

**PALM BEACH COUNTY
BOARD OF COUNTY COMMISSIONERS**

WORKSHOP SUMMARY

Meeting Date: October 29, 2013

Department: Environmental Resources Management

I. EXECUTIVE BRIEF

Title: Freshwater Discharges to Lake Worth Lagoon

Summary: This workshop will provide an update on the record high volume of freshwater discharges this wet season and the effects on the Lake Worth Lagoon (LWL) resources. Presentations will include a summary by the South Florida Water Management District (SFWMD) on LWL drainage basin/land use, 2013 wet season rainfall/runoff characteristics, and how much Lake Okeechobee water was discharged into LWL. An ERM staff presentation will describe the effects of the freshwater discharges and the ensuing muck accumulation on seagrass and oyster resources. Countywide (SF)

Background and Policy Issues: As part of the Lake Worth Lagoon Initiative, the multi-agency initiative coordinates regularly to discuss LWL water quality issues. Above-average rainfall has occurred during this wet season and is predicted to be above average throughout the peak (September-October) hurricane season across most basins in the SFWMD's 16 county region. SFWMD is operating in flood control mode and doing what it can to minimize freshwater discharges in a system that lacks water storage capacity. Reduction of discharges will also reduce muck sediment transport to the lagoon.

Attachments:

1. SFWMD PowerPoint Presentation
 2. ERM PowerPoint Presentation
-
-

Recommended by:

Paul Davis for Robert Robbins 10/16/13
Department Director **Date**

Approved by:

[Signature] 10/24/13
County Administrator **Date**

II. FISCAL IMPACT ANALYSIS

A. Five Year Summary of Fiscal Impact:

Fiscal Years	2014	2015	2016	2017	2018
Capital Expenditures	_____	_____	_____	_____	_____
Operating Costs	_____	_____	_____	_____	_____
External Revenues	_____	_____	_____	_____	_____
Program Income (County)	_____	_____	_____	_____	_____
In-Kind Match (County)	_____	_____	_____	_____	_____
NET FISCAL IMPACT	_____	_____	_____	_____	_____
# ADDITIONAL FTE POSITIONS (Cumulative)	_____	_____	_____	_____	_____

Is Item Included in Current Budget? Yes _____ No _____
 Budget Account No.: Fund _____ Department _____ Unit _____ Object _____
 Program _____

B. Recommended Sources of Funds/Summary of Fiscal Impact:

There is no direct fiscal impact due to this workshop item.

C. Department Fiscal Review:

[Signature]

III. REVIEW COMMENTS

A. OFMB Fiscal and /or Contract Dev. and Control Comments:

Lisa Neary 10/17/13
 OFMB *HN* cc *10/17/13*

Dr. J. Jacobson 10/18/13
 Contract Development and Control

B. Legal Sufficiency:

[Signature]
 Assistant County Attorney

C. Other Department Review:

 Department Director

Palm Beach County Board of County Commissioners Workshop

October 29, 2013

Attachment 1

Wet Season Freshwater Inflows to the Lake Worth Lagoon


Yongshan Wan, Ph.D. P.E.
Section Leader
Coastal Ecosystems Section



sfwmd.gov

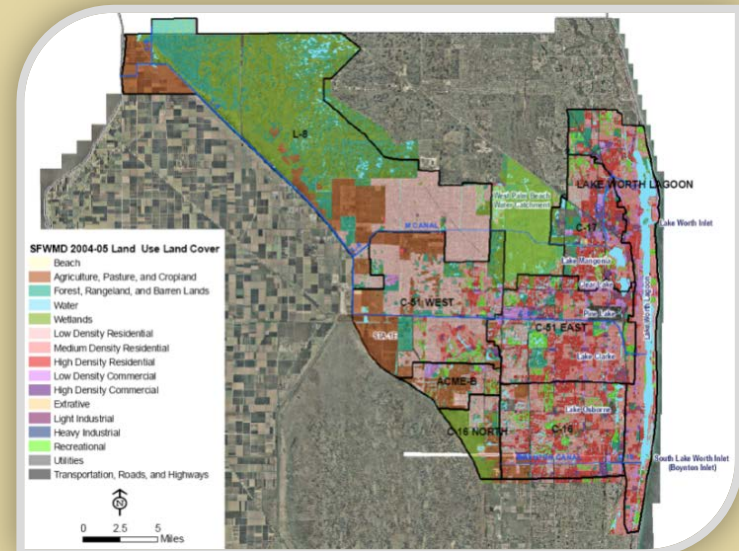
Topics:

- Lake Worth Lagoon drainage basin delineation and land use characteristics
- 2013 wet season rainfall/runoff characteristics and discharges into LWL
- How much Lake Okeechobee water was discharged into LWL during 2013 wet season?

