SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rotenberger Vegetation Changes as Influenced by Hydrologic Conditions, 1998-2007

Public Meeting on the Long-Term Plan for Achieving Water Quality Goals for the Everglades Protection Area Tributary Basins

May 27, 2009

Brian Garrett and Michelle Ferree
Stormwater Treatment Area Management Division
bgarret@sfwmd.gov
mferree@sfwmd.gov

sfwmd.gov

Presentation Overview

- History of Rotenberger Wildlife Management Area (RWMA) hydrology
- Current monitoring efforts
- Qualitative vegetation surveys – Methods and Results
- Species of concern – Dogfennel and Carolina willow
- Photographic documentation of vegetation changes from 1998-2007
- Current efforts to improve the RWMA

Timeline of Events

- **1950s – Perimeter levees constructed around the RWMA; area became solely rainfall-driven**
  - **Increased soil oxidation**
  - **Likely increased fire frequency and intensity**
- **1994 – RWMA targeted for hydropattern restoration**
- **1999 – Large-scale wildfire occurred in the RWMA (included peat fires); Stormwater Treatment Area 5 (STA-5) was constructed**
- **July 2001 – STA-5 began discharging treated water into the RWMA via the G-410 pump station**

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Map of the RWMA

Culvert
Pump
Spillway
sampling sites
STA levee

background image - DOQQ, 2004, 1 meter

Rotenberger Wildlife Management Area

Operations Control & Maintenance Engineering

Timeline of Events

- **Mid-2001 to 2005 – Hydropattern increased from ~4 months to 10 months**
- **June 2004 – Large-scale wildfire occurred in the RWMA (no peat fires detected)**
- **2006-2007 – South Florida experienced a severe drought**
- **May 2006 – Severe wildfire occurred in the RWMA (included several peat fires)**

Effects of Soil Oxidation & Fires

Exposed root systems caused by repeated fires and soil oxidation

Area that experienced peat fires in May 2006

Effects of Peat Fires

- Peat fires occurred in 1999 and 2006
- Can destroy a plant's root system, therefore opening up the area to colonization by different species
- Elevates Total Phosphorus concentration in surface soil layer
- Creates depressions that remain inundated for longer periods
- Can promote cattail & willow expansion

Hydrologic Periods

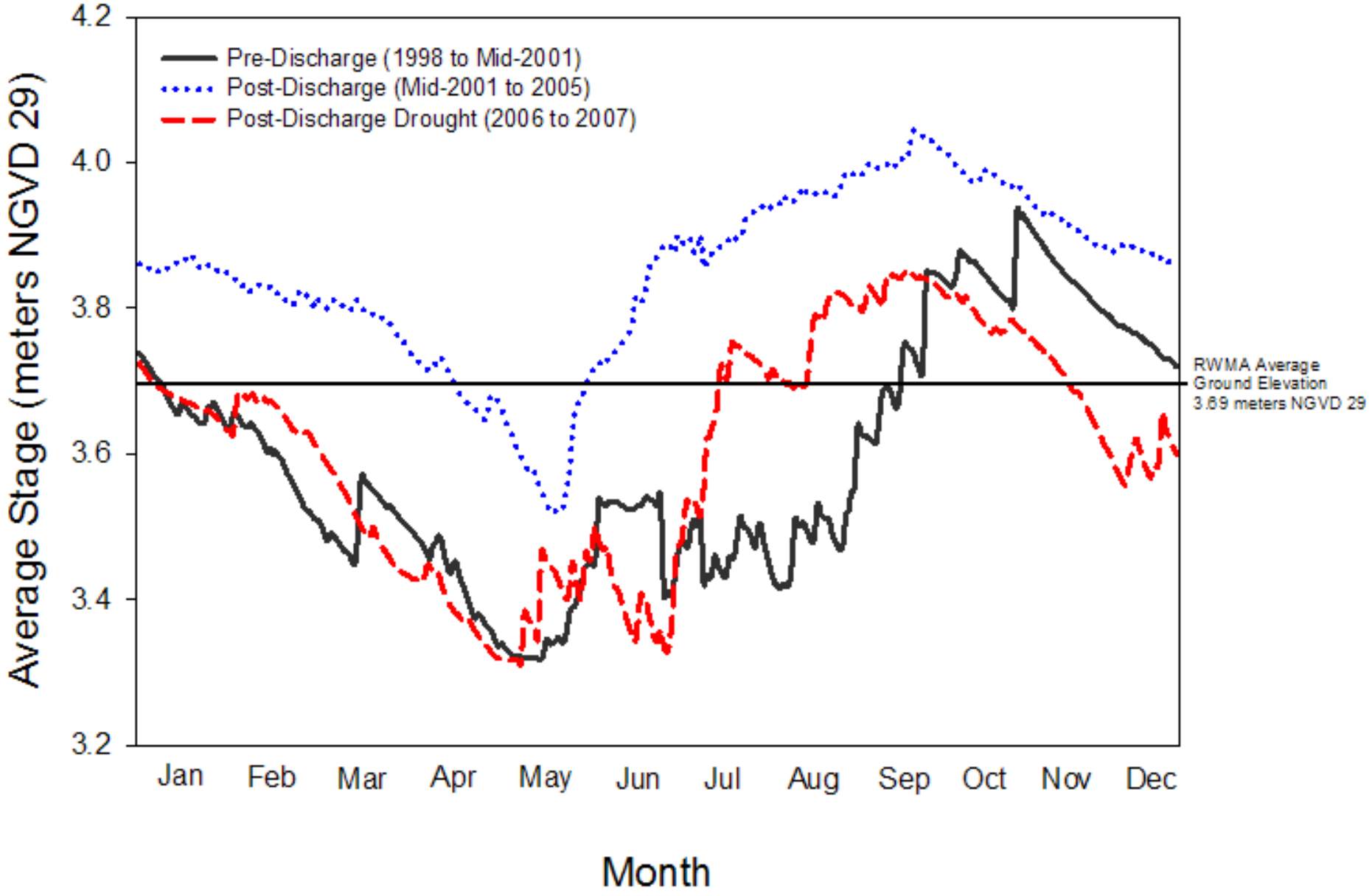
- **Data were analyzed based on 3 hydrologic periods:**

