



# Everglades Ecosystem Assessment: Regional Environmental Monitoring and Assessment Program (R-EMAP)

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Co-PIs:

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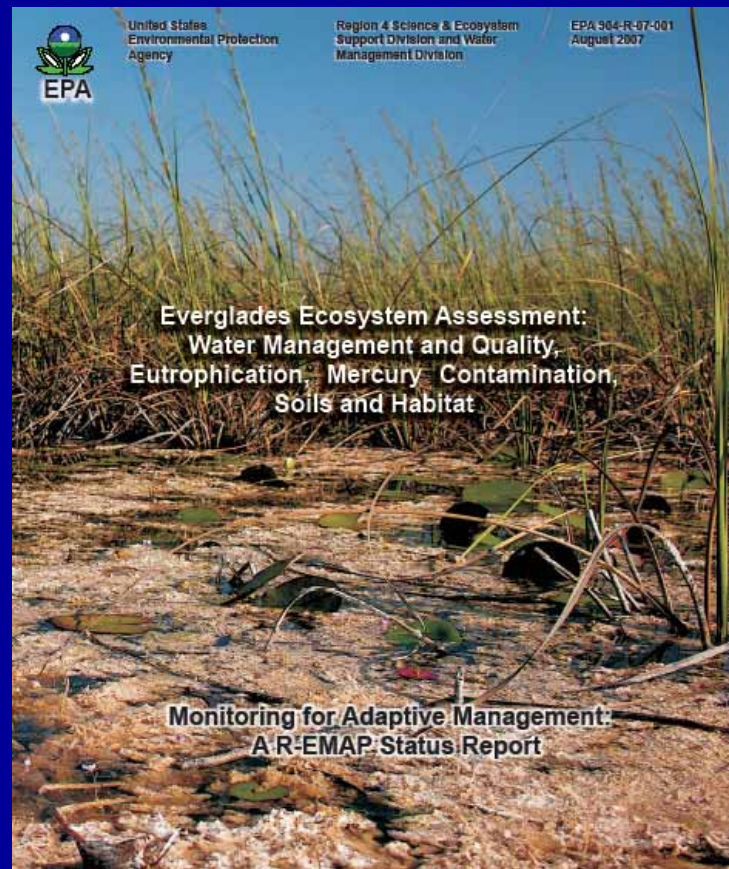
Tom Philippi, Jenny Richards, Len Scinto,  
Joel Trexler

University of Georgia --  
Marguerite Madden

FIU Post-docs:

Guangliang Liu, Brooke Sargeant

GEER 2008



# R-EMAP Sampling 1993-2005

EMAP design

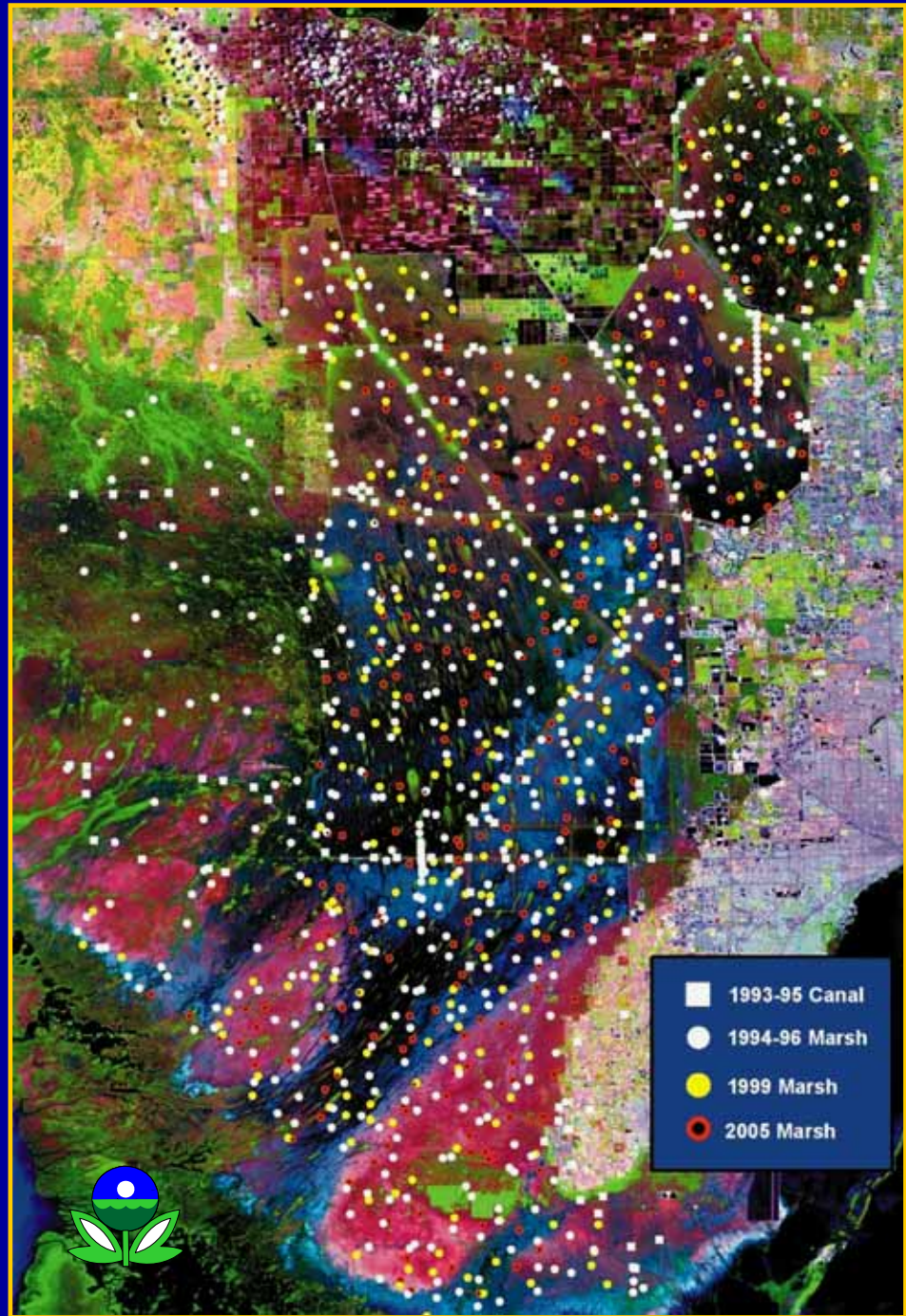
Canal = 1993-95

Marsh = 1995-96; 1999; 2005

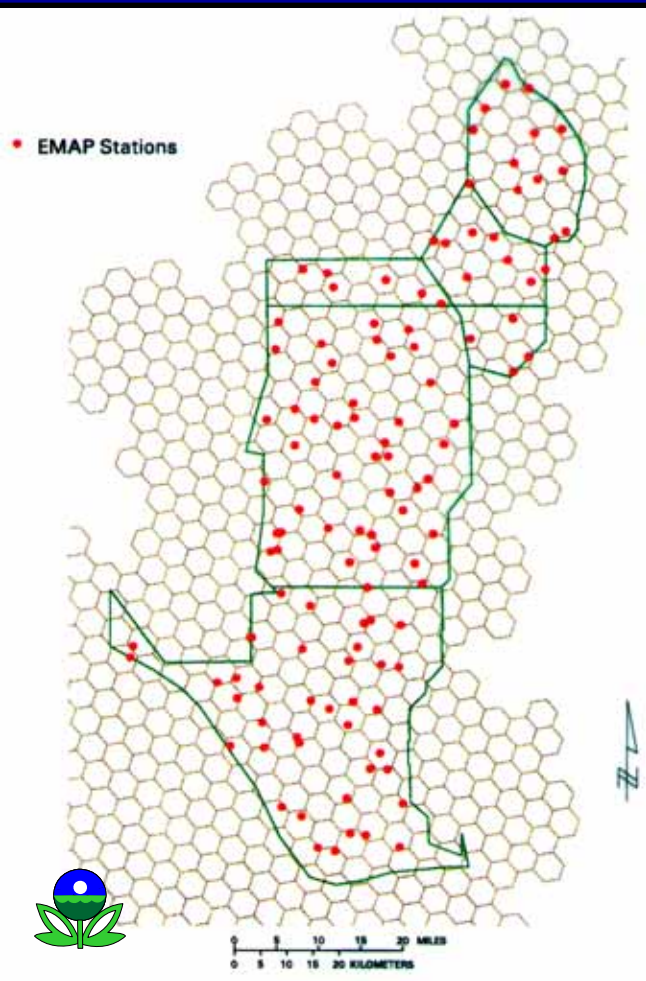
1145 Distinct Sample Sites

~ biogeochemistry  
(~100,000 data values);  
periphyton; macrophytes;  
aquatic community ecology  
(stable isotopes, food webs)

~\$6M investment to date  
(FL Hg TMDL~\$8M, CERP~  
\$11B)



# PROBABILITY-BASED ASSESSMENT



- Unbiased estimates of resource condition and change with known confidence.
  - Every member of a statistical population has a known, equal chance of being selected; the samples are drawn at random; the statistics are model-free (no assumptions to violate).
- Reviewed by the National Academy of Science.
- Has been applied to numerous terrestrial and aquatic ecosystems nationwide.