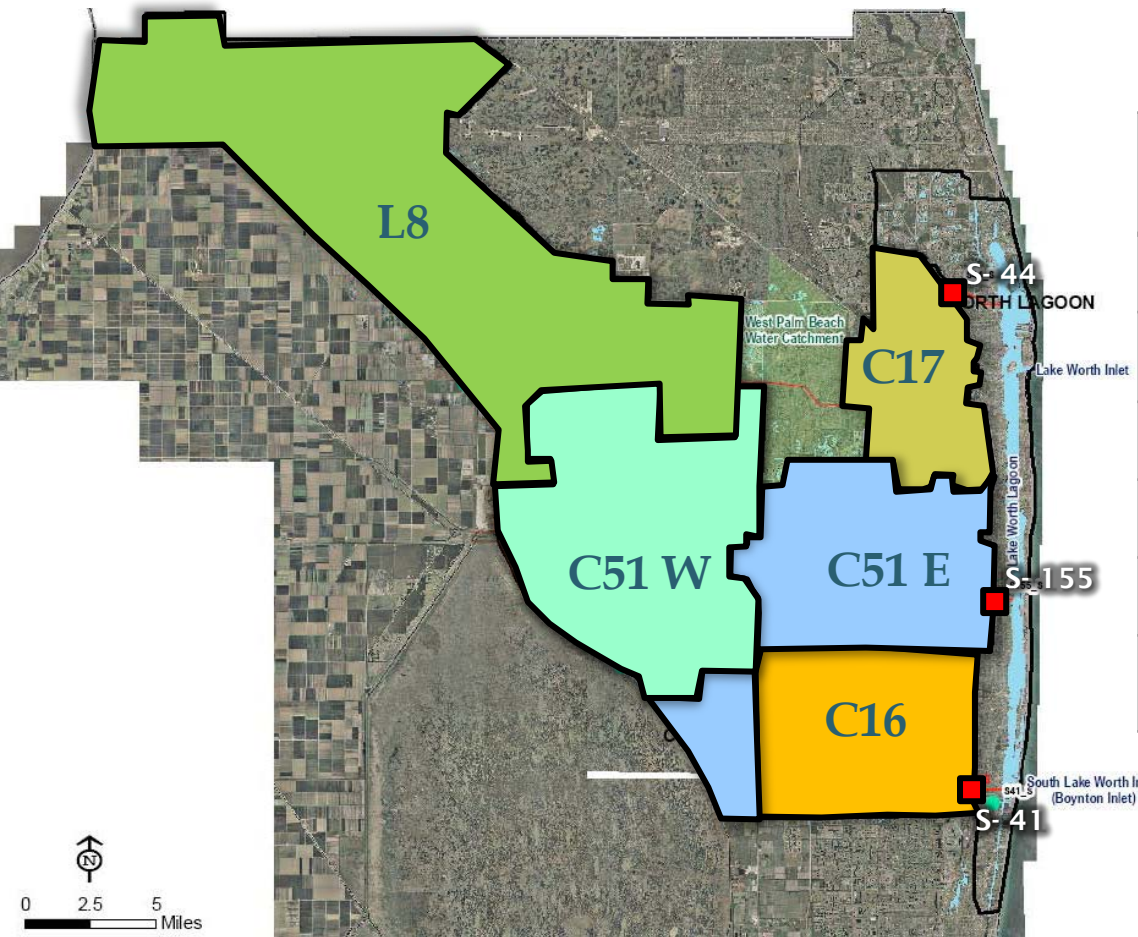


Wet Season
Freshwater Inflows
to the Lake Worth Lagoon

Lake Worth Lagoon Drainage Basin Delineation and Land Use Characteristics

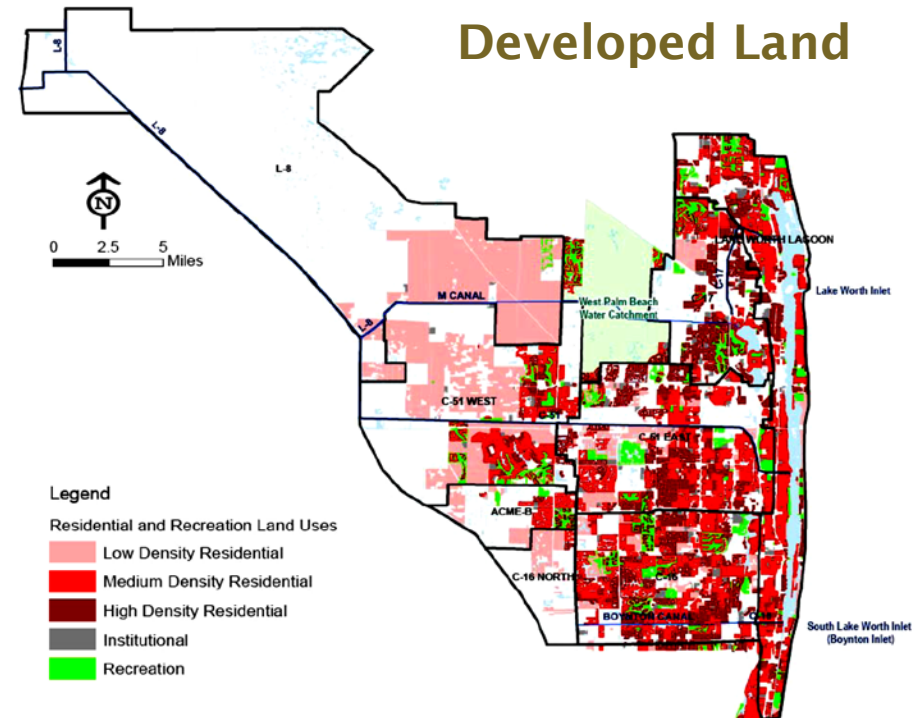
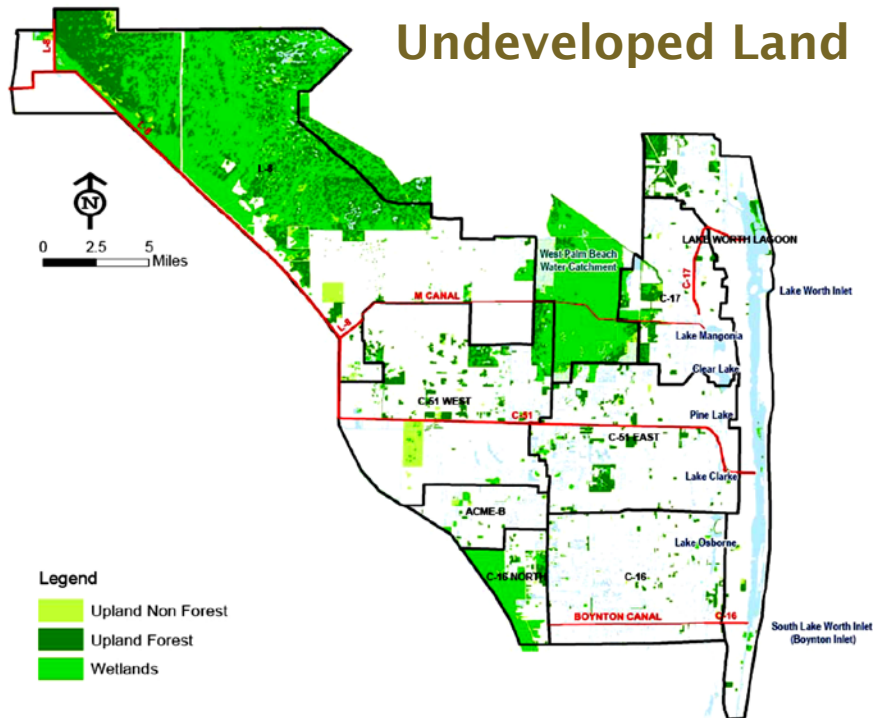


LWL Watershed Consists of 6 Major Drainage Basins (Totaling About 480 Square Miles)



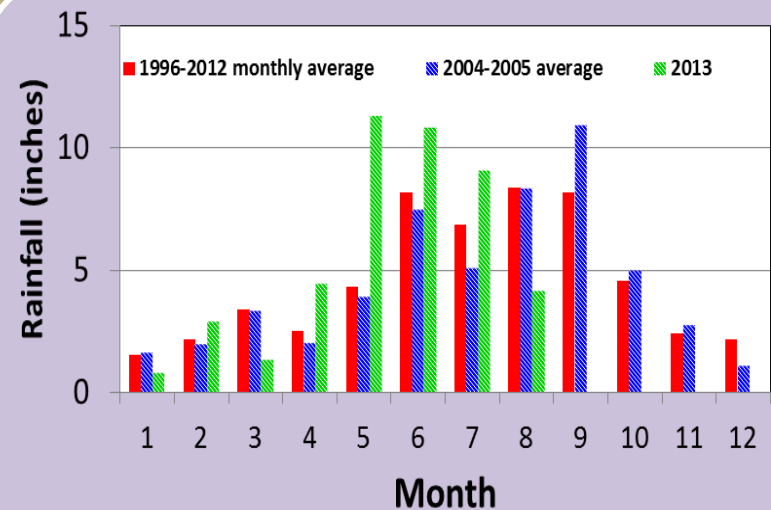
Basin	Area (acres)	Structure
C17	22,569	S- 44
L8	106,440	
C51 EAST	47,012	S- 155
C51 WEST	51,737	
C16	39,813	S- 41
LAKE WORTH LAGOON	38,139	UNGAUGED

About 50% of Land Use is Residential and Urban Development

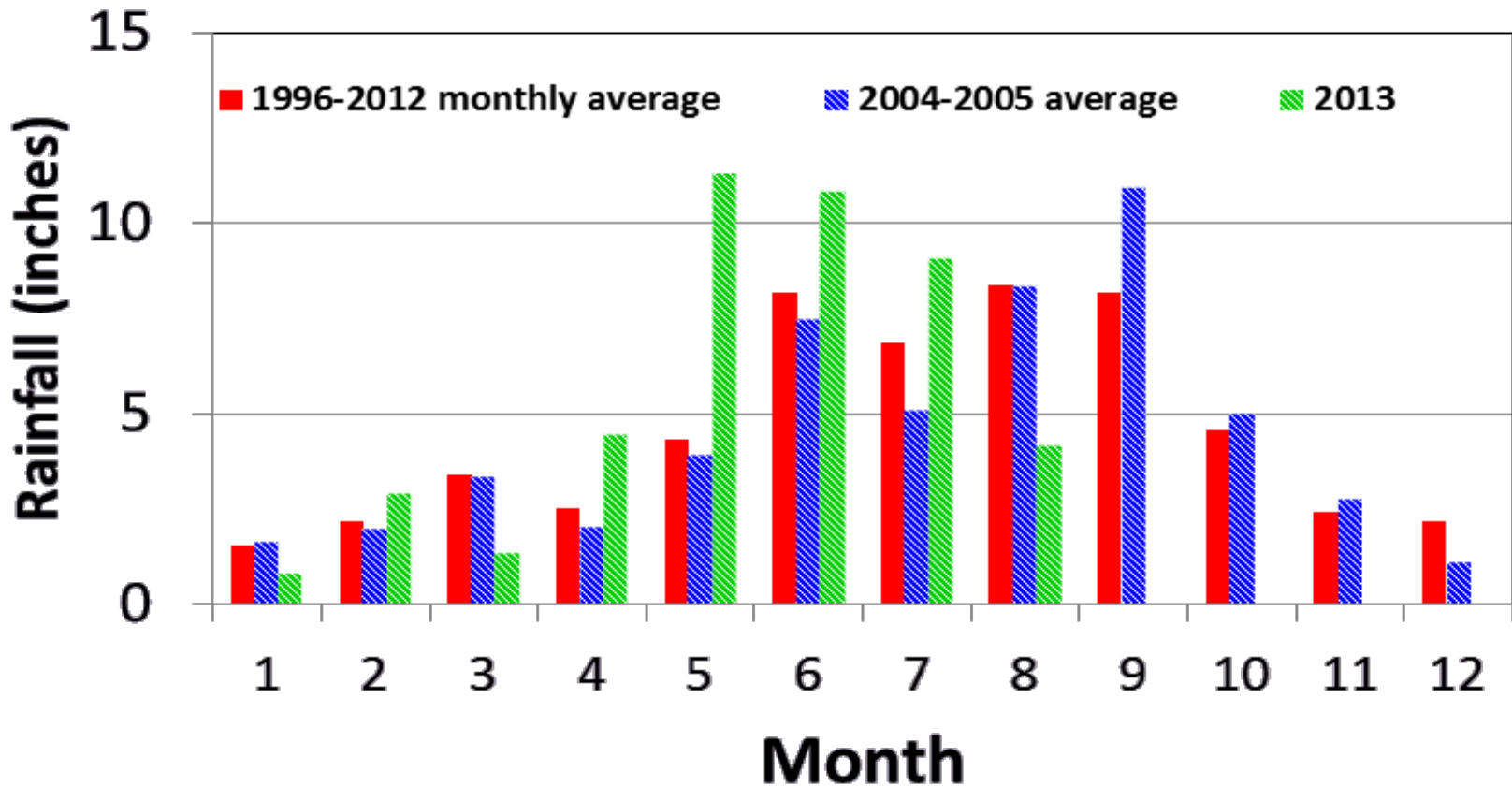


High and medium density residential: high percentage of impervious areas for runoff generation