  - Pre-STA-5 Discharge (Pre-Discharge): May 1998-June 2001

  - Post-STA-5 Discharge (Post-Discharge): July 2001-Dec 2005

  - Drought: Jan 2006-Oct 2007

RWMA Hydrograph



Current Vegetation Monitoring Efforts

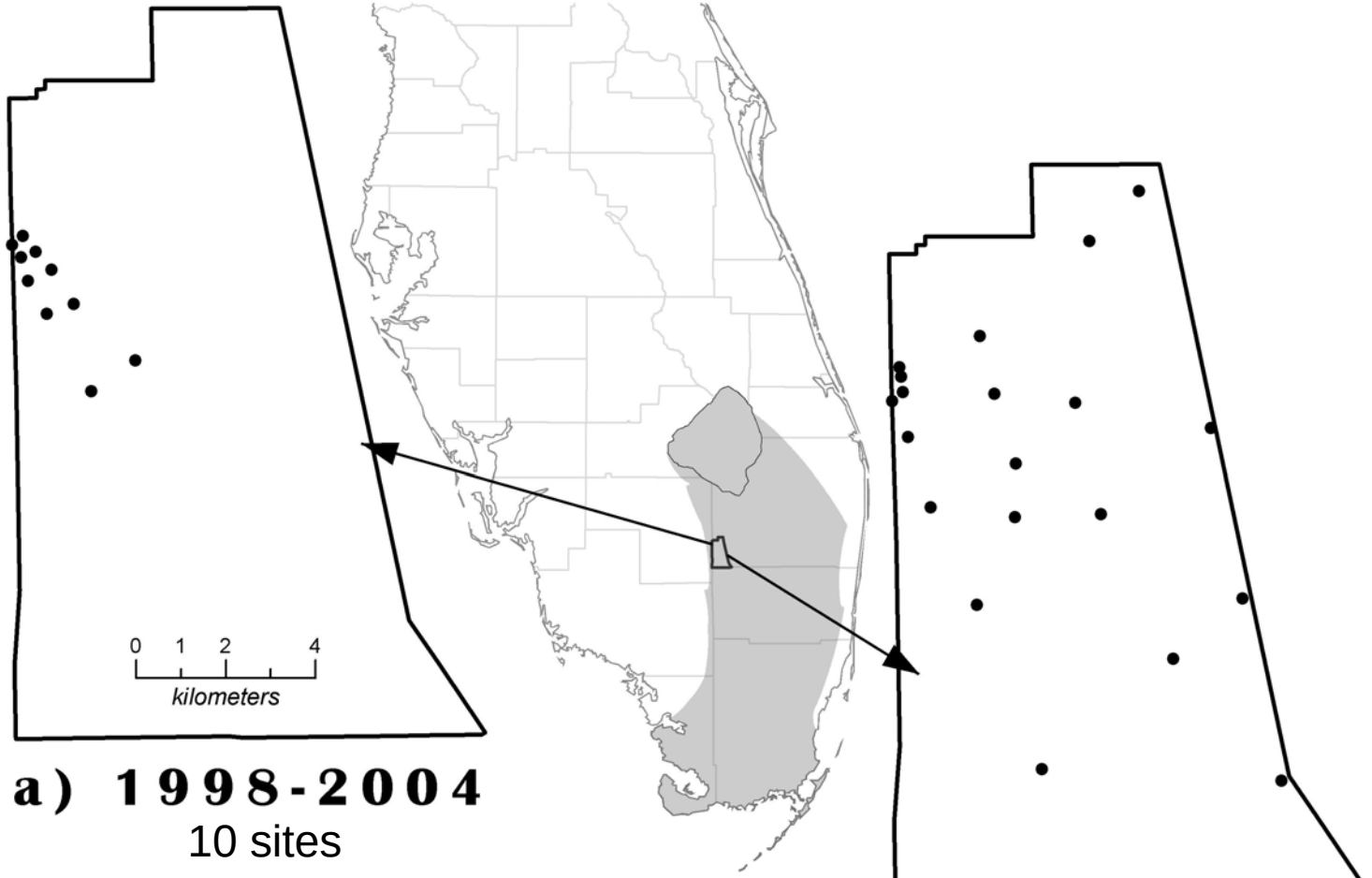
- Vegetation monitoring – biannually
  - **Qualitative surveys**
  - **Quantitative surveys (Point-intercept Method)**
  - **Macrophyte tissue nutrients**
- Aerial imagery (Vegetation classification maps)
  - **2000**
  - **2005**
  - **2008 (Mapping in progress)**

