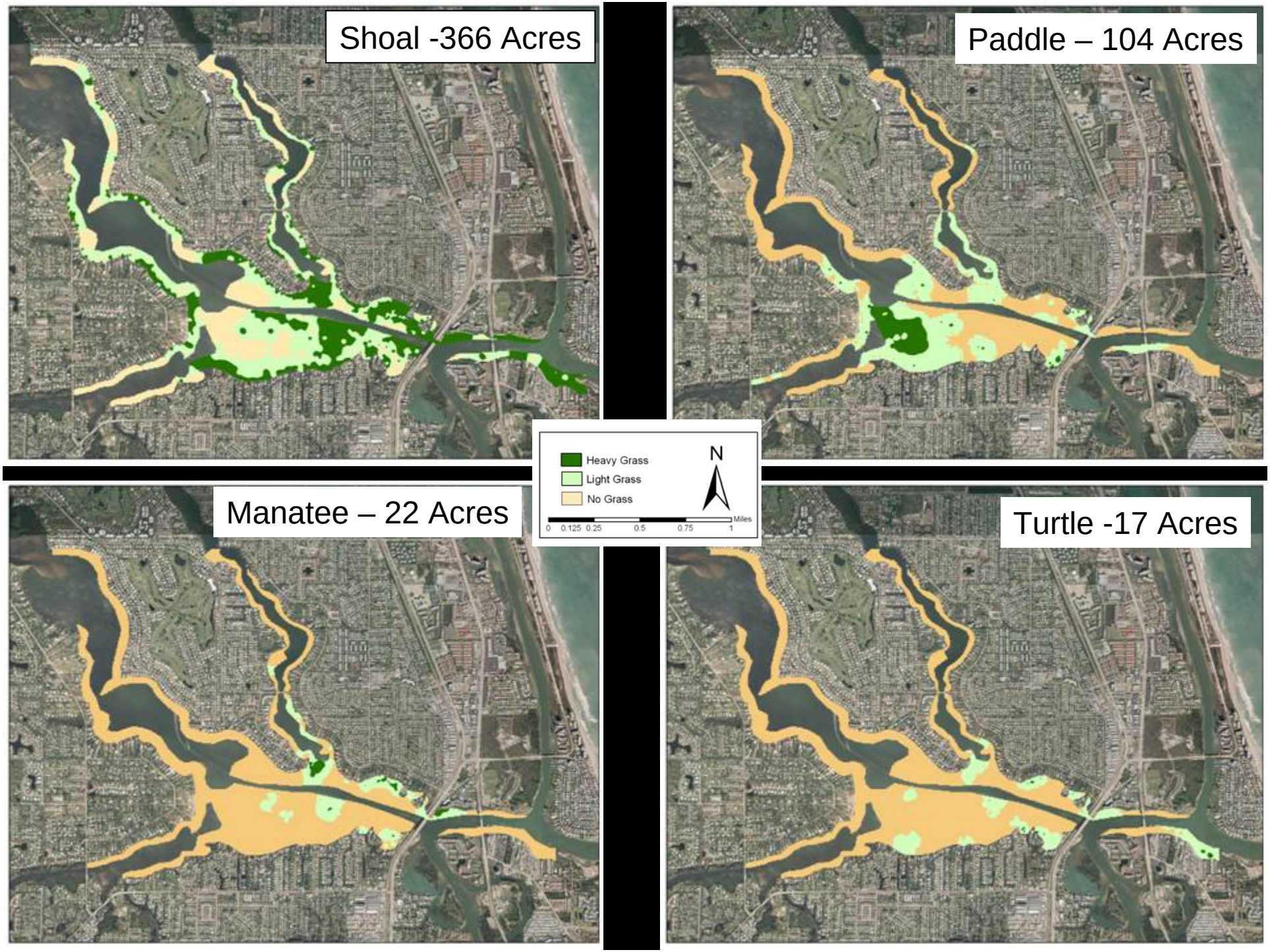
The figure to the right shows actual samples (small points) and IDW estimates (color gradients) for an actual segment of our study area.




2007 Seagrass
Heavy Grass
Some Grass
Light Grass
Sand
N
Miles
0 0.125 0.25 0.5
Grass- 496 Acres

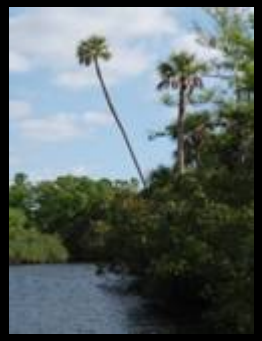


Johnson's - 455 Acres


Shoal -366 Acres
Paddle – 104 Acres
Manatee – 22 Acres
Turtle -17 Acres
Heavy Grass
Light Grass
No Grass
N
0 0.125 0.25 0.5 0.75 1
Miles

Methodological Issues

- Lack of equipment slows process down
- Bias when laying down quadrat under water
- Poor water clarity makes work difficult
- Physically demanding during strong current and at deep sites
- Approach evolved through time to be more efficient and thorough
- ArcGIS Analysis issues
- Whenever GPS had problems points had to be re-sampled.



Conclusion

- 2007 study vs 2003 showed seagrass gain
  - *True gain plus gain from new technique*
- Learned a lot more by looking at the whole river unlike pervious years, when we only assessed certain areas.
- We need to generate dock coverage and clip docks from area analyzed so we don't overestimate occurrence of seagrass (i.e., under docks).
- Spatial extent of seagrass likely will be overestimated if bare (sand) areas are not sufficiently assessed.

Acknowledgements

We did have some bad Days!!

- Staff and volunteers who helped sure know the river.
- A lot of work so we are seeking volunteers for 2010 work.