2013 Wet Season Rainfall/Runoff Characteristics and Discharges into LWL

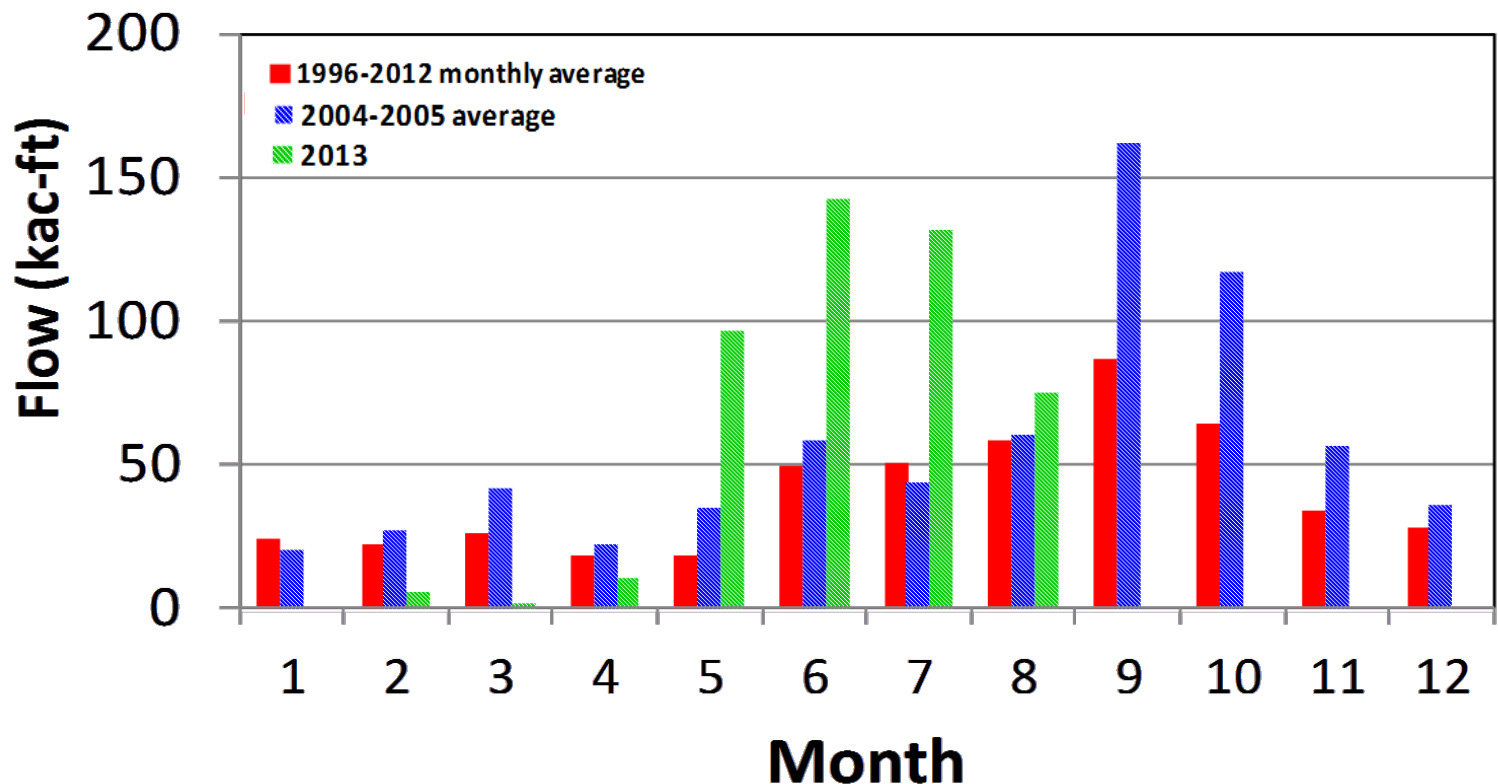


Total rainfall in May- August in Palm Beach is ranked 11th in the past 75 yrs, 26% more than normal

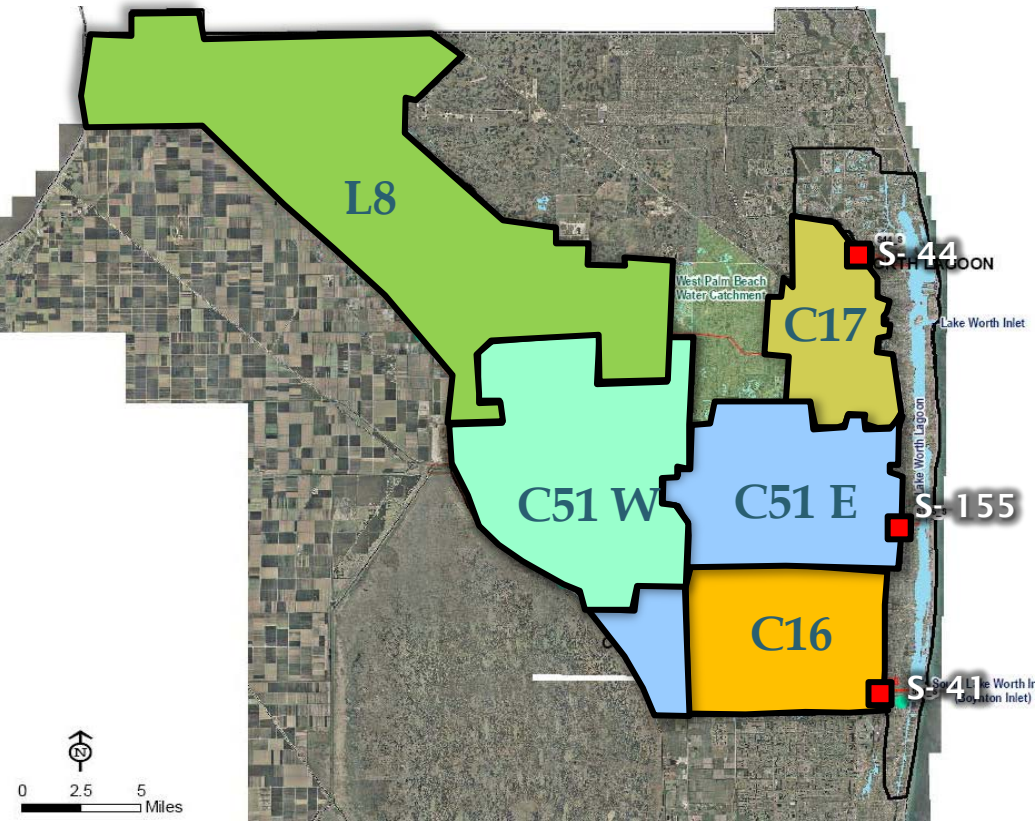
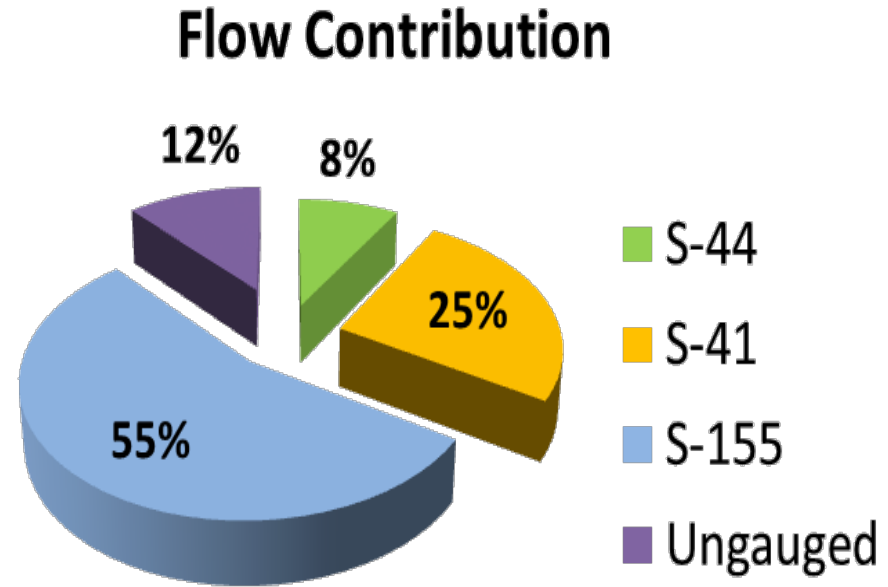


LWL received abnormally high amounts of freshwater during May-August

Sum of 3 Structures: S44, S155, S41
(Ungauged basin flow not included)



**S- 155 contributed
55% of total inflows
and the ungauged
basin 12%**



How Much Lake Okeechobee Water Was Discharged to LWL During 2013 Wet Season?