Qualitative Vegetation Surveys

- **Conducted biannually 1998-2007**
  - **Spring (March, April, or May)**
  - **Fall (September, October, or November)**

- **Recorded all plants within ~25 meter radius of site**
- **These surveys do not estimate density or site coverage**
- **Surveys do indicate what species are present at each site across the RWMA**

Sampling Sites

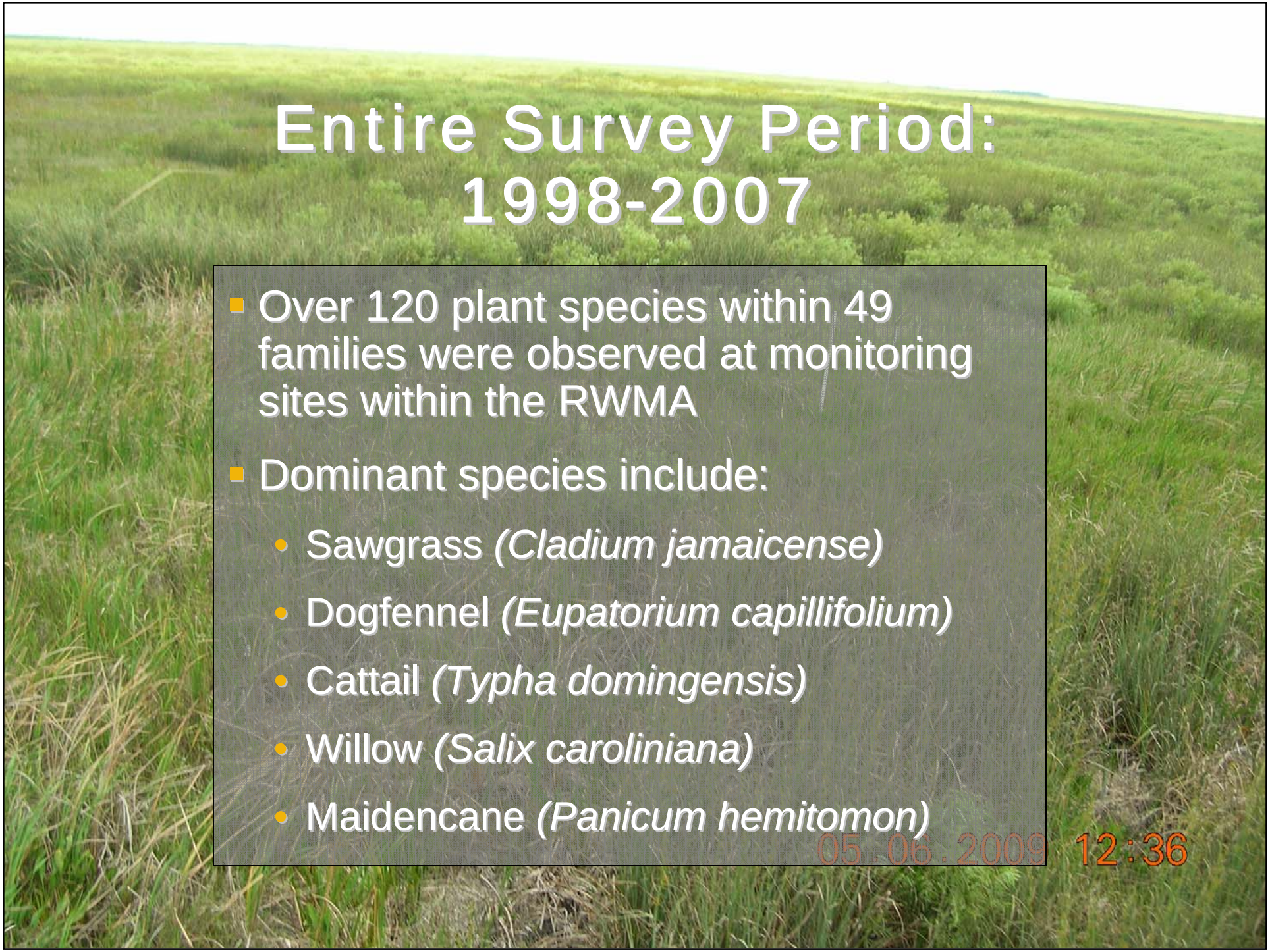


a) 1998-2004
