

A Partnership Program at Freedom Park's Treatment Wetlands:

FGCU's Everglades Wetland Research Park and Collier County
Stormwater Planning

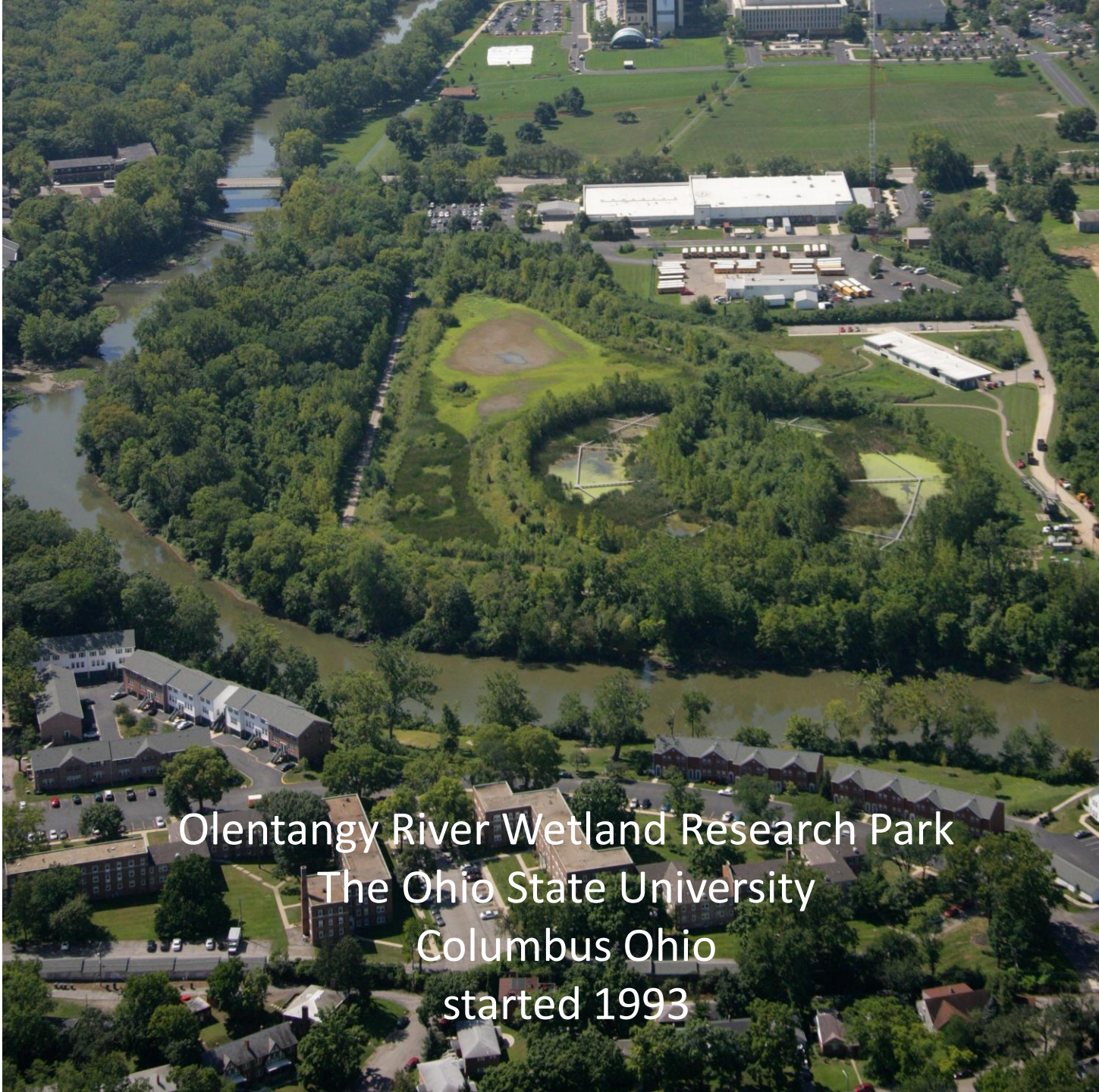
By

William J. Mitsch, Ph.D.