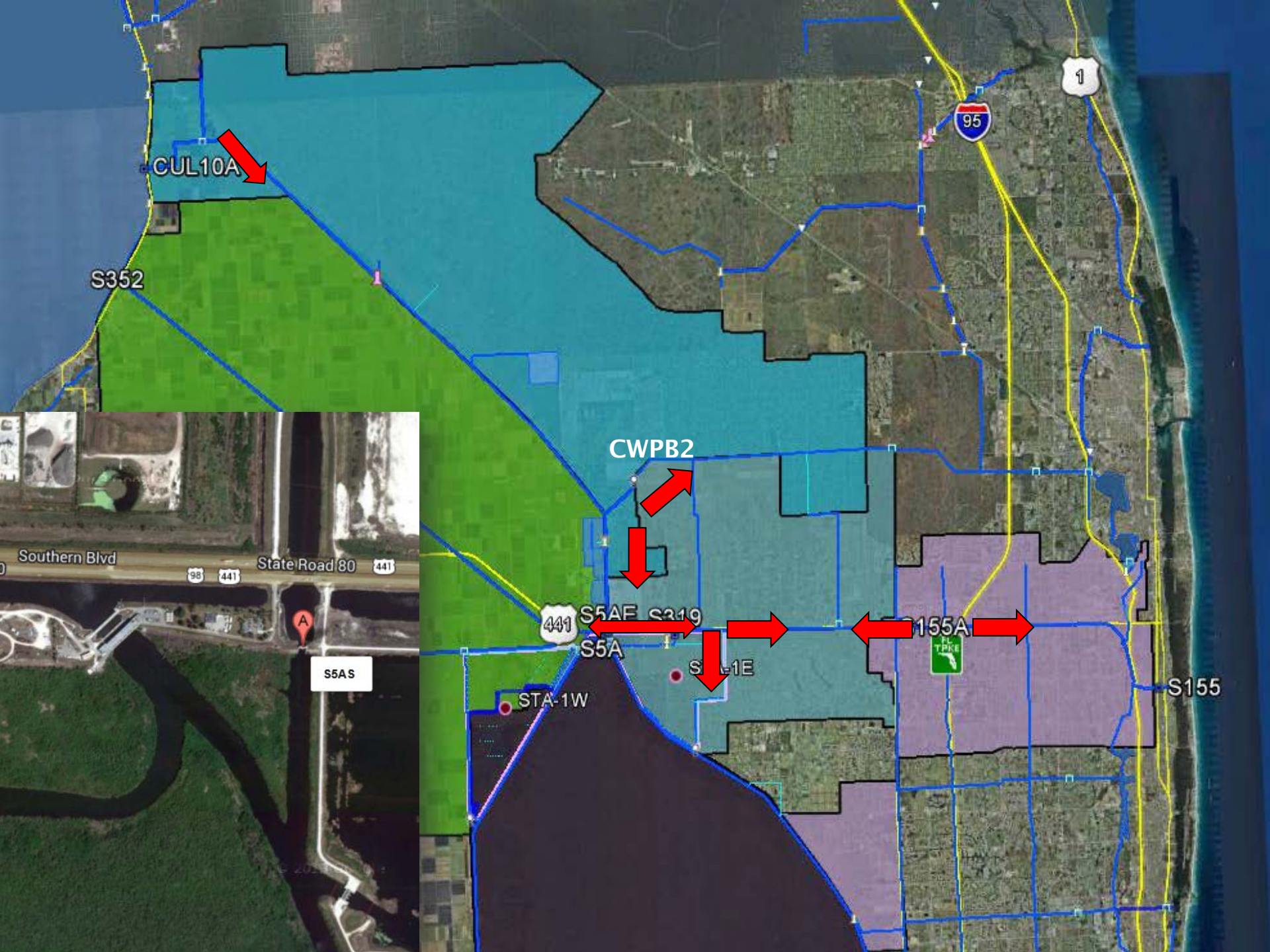
S- 155

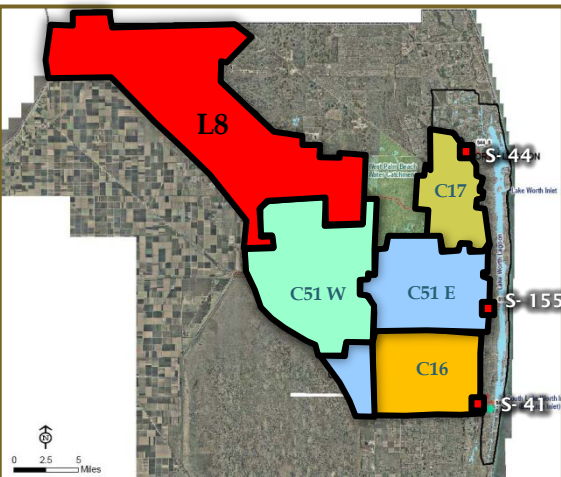


S- 41

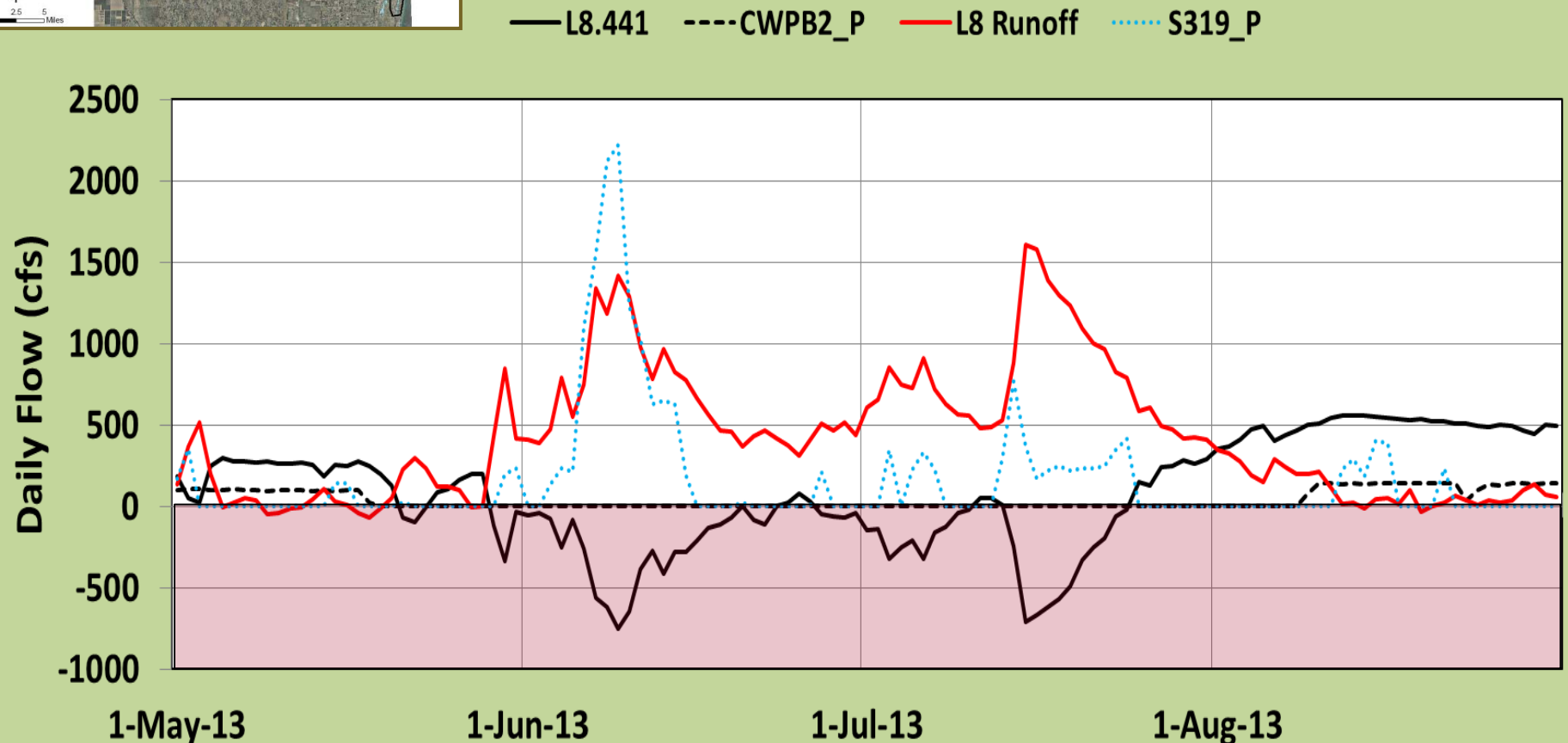


S- 44

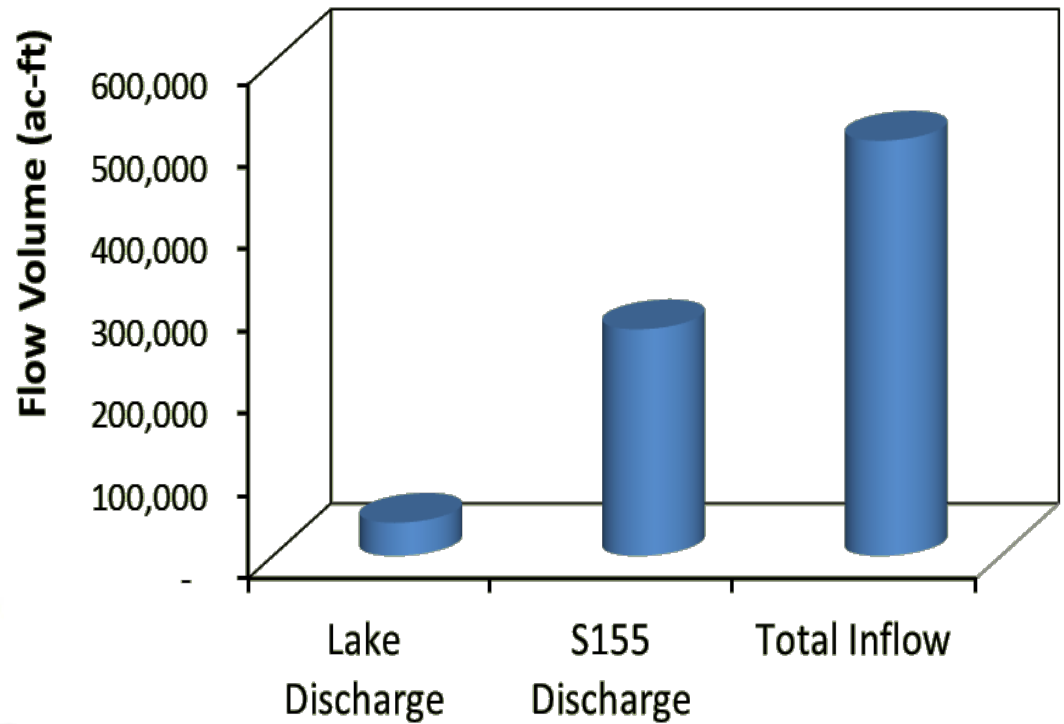
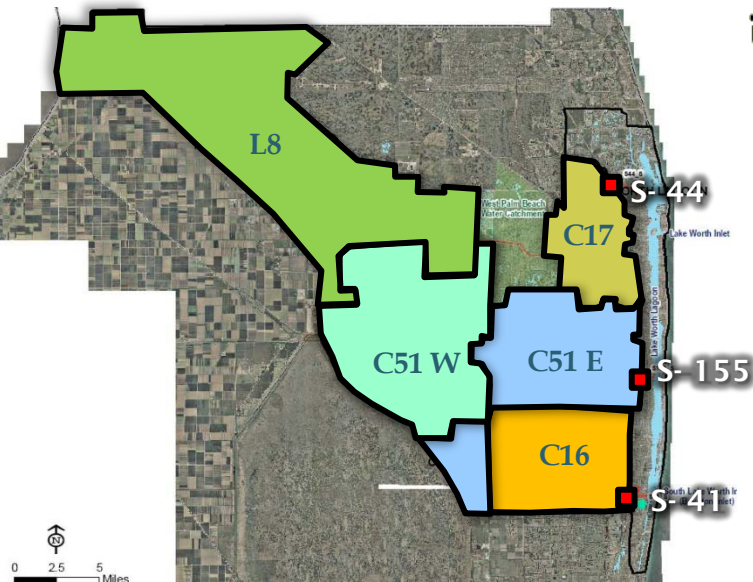




L8 Basin Runoff Back- flowed to the Lake During High Flow Events



The Amount of Lake Okeechobee Water Discharged to LWL During May- August 2013 was 7- 8% of the Total Inflow



Summary

- ✓ Lake Worth Lagoon Watershed is highly urbanized with 12% of the area ungauged
- ✓ 2013 May- August rainfall was 26% more than normal, resulting in extremely high discharges into LWL
- ✓ LO water discharged into LWL was 7- 8% of total inflow during May- August 2013



Acknowledgements for Data Support