10 sites

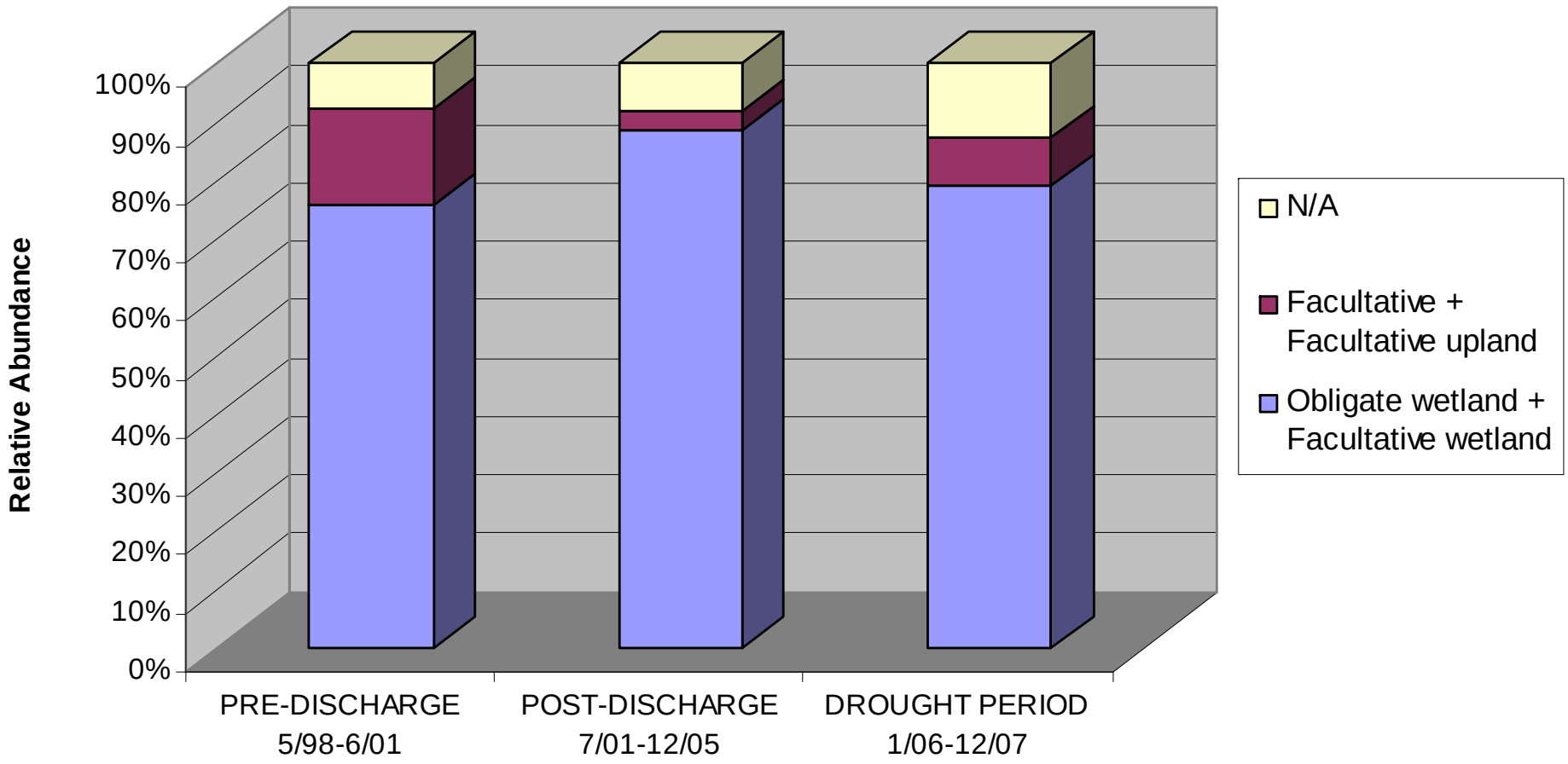
b) 2005-2007
20 sites

Entire Survey Period: 1998-2007

- Over 120 plant species within 49 families were observed at monitoring sites within the RWMA
- Dominant species include:
  - Sawgrass *(Cladium jamaicense)*
  - Dogfennel *(Eupatorium capillifolium)*
  - Cattail *(Typha domingensis)*
  - Willow *(Salix caroliniana)*
  - Maidencane *(Panicum hemitomon)*



