Nutrient Characteristics of Moist-soil Wetlands in Agricultural Landscapes

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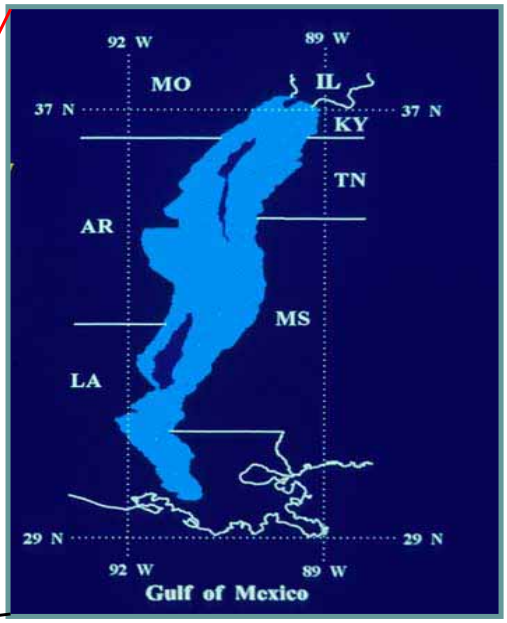