- ▶ From Coastal Ecosystems Section, SFWMD
 - **Teresa Coley**
 - **Zhiqiang Chen**

- ▶ From Hydro Data Management Section, SFWMD
 - **John Raymond**

Questions?



Freshwater Discharges to Lake Worth Lagoon

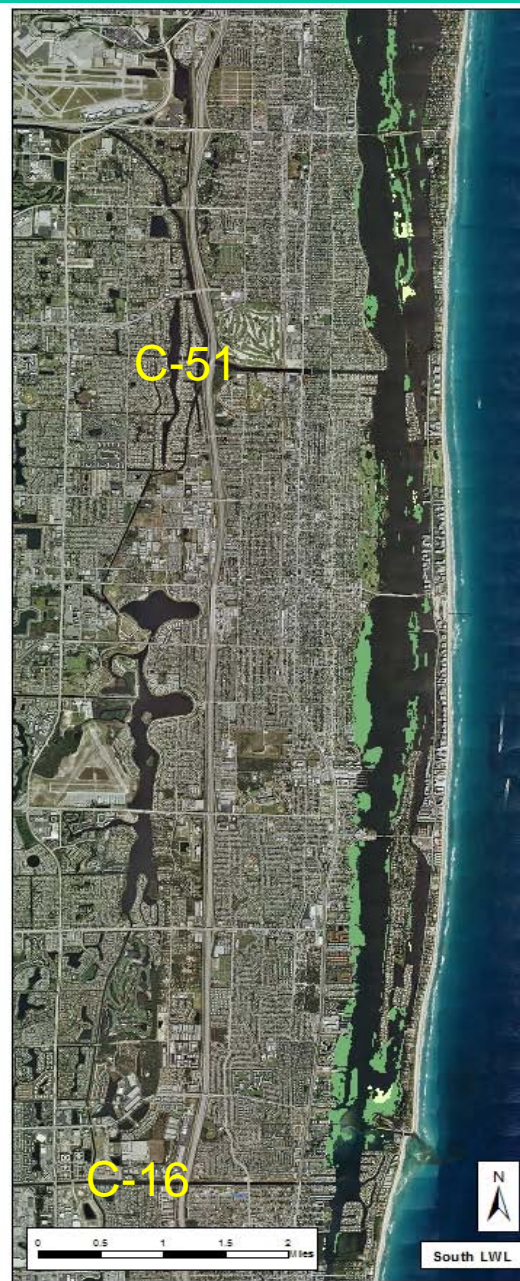
Attachment 2

Robert Robbins, Director
Environmental Resources Management
October 29, 2013



Seagrass Mapping

- Aerial Mapping ~5 yrs
- 2001 & 2007 seagrass coverage 22% or >1600 acres
- 2012 & 2013 unable to capture aerial photo due to discharges and reduced water clarity
- Grant funded by State Legislative Appropriation



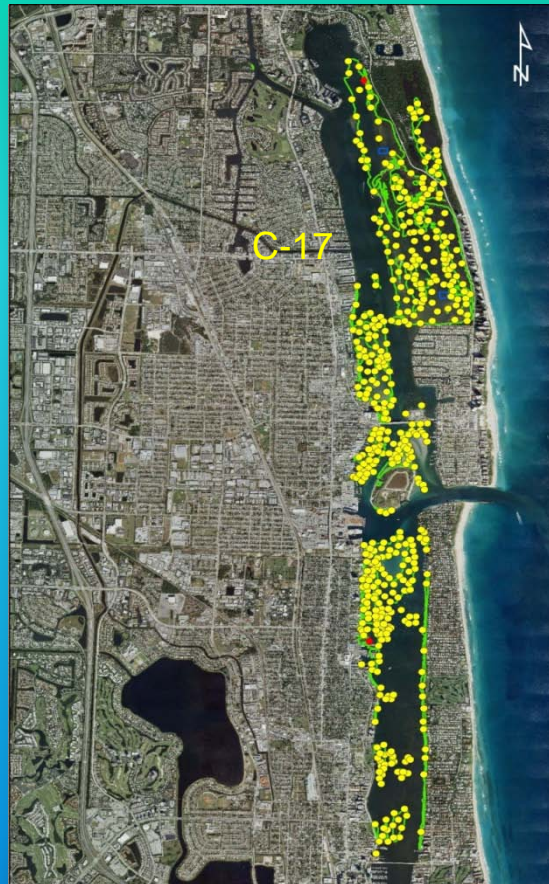
Seagrass Mapping

- 2012 aerial failed due to poor water clarity
- 2013 methodology sampling 1,000 points