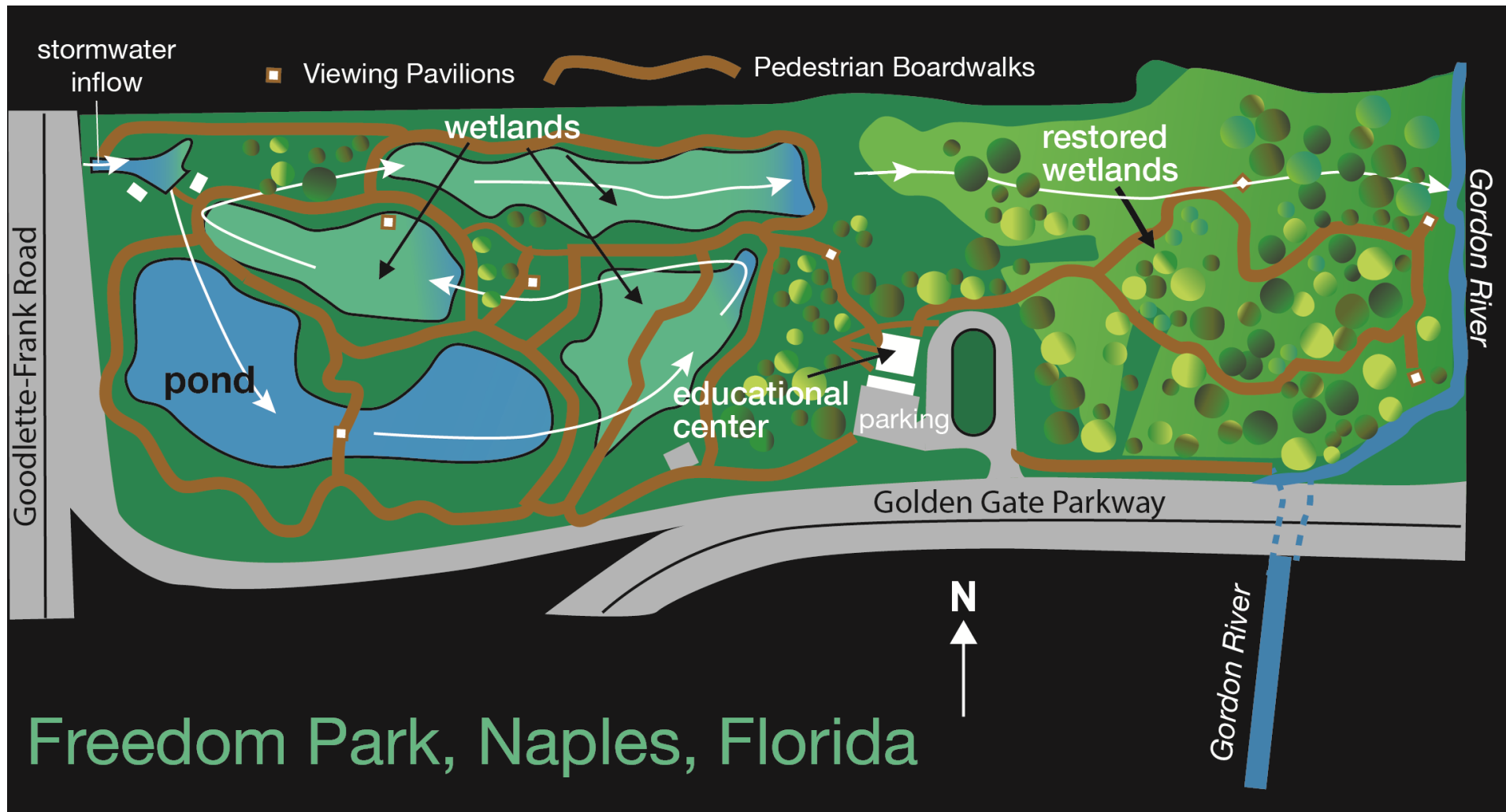
Director, Eminent Scholar, and Sproul Endowed Chair,
Everglades Wetland Research Park, Florida Gulf Coast University, Naples FL;
Editor-in-Chief, Ecological Engineering;
Emeritus Professor, The Ohio State University