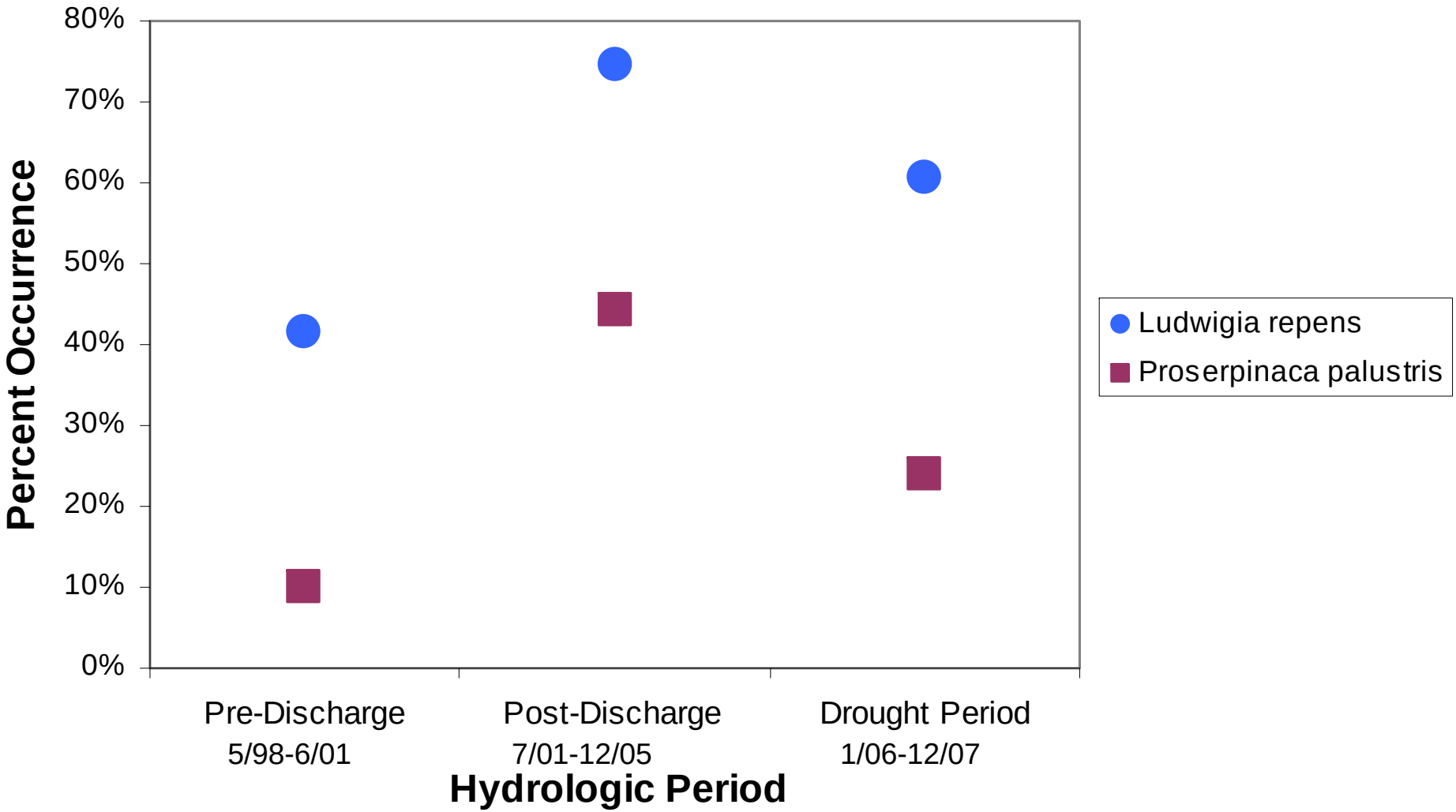
Relative Abundance by NWI Designation



Pre-Discharge to Post-Discharge Period

- **Since July 2001, the hydroperiod increased from ~4 months to 10 months.**
- **Relative abundance of obligate wetland species (e.g., *Ludwigia repens*) increased.**
- **Relative abundance of facultative upland species (e.g., *Eupatorium capillifolium*) decreased.**