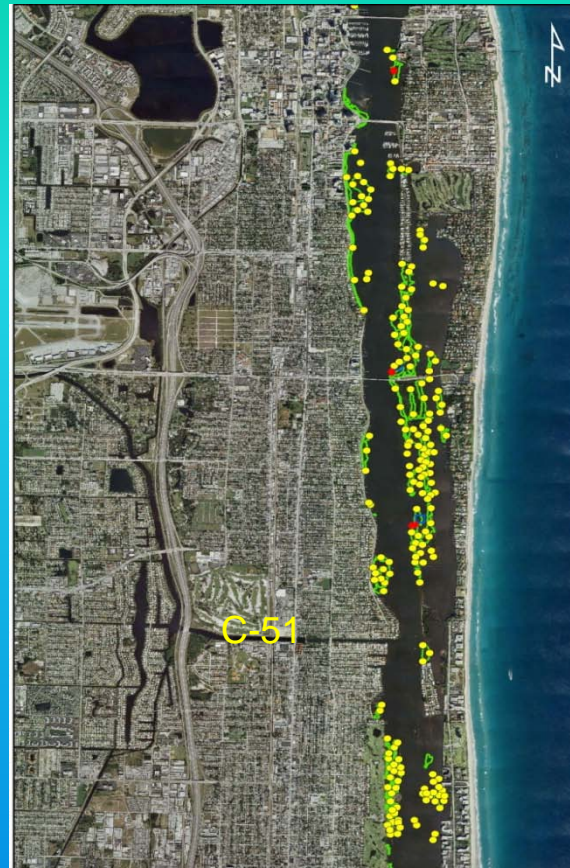
Adjacent to Rybovich Marina

SEAGRASS MAPPING 2013



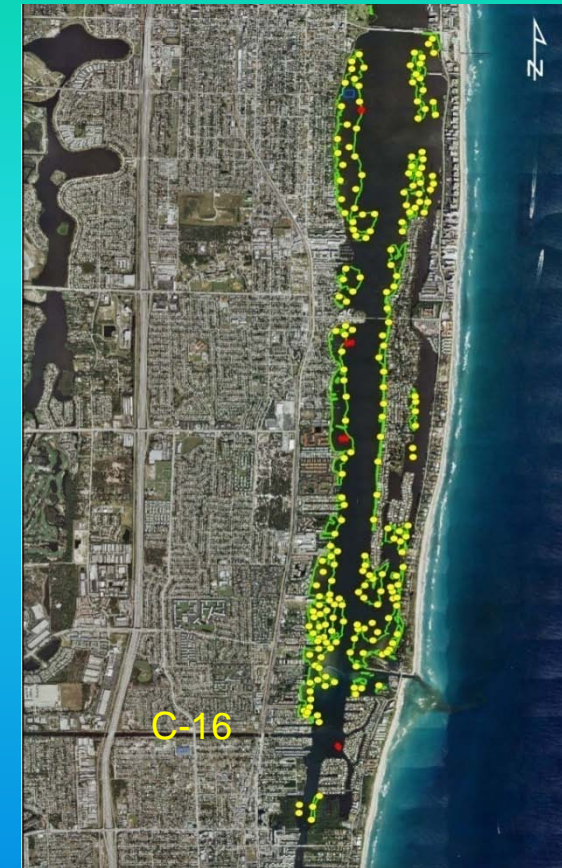
North Lagoon

- 80% with seagrass
- 20% without seagrass



Central Lagoon

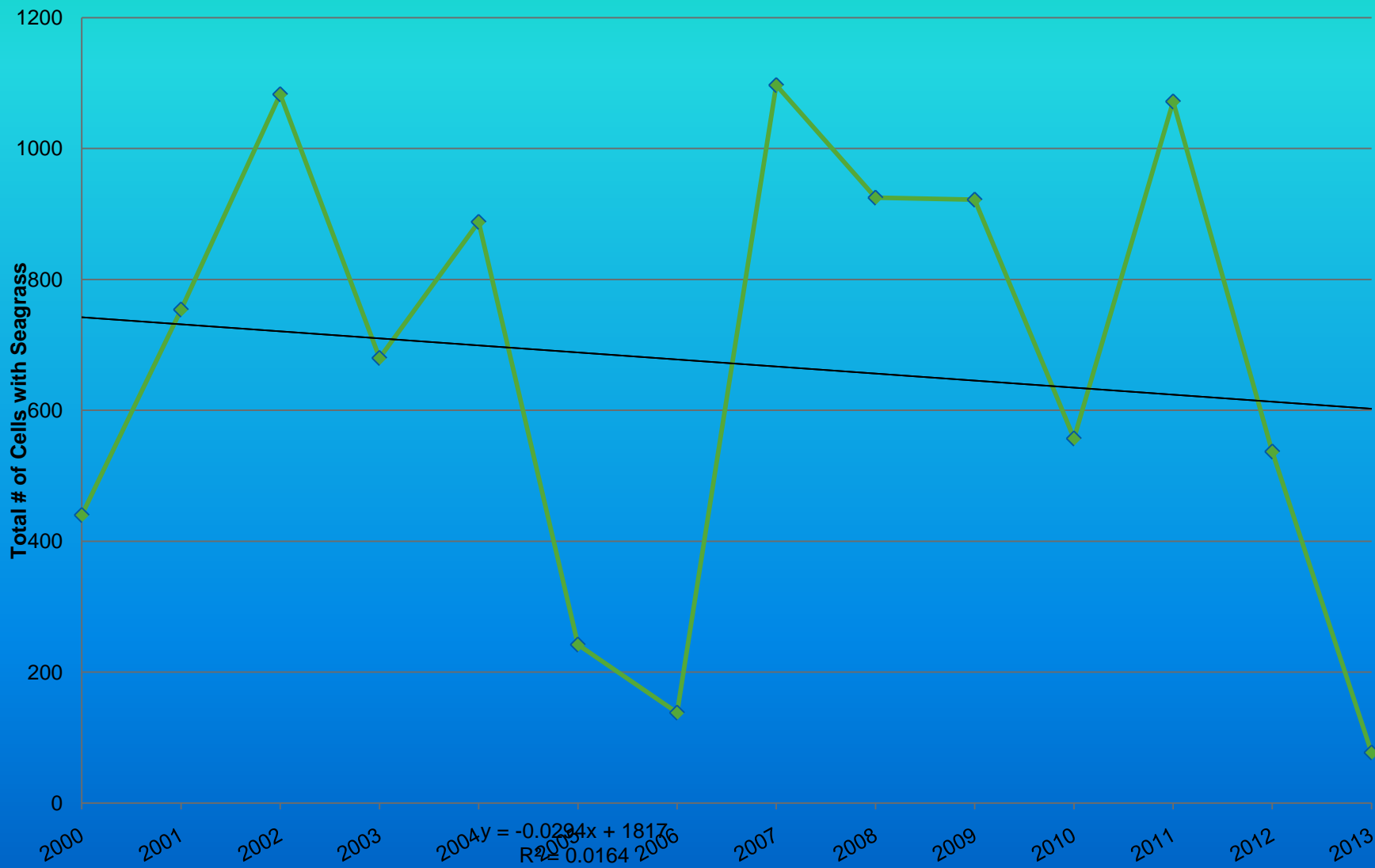
- 22% with seagrass
- 78% without seagrass