Freedom Park
Naples Florida
started mid-2000s

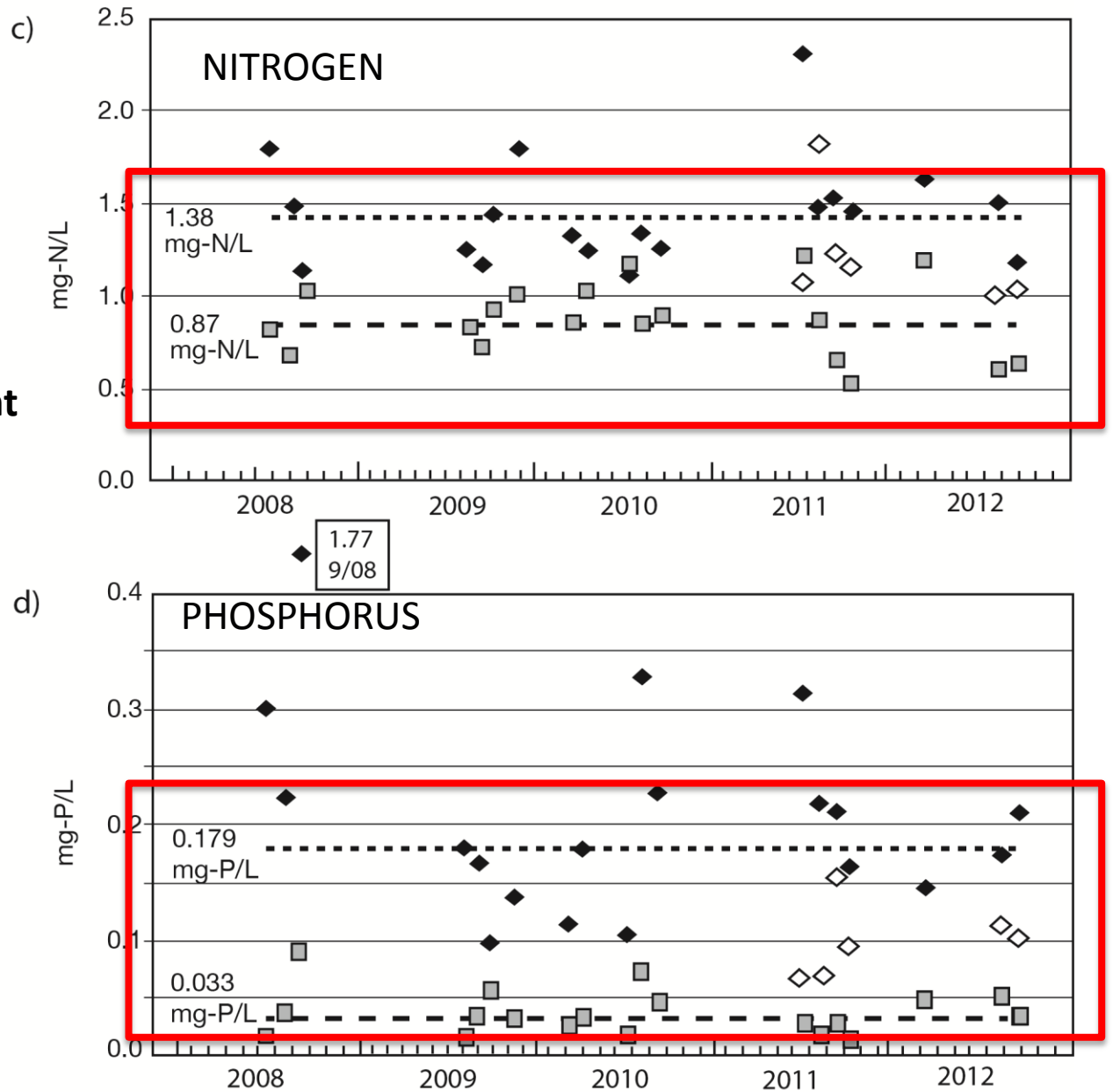


Olentangy River Wetland Research Park
The Ohio State University
Columbus Ohio
started 1993



Water Quality Improvement Through created wetlands at Freedom Park

Source: Jim Bays, CH2M



Freedom Park Stormwater Wetlands: Towards a Long-Term Monitoring and Management Plan

William J. Mitsch, PhD.

Everglades Wetland Research Park, Florida Gulf Coast University
4940 Bayshore Drive, Naples, FL 34112

Introduction

A 20-ha constructed wetland complex in Naples Florida, named Freedom Park, was constructed in 2007-2008 at an abandoned citrus grove site to treat urban stormwater runoff while providing a “park-like” aquatic/terrestrial landscape for the enjoyment and environmental education for the citizens of Collier County (Fig. 1). An estimated 25,000 visitors came to Freedom Park in 2013 (J. Bays, personal communication).

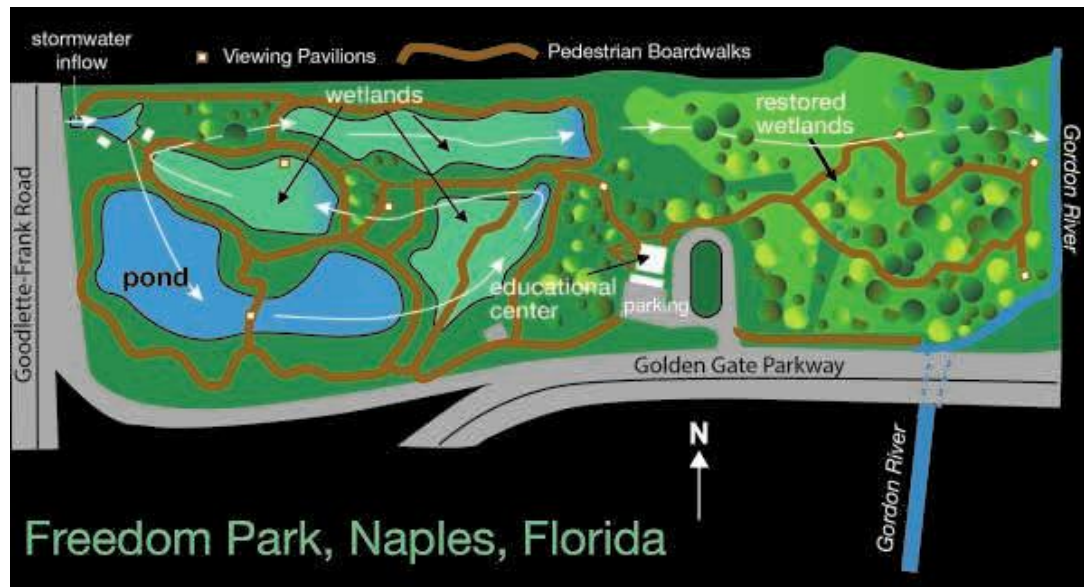


Figure 1. Freedom Park restored and stormwater wetlands constructed in 2007-08 in Naples, Florida.