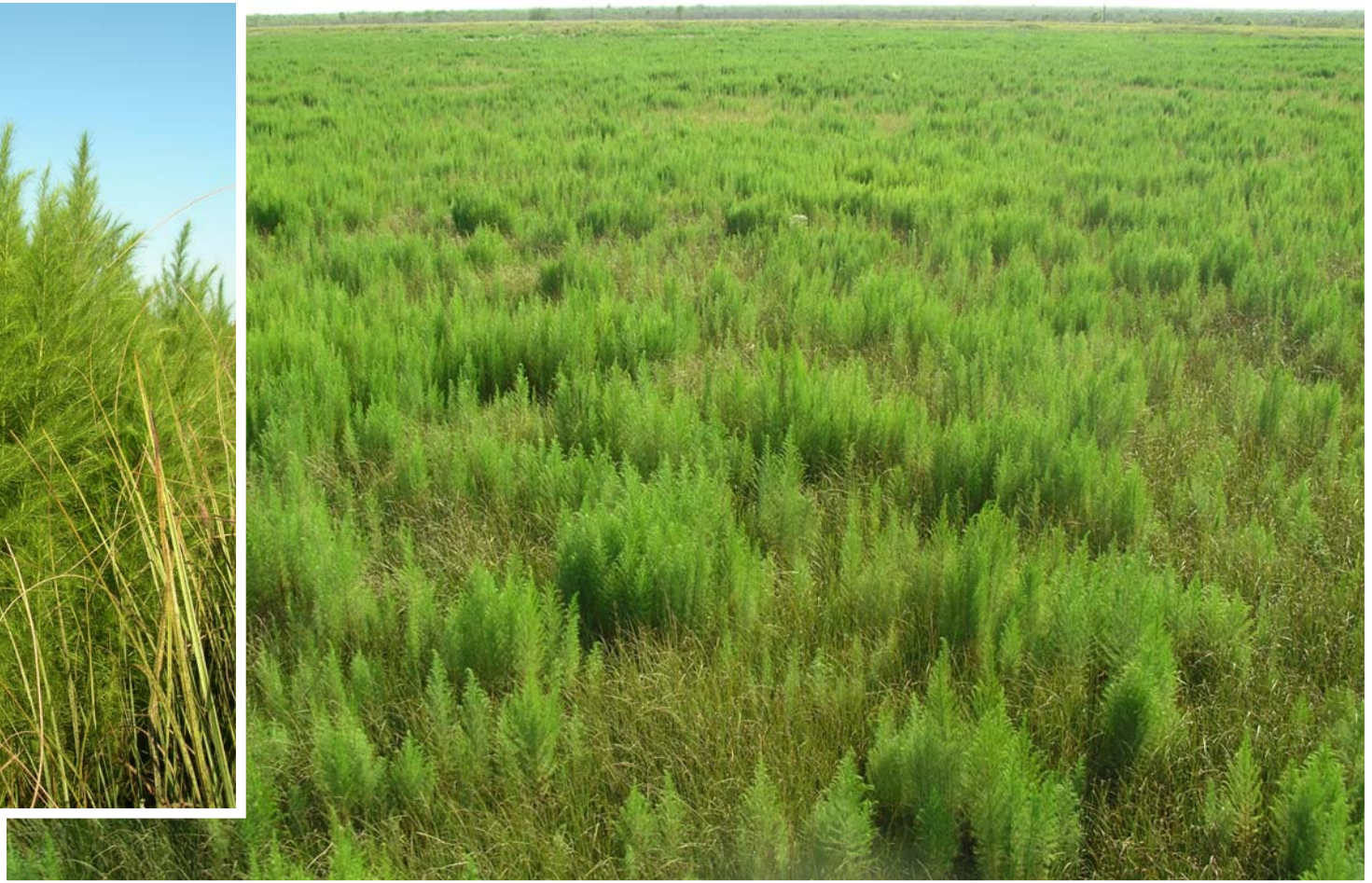
Changes in Occurrence of Representative Obligate Wetland Species over Different Hydrologic Periods