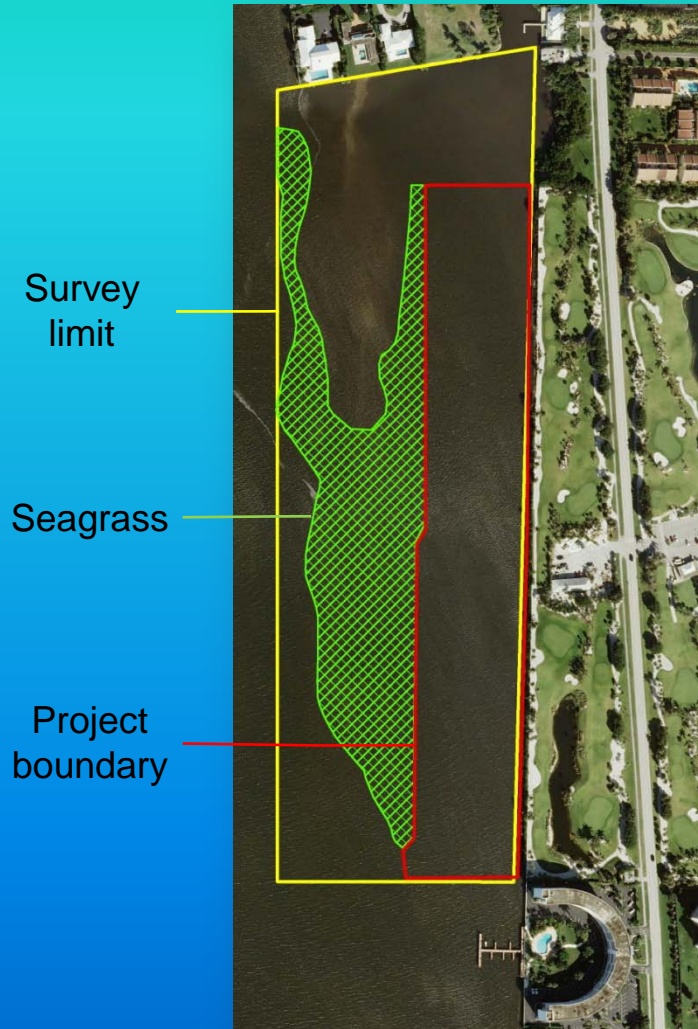
South Lagoon

- 54% with seagrass
- 46% without seagrass

Overall frequency of seagrass occurrence in the Lake Worth Lagoon, 2000-2013



Grassy Flats



9.31 acres in 2010



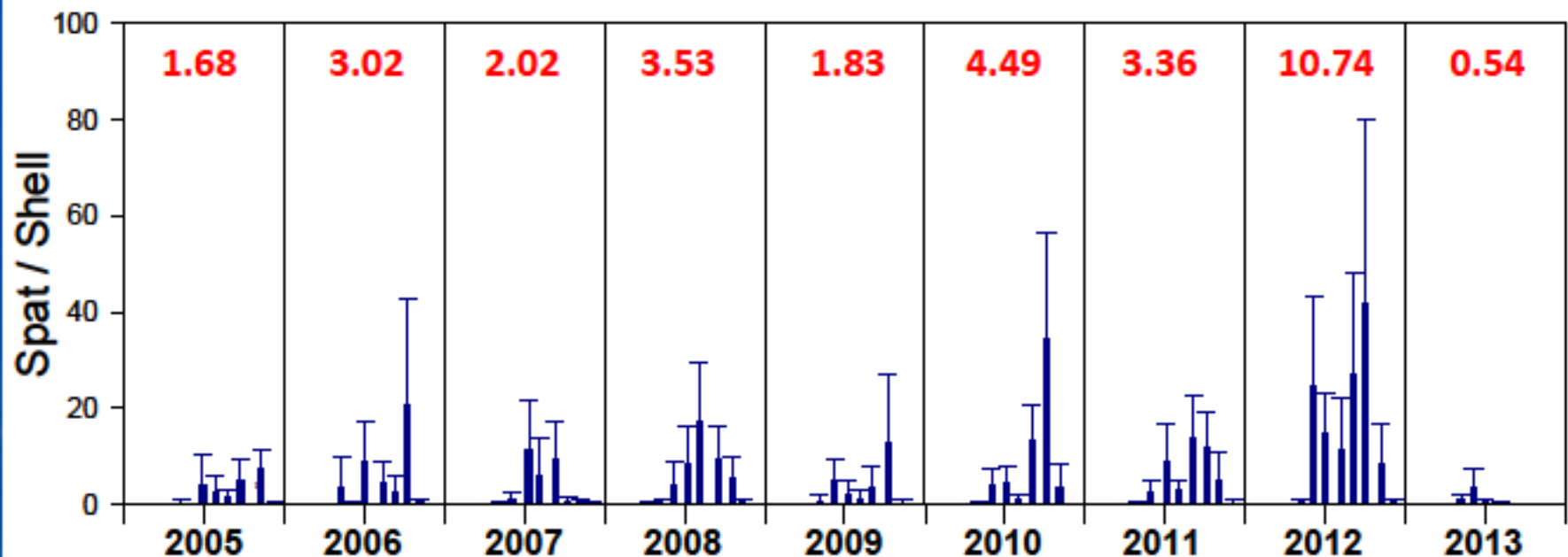
5.90 acres in 2011



0.92 acres in 2013

Juvenile Recruitment

- Spat generally present continuously May through Dec of each year
- Mean annual recruitment rates: 1.7 – 10.7 spat/shell
 - 2012 highest rate measured to date – 10.74 spat/shell
- Recruitment rates very low in 2013 so far
 - May be lowest annual rate to date – 0.54 spat/shell



C-51 Canal

- Freshwater Discharges contain suspended sediments & high nutrients
- Results
 - Muck Deposits
 - Increased Turbidity



Muck Sediments

- Easily re-suspended
 - Increased turbidity
 - Decreased light penetration
 - Blankets the natural sand bottom
- Reduces oysters & seagrass
- Prevents colonization/expansion of oysters & seagrass
- Decreases biodiversity



Impacts at Ibis Isle Restoration Project

- 2012-13 observed:
 - Accumulation of muck
 - Burial of oysters
 - Loss of mangroves



March 2012

Oyster Station

August 2013

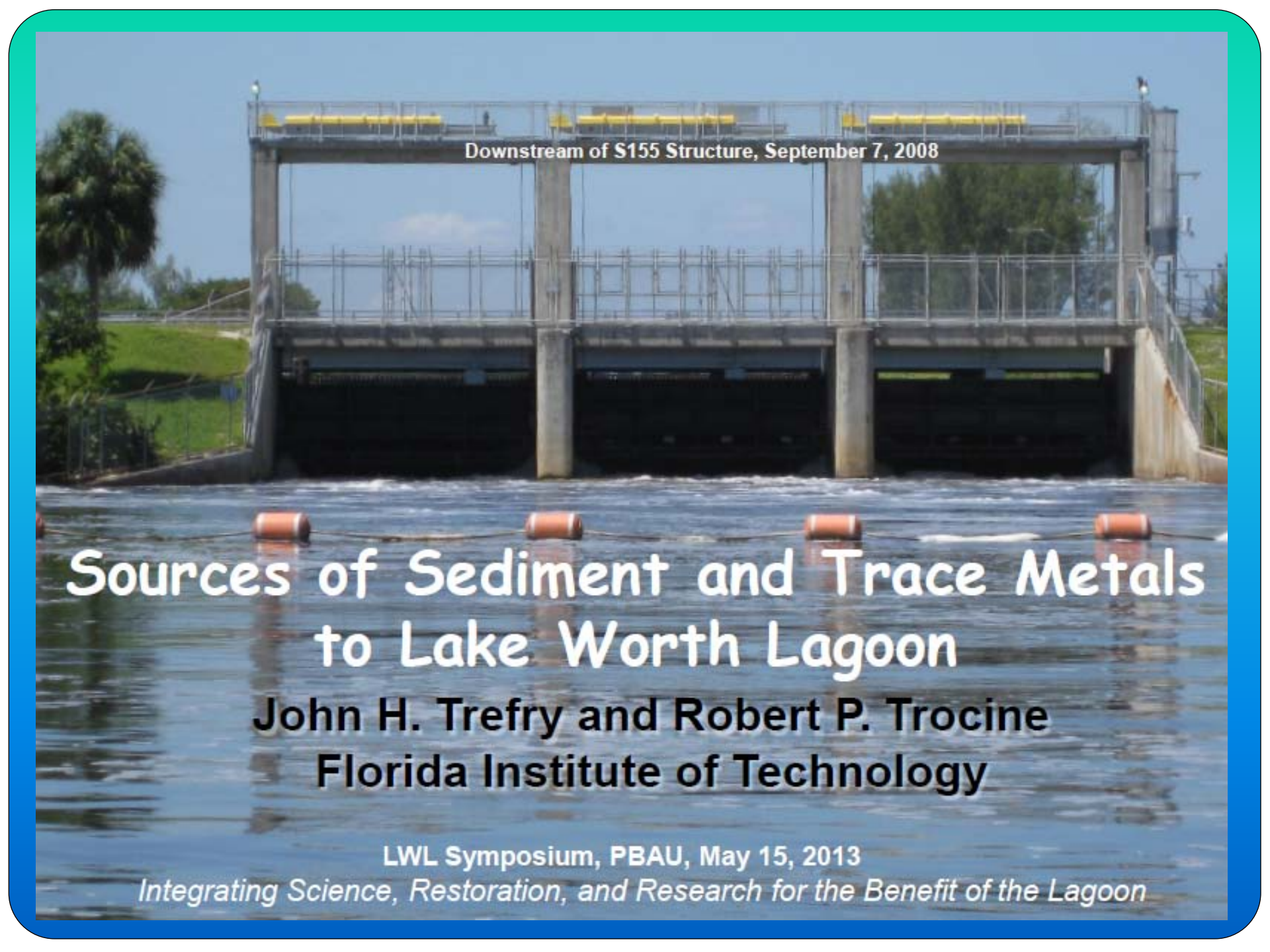




< C-51 in 1940

2013





Downstream of S155 Structure, September 7, 2008

Sources of Sediment and Trace Metals to Lake Worth Lagoon

John H. Trefry and Robert P. Trocine
Florida Institute of Technology

LWL Symposium, PBAU, May 15, 2013

Integrating Science, Restoration, and Research for the Benefit of the Lagoon

Yes, you can 'finger-print' muck

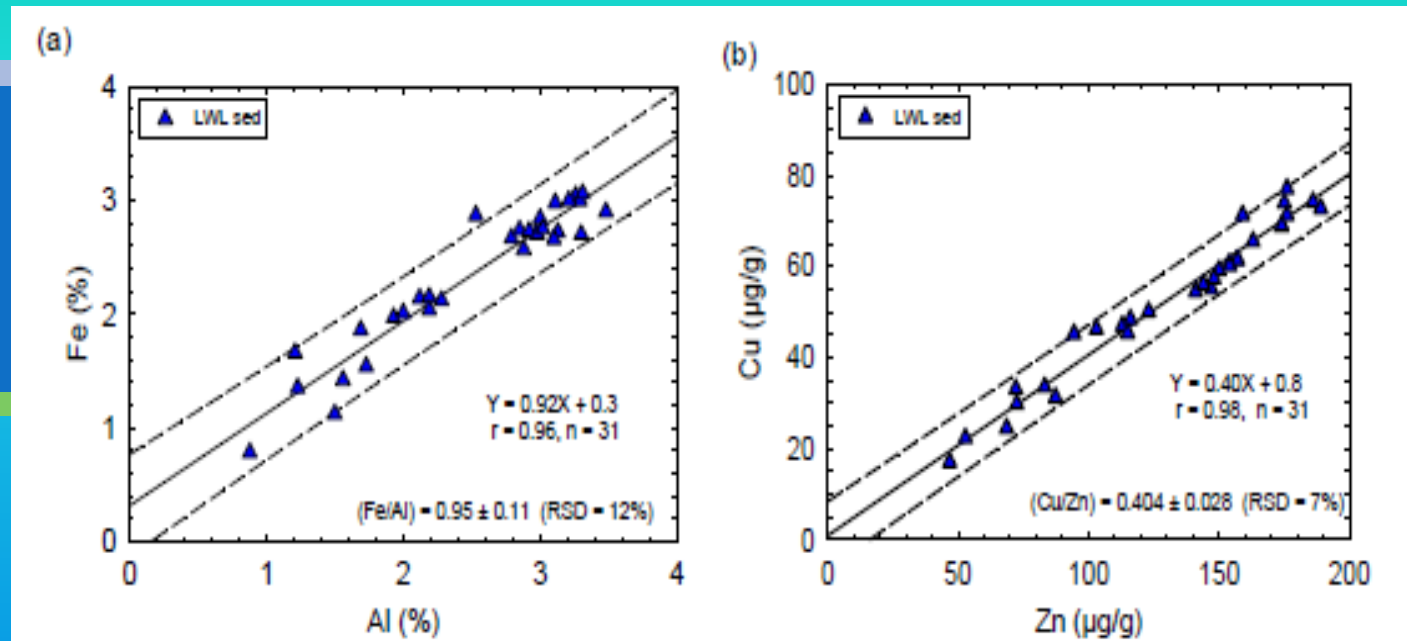


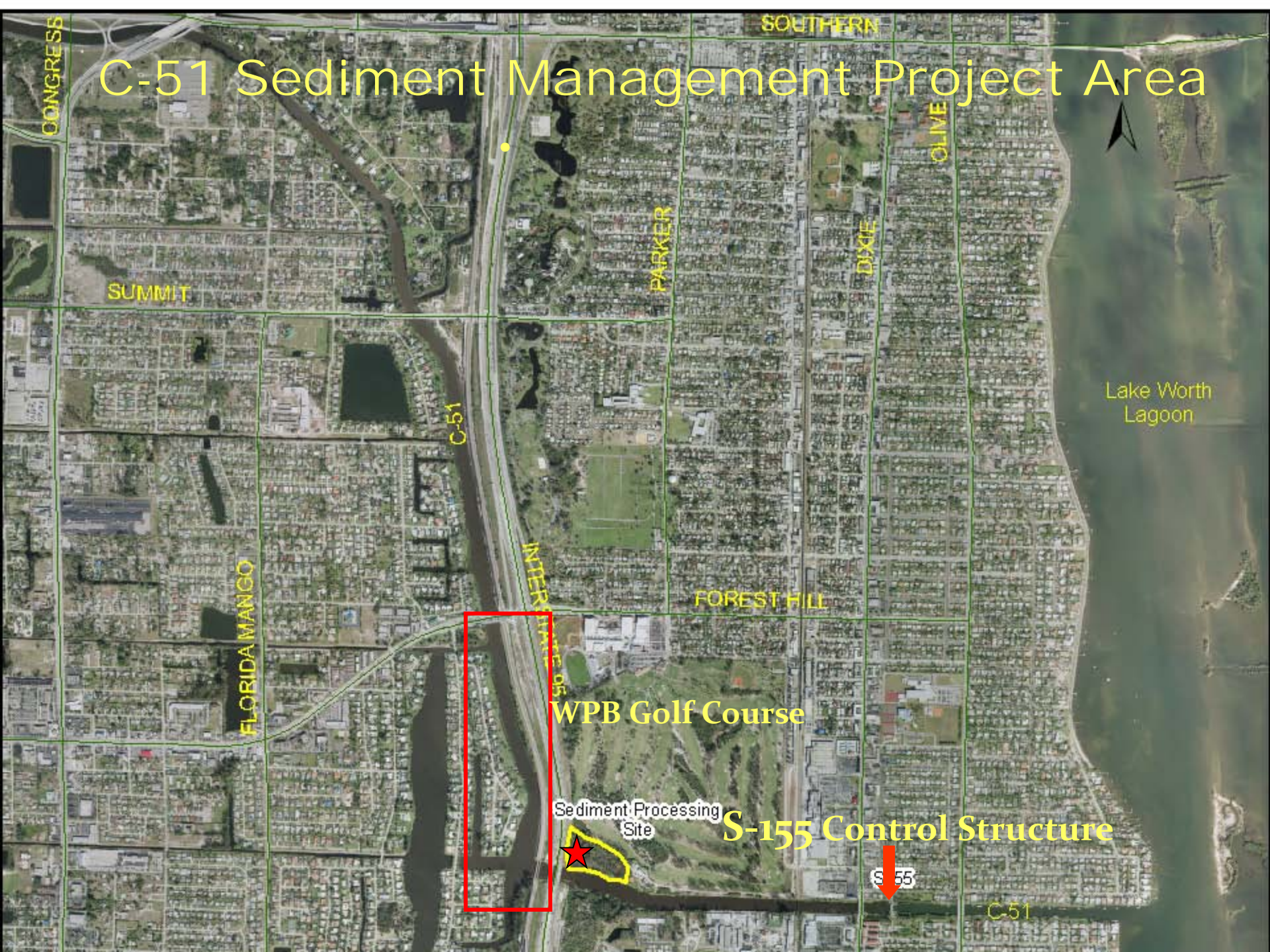
Fig. ES1. Iron (Fe) versus aluminum (Al) and copper (Cu) versus zinc (Zn) from bottom sediments in LWL. Dashed lines show 95% prediction intervals with relative standard deviations.

Fraction of organic matter in surface suspended sediment that was derived from a terrestrial source.



“... decreasing flow at the S-155A structure ... would lessen the burden of freshwater and sediment on LWL.”

C-51 Sediment Management Project Area



WPB Golf Course

Sediment Processing Site

S-155 Control Structure

S-155

C-51

1. Dredging



2. Muck dewatered



3. Sediment/Polishing Ponds



4. Water Treatment



5. Water Returned



6. Dried muck goes..?



Sediment Collection



Total Accretion			
Years	2007 – 2008	2008 – 2010	2010 – 2013
Total (CY)	10,478	6,401	8,643
Average / Year	10,478	3,200	2,881

Take Away Points:

- SFWMD is doing what it can to reduce freshwater discharges.
- 'System' lacks water storage.
- Too much freshwater kills seagrasses and oysters.
- Seagrasses and oysters will recover, given the chance.
- Muck sediments are left behind.
- Muck smothers most living organisms.
- C-51 Sediment Trap helps.
- Reducing discharges will also reduce sediments.



Freshwater Discharges & Lake Worth Lagoon