Freedom Park Water Quality Celebration

Join us at Freedom Park

Thursday November 17

11:00 a.m. - 12:30 p.m.

To celebrate a historic partnership between FGCU and Collier County to tackle the water quality challenges facing Naples Bay



- ◊ Hear from local and university officials and FGCU researchers at 11:00 a.m.
- ◊ See the water quality and wetland research being done at Freedom Park
- ◊ Get an understanding of the science being applied





FREEDOM PARK WATER QUALITY CELEBRATION

**11AM-12:30 PM THURSDAY, NOVEMBER 17
FRED W. COYLE FREEDOM PARK**

**1515 GOLDEN GATE PARKWAY, NAPLES
NORTHEAST CORNER OF GOLDEN GATE PARKWAY & GOODLETTE-FRANK ROAD**

Celebrate a unique collaboration between Florida Gulf Coast University's Everglades Wetland Research Park and Collier County to provide water quality research at Freedom Park. Designed to help improve water quality in Naples Bay and reduce flooding in downstream communities, the park's interconnected manmade ponds, marshes and wetlands and restored natural wetlands function as natural filtration systems similar to those built to protect the Everglades.

- Learn benefits of wetlands and how to reduce bay pollution
- Tour wetlands and ponds on boardwalks and paths with FGCU researchers
- Visit the natural history education center
- Hear presentations by county and university officials and FGCU researchers

Co-sponsored by Collier County (Parks and Recreation, Conservation Collier, Stormwater and Pollution Control) and by Florida Gulf Coast University (Everglades Wetland Research Park in the College of Arts & Sciences).



COLLEGE OF
ARTS & SCIENCES



For more information, contact Dr. Li Zhang at (239) 325-1364 or lzhang@fgcu.edu

Freedom Park Stormwater Wetlands: Towards a Long-Term Monitoring and Management Plan

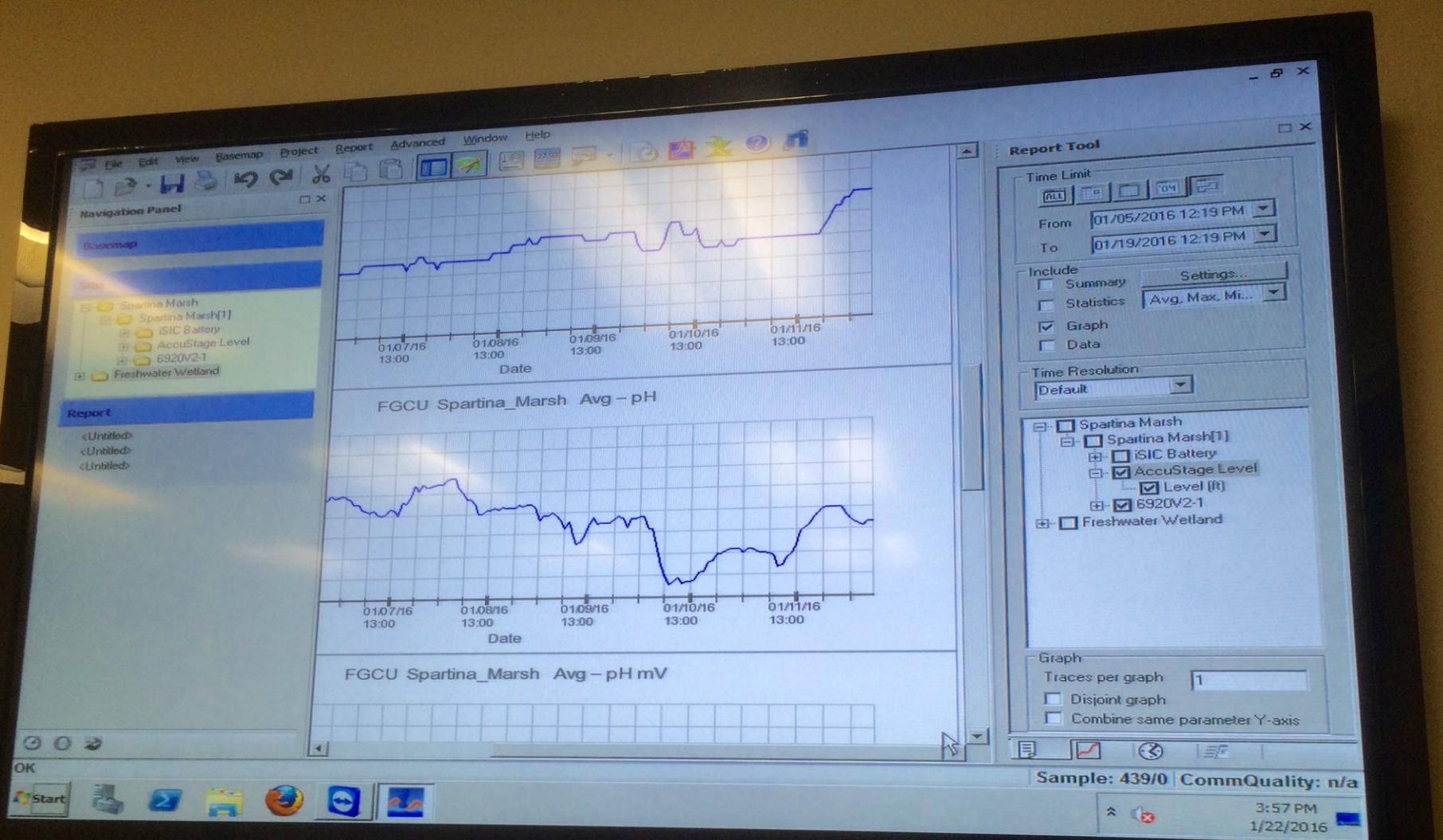
1. Hydrology and bathymetry
2. Water quality sampling and analyses
 - Routine sampling twice monthly
 - Special storm sampling at 6-hr frequencies with auto samplers
 - Diurnal and dawn-dusk sampling
 - Continuous stage and water quality station
3. Vegetation Cover and Productivity
4. Wildlife Observations