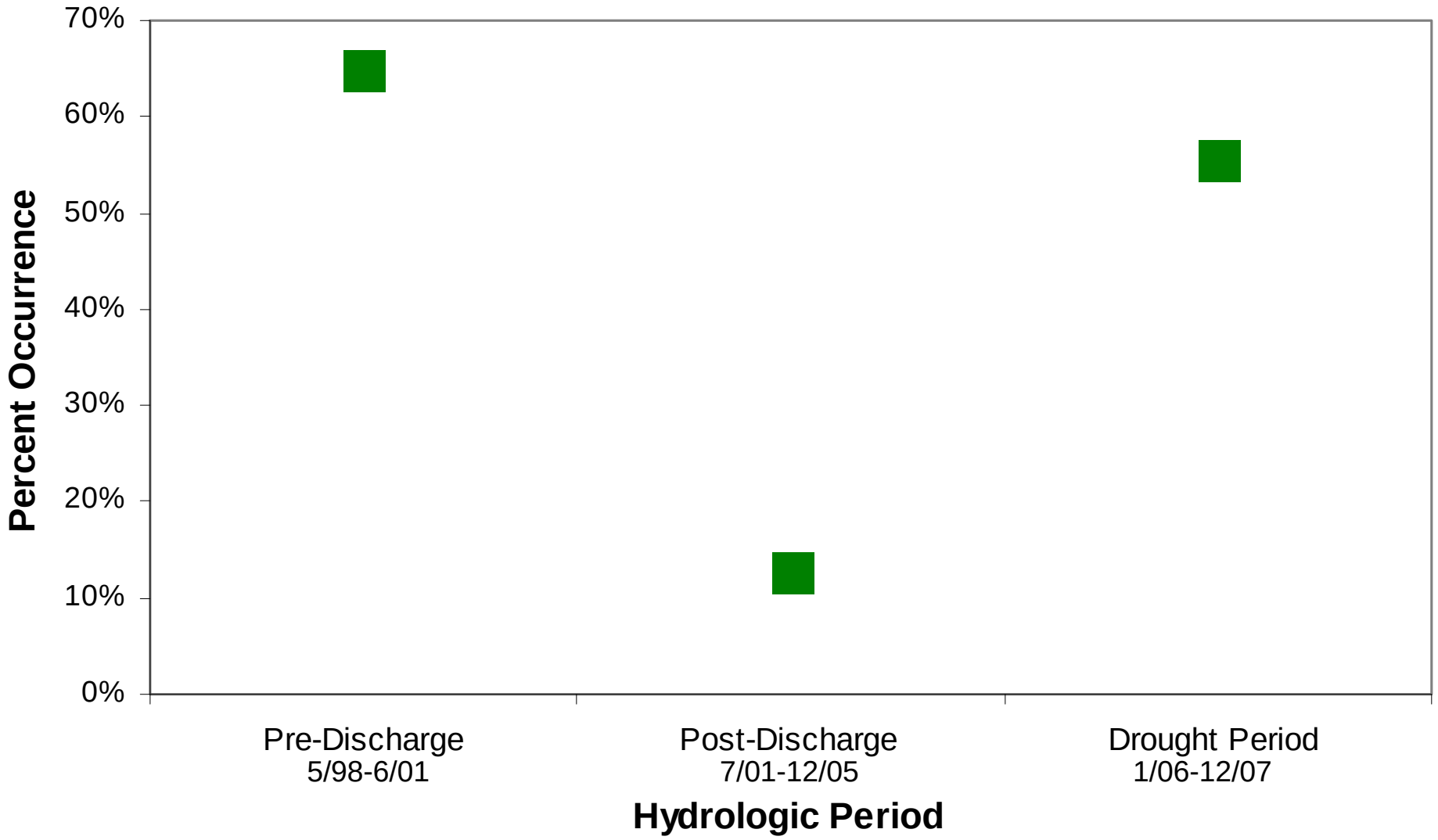
Post-Discharge to Drought Period

- **2006-2007 - Severe drought period, STA-5 water was unavailable for discharge.**
- **Relative abundance of obligate wetland species decreased.**
- **Relative abundance of facultative upland species (primarily *Eupatorium capillifolium*) increased.**

Eupatorium capillifolium (Dogfennel)

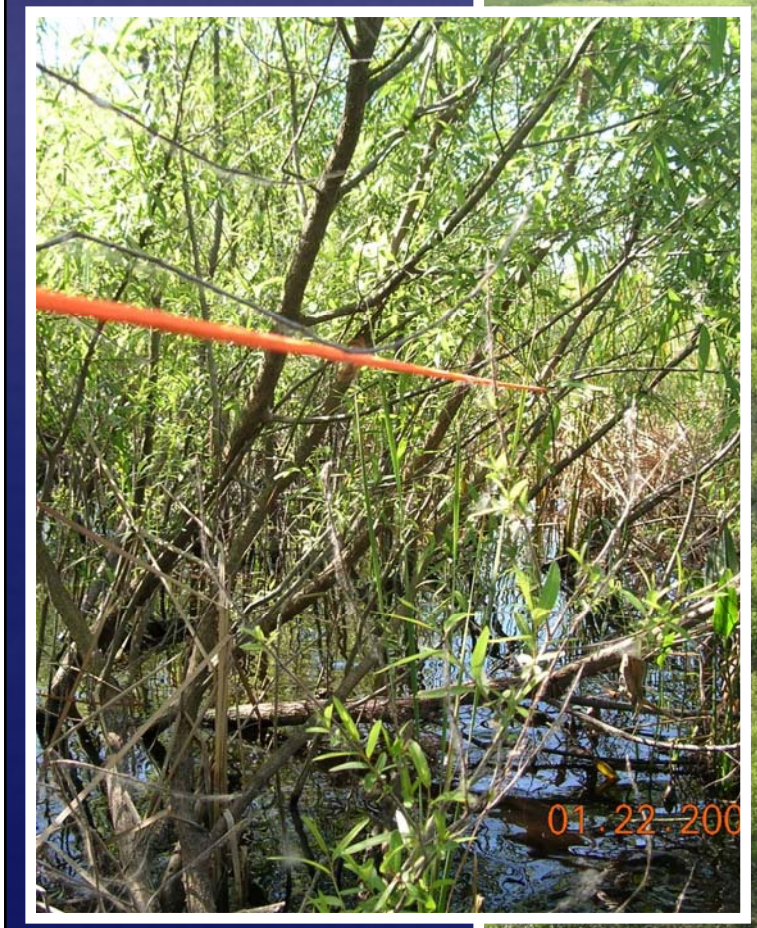


Changes in Percent Occurrence of *Eupatorium capillifolium* over Different Hydrologic Periods