# Sampling Everywhere



# Program Elements

## *Chemical analytes in biogeochemical media*

Surface water

Floc

Pore water

Soil

Periphyton

Mosquitofish

## *Macrophytic plants*

## *Community ecology*

Periphyton, benthic macroinvertebrates, fish

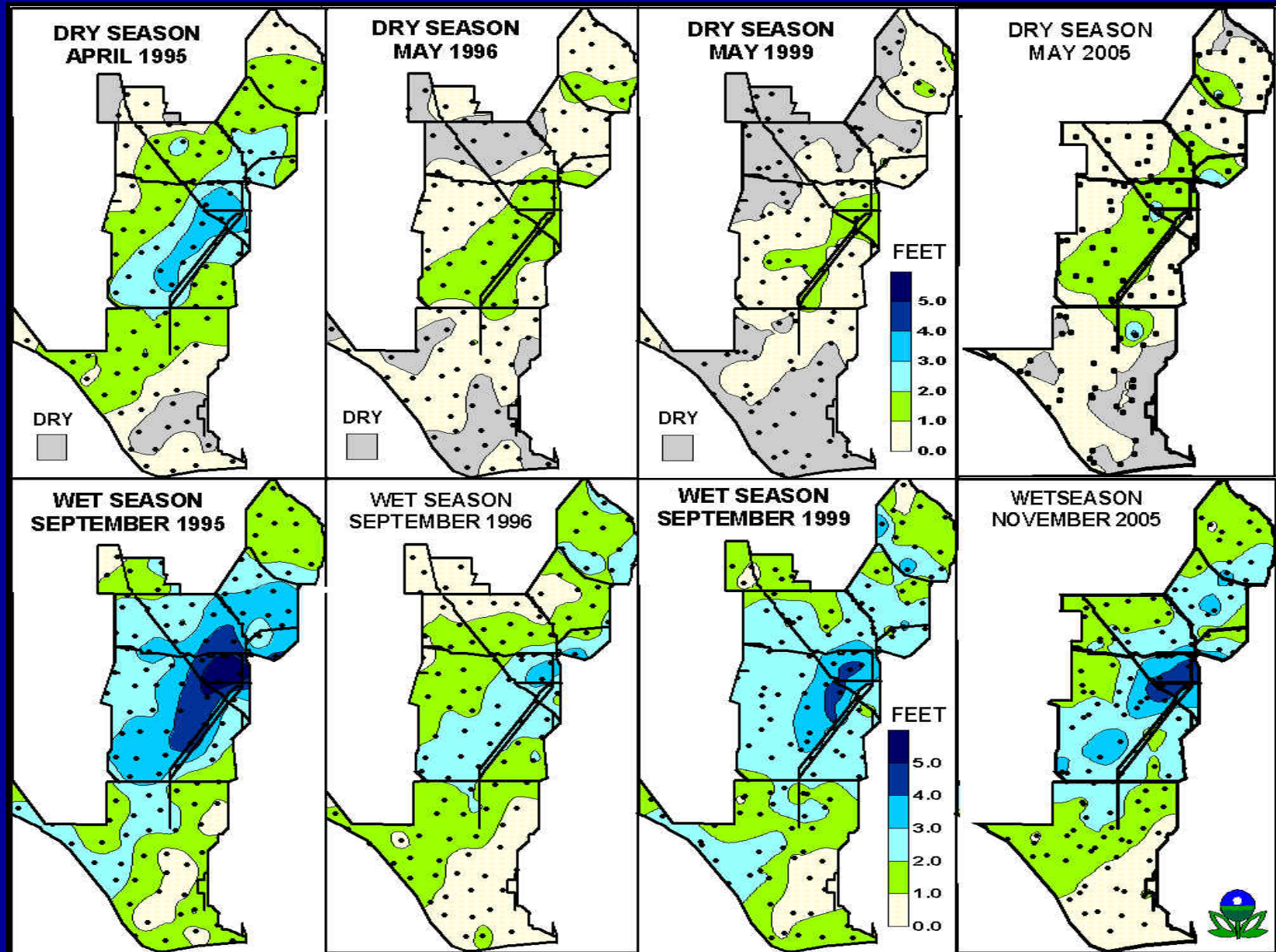
# Program Statistical Tools 1995/96 -- 1999 -- 2005

- **Weight of Evidence Approach**
  - Box-and-whisker plot (data distribution, changes)
  - **Krig** (spatial patterns, changes)
  - **Cumulative Distribution Function plot** (impacted area [% , +/- CI])
  - **Cumulative Distribution Function test** (Has impacted proportion changed over time?)
  - **z-test** [of means (are years different?)]
- **Multivariate analyses** (associations, causative factors)

# Program Findings Relevant to Management 1995/96 -- 1999 -- 2005

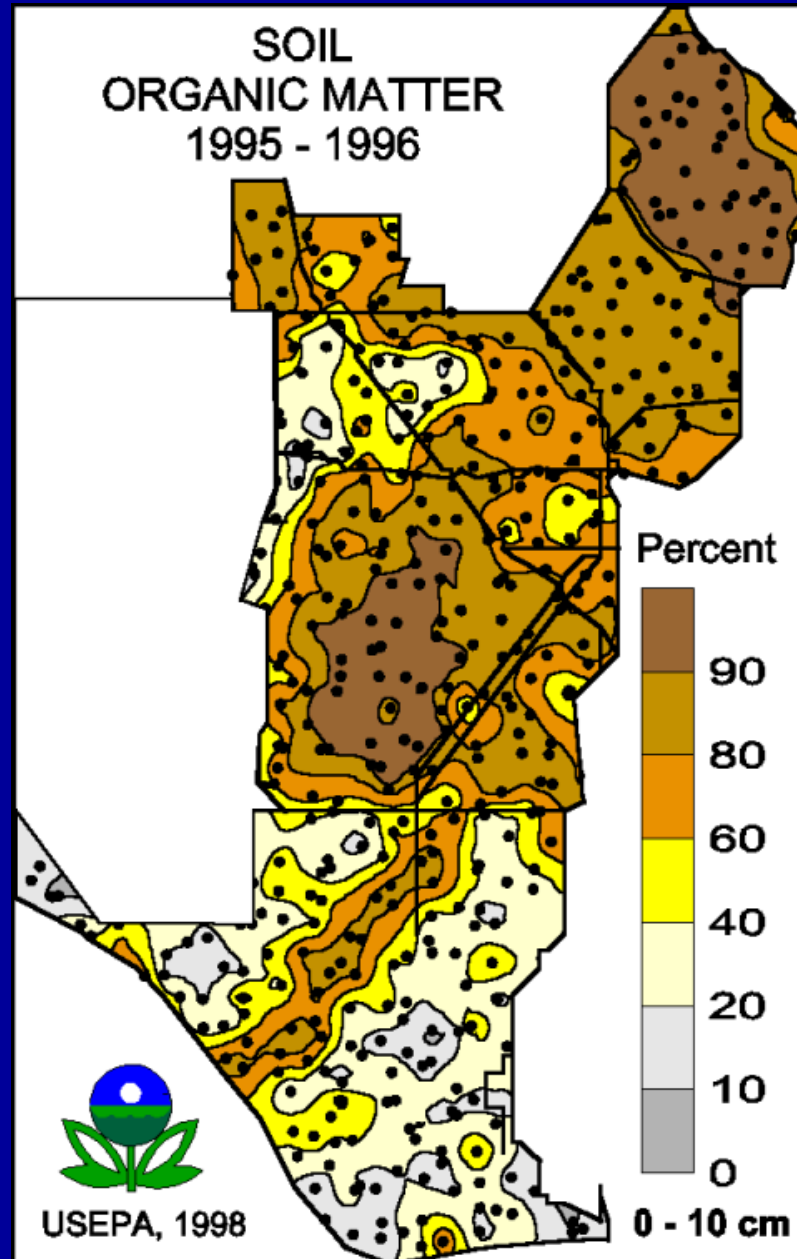
- **Initial conclusions about:**
  - critical analytes
  - entire system
  - proportion impacted
  - statistical confidence
- **New analyses about:**
  - multivariate relationships
  - community & systems ecology
  - Also in support of CERP

# Water Depth





# Soil Organic Matter



# New Program Publications

Scheidt and Kalla 2007.

<http://www.epa.gov/region4/sesd/reports/epa904r07001.html>

G. Liu et al. 2007, 2008.

B. Sargeant et al. 2008, 2009; poster # 26 II

*Hydrobiologia* special issue -- 2009.