Water Auto Sampler for Storm Event Sampling
in Freedom Park,
September 2016



Continuous Stage and Water
Quality Sensor in Freedom Park,
September 2015



Display of Real-Time Stage and Water Quality from Freedom Park, FGCU's Kapnick Building, Naples Botanical Garden



Biomass Day at Freedom Park, September 2016



Biomass Day at Freedom Park, September 2016

Proposed “Wetlaculture” Mesocosm Experiments at Freedom Park

Linking Treatment Wetlands for Sustainable Clean
Water with Nutrient Recycling

Our Team

Prof. Bill Mitsch, Ph.D., Project Director and Principal Investigator

Director, Eminent Scholar and Sproul Endowed Chair, Everglades Wetland Research Park, Florida Gulf Coast University, Naples Florida; Editor-in-Chief, Ecological Engineering; Professor Emeritus at the Ohio State University

Technical Advisors

Mr. Jim Bays, Technology Fellow, Natural Treatment Systems, CH2M Hill, Tampa, Florida

Prof. Siobhan Fennessy, Ph.D., Jordon Professor of Biology, Kenyon College, Gambier, Ohio

Prof. Jiyoung Lee, Ph.D., Associate Professor of Environmental Microbiology, College of Public Health, The Ohio State University

Prof. Jay Martin, Ph.D., Professor of Agricultural and Ecological Engineering, College of Food, Agricultural, and Environmental Sciences, The Ohio State University

Prof. Sam Miller, Director, Gigot Center for Entrepreneurship, Mendoza College of Business, University of Notre Dame

Prof. Hans Paerl, Ph.D., Kenan Professor of Marine and Environmental Sciences, University of North Carolina

Prof. Jennifer Tank, Ph.D., Galla Professor of Biological Sciences and Director, Environmental Change Initiative, University of Notre Dame

Others:

Dr. Li Zhang, Assistant Director, Everglades Wetland Research Park, Florida Gulf Coast University

Ms. Lauren Griffiths, M.S. candidate, Environmental Sciences, Florida Gulf Coast University

Ms. B.B. Jiang, Ph.D. candidate, School of GeoSciences, University of South Florida, Tampa

Ms. Taylor Nesbit, M.S. candidate, Environmental Sciences, Florida Gulf Coast University

Our inspiration



GEORGE
BARLEY

WATER
PRIZE

PRESENTED BY
EVERGLADES FOUNDATION

Awarded in 2020

Overview

Our overall goal is to investigate a new landscape-scale approach that integrates:

1. wetland retention of nutrients from stormwater and polluted river water fluxes that otherwise will damage downstream lakes, rivers, coastal areas, and
2. recycling of the nutrients back to agriculture or horticulture.

Our overall approach

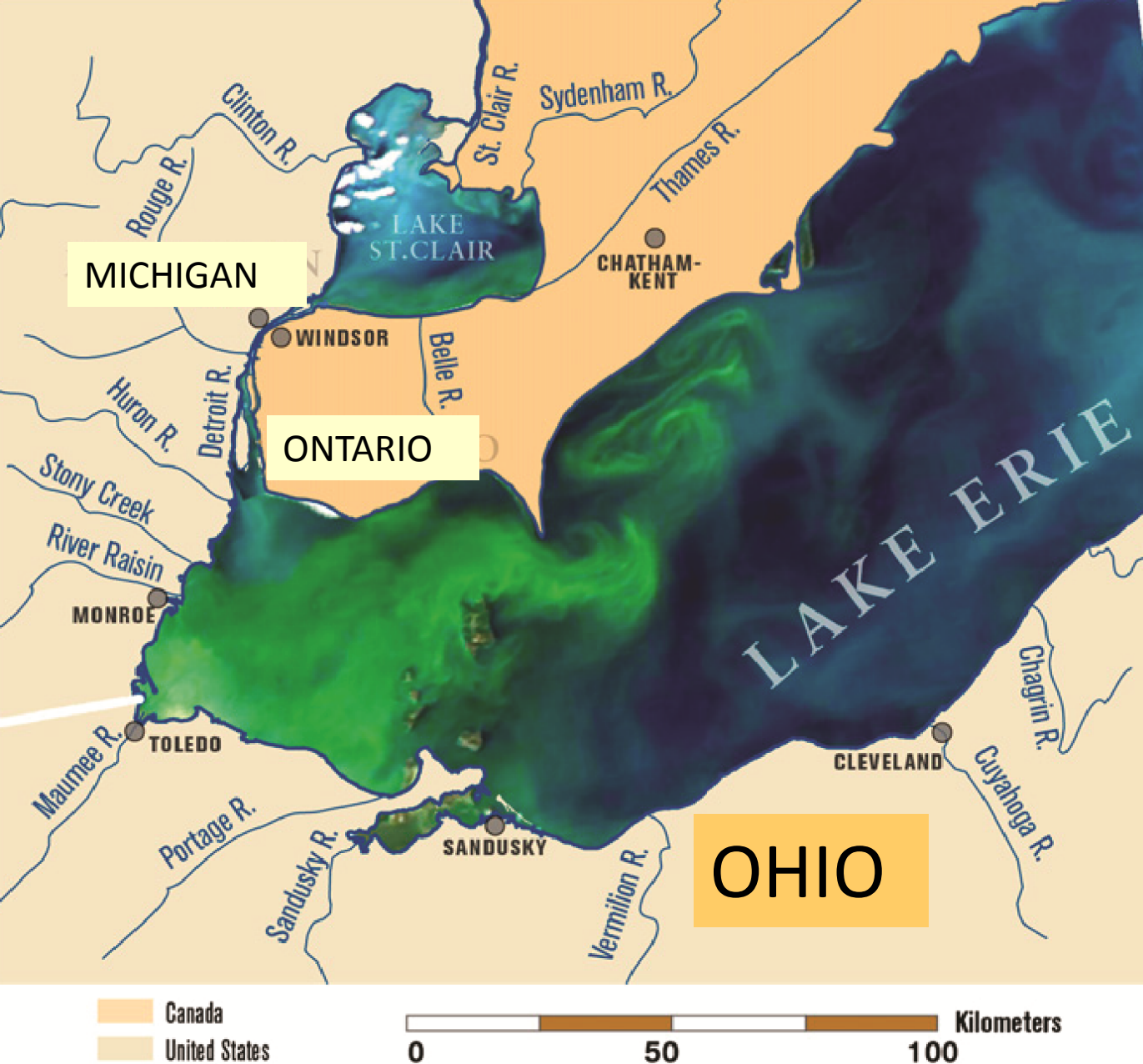
wetland mesocosm experiments in two distinct climates—south Florida and Ohio—where significant nutrient pollution is resulting in harmful algal blooms

Florida governor declares state of emergency over 'guacamole-thick' algae

Published June 30, 2016 FoxNews.com



Lake Erie Algal Blooms



“Nutrient impairment continues to plague Lake Erie, impacting an \$11.5 billion tourism industry”
Ohio Lake Erie Phosphorus Task Force (Nov 2013)

Satellite Image from Sept 3, 2011 of Western Lake Erie (Michalak et al. 2013) PNAS

Preliminary design for mesocosm compound at Freedom Park

- Installation of approximately 30 mesocosm tubs (each 2.5 ft wide x 4 ft long) in a 5 x 6 array near a source of high phosphorus water
- Desired inflow phosphorus concentrations ~100 to 200 ppb (0.1 to 0.2 mg-P/L)
- Fence around mesocosm compound for security
- Require electricity to pump river water into feed tanks to distribute by gravity to mesocosm tubs

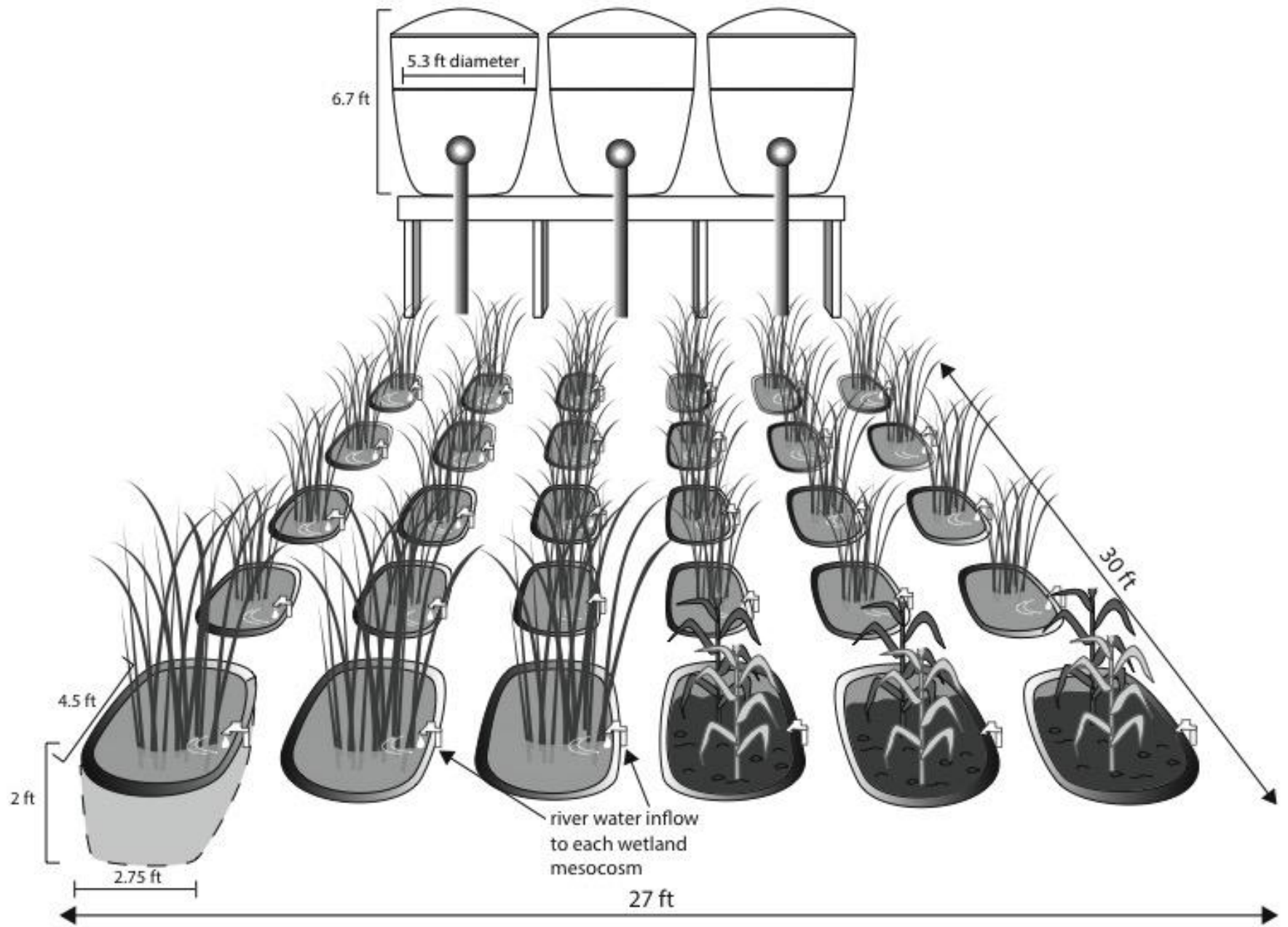


Needs for the Freedom Park mesocosm experiment

- ~\$20,000 for the tubs, water supply tanks, and plumbing/carpentry/fencing/back hoe earthmoving
- Land for mesocosm compound near high phosphorus water; 40 ft x 60 ft



river water feed tanks





Wetland mesocosm
planting—Buckeye
Lake, Ohio
October 22, 2016



Wetland mesocosm
planting—Buckeye
Lake, Ohio
October 22, 2016



Wetland mesocosm planting—Buckeye Lake, Ohio
October 22, 2016



Wetland mesocosm hydrologic testing—Buckeye Lake, Ohio
October 22, 2016



Newly constructed wetland mesocosm compound—Buckeye Lake, Ohio
November 4, 2016



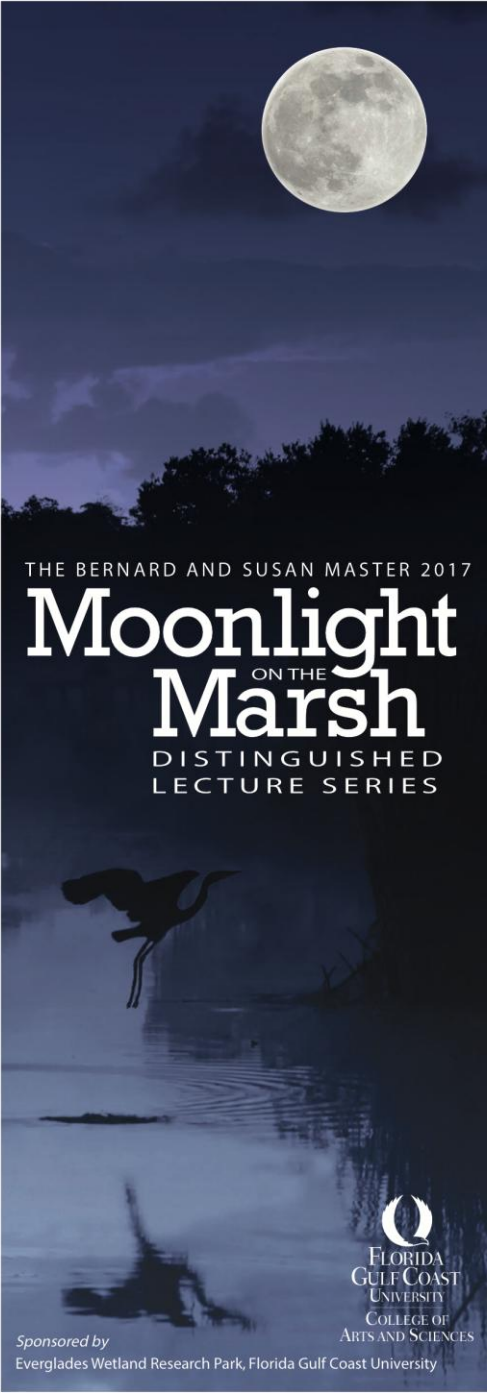
Wetland Mesocosm Compound at Olentangy River Wetlands, OSU, ~2001 (photo by W. Mitsch)



Proposed Location of Mesocosm Compound in Freedom Park

Our short-term goals at Freedom Park

- Experiments will investigate hydraulic loading rates (HLR) for appropriate wetland vegetation communities in Freedom Park (3 different loading rates with current rate as lowest)
- Environmental education with graduate student theses and dissertations based on these mesocosm experiments
- Interpretation signage for the public to understand wetland research on vital public problem
- Publication of research results in peer-reviewed scientific literature
- Exploration of feasibility of this approach for full-scale testing and implementation with a sound business model



THE BERNARD AND SUSAN MASTER 2017

Moonlight ON THE Marsh

DISTINGUISHED
LECTURE SERIES

Sponsored by
Everglades Wetland Research Park, Florida Gulf Coast University



JANUARY 19, 7 pm THURSDAY

**The Dutch solution to floods:
Live with water, don't fight it**

Leon P.M. Lamers, Ph.D.

*Professor of Aquatic Ecology & Environmental
Biology, Institute for Water and Wetland Research,
Radboud University, Nijmegen, The Netherlands
Co-sponsor: Heffner Family, Columbus, Ohio*

FEBRUARY 2, 7 pm THURSDAY

**Rethinking conservation and
development in South American
wetlands: A challenge beyond
the borders**

Luisa Fernanda Ricaurte, Ph.D.

*Freelance Consultant, Alexander von Humboldt
Institute, Bogotá, Colombia*

FEBRUARY 10, 6 pm FRIDAY

*This lecture is held at the Wetlands Day
Celebration, Corkscrew Swamp Sanctuary,
375 Sanctuary Road West, Naples, FL 34120*

**Restoring the Greater Florida
Everglades – what has gone right
and what has gone wrong**

William J. Mitsch, Ph.D.

*Eminent Scholar and Director, Everglades Wetland
Research Park, Naples, Florida and Juliet C. Sproul
Chair for Southwest Florida Habitat Restoration and
Management, Florida Gulf Coast University,
Naples, Florida*

MARCH 2, 7 pm THURSDAY

The global freshwater crisis

Gary A. Lamberti, Ph.D.

*Professor and Past Chair, Department of Biological
Sciences, University of Notre Dame, Notre Dame, Indiana.
Co-sponsor: Notre Dame Club of Naples*

MARCH 16, 7 pm THURSDAY

Monitoring for water quality and health

Joan B. Rose, Ph.D.

*Homer Nowlin Chair in Water Research and
2016 Stockholm Water Prize Laureate, Department
of Fisheries and Wildlife, Michigan State University,
East Lansing, Michigan*

*All lectures, except for February 10,
are held at FGCU's Harvey Kapnick
Education and Research Center, Naples
Botanical Garden, 4940 Bayshore Drive,
Naples, Florida 34112*

For more information, please contact:

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Eminent Scholar and Director
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*Everglades Wetland Research Park and Juliet C. Sproul Chair
for Southwest Florida Habitat Restoration and Management,
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