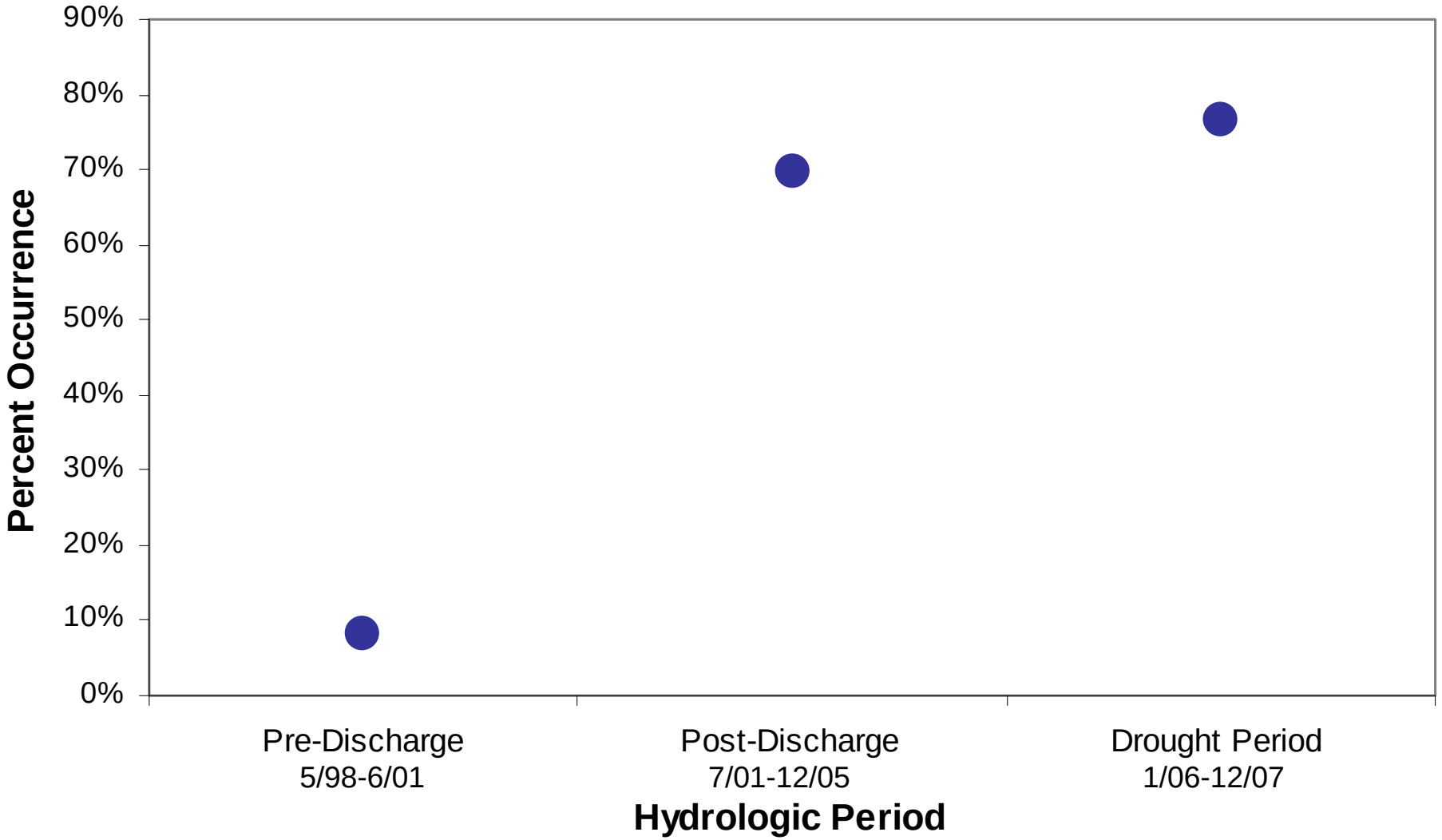


Salix caroliniana (Carolina willow)

Coverage over RWMA has continuously increased since 1998



Changes in Percent Occurrence of *Salix caroliniana* over Different Hydrologic Periods



Example of Willow expansion (RA3)

November 2004

April 2006

April 2009

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S.25 – March 1998

S.25 – July 2000

S.25 – May 2004

S.25 (renamed RA1) – Oct 2007

Photo Documentation of Vegetation Changes at S.25 (RA1) site: Mar ‘98-Oct ‘07

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S1 – March 1998

S1 – July 2000

S1 – May 2004

S1 (renamed RE1) – Oct 2007

Photo Documentation of Vegetation Changes at S1 (RE1) site: Mar ‘98-Oct ‘07

Current Efforts

- Revising Operation Plan to improve ability to achieve optimum hydrologic conditions throughout the year
- Installing small supplemental pump station to increase flexibility to deliver water the area
- Restoring several tree islands by removing exotic plant species and planting native species
- Spraying test plots for willow control
- Continuing to evaluate vegetation changes

Summary

- Vegetation composition in this area is greatly affected by changes in hydrologic conditions
- This study will be valuable as the District continues to assess the success of hydropattern restoration projects:
  - Rotenberger Wildlife Management Area
  - Over-dried areas of the EPA (e.g., WCA-3A)
- Conditions in the RWMA can be improved through improved operation schedule and increased flexibility in delivering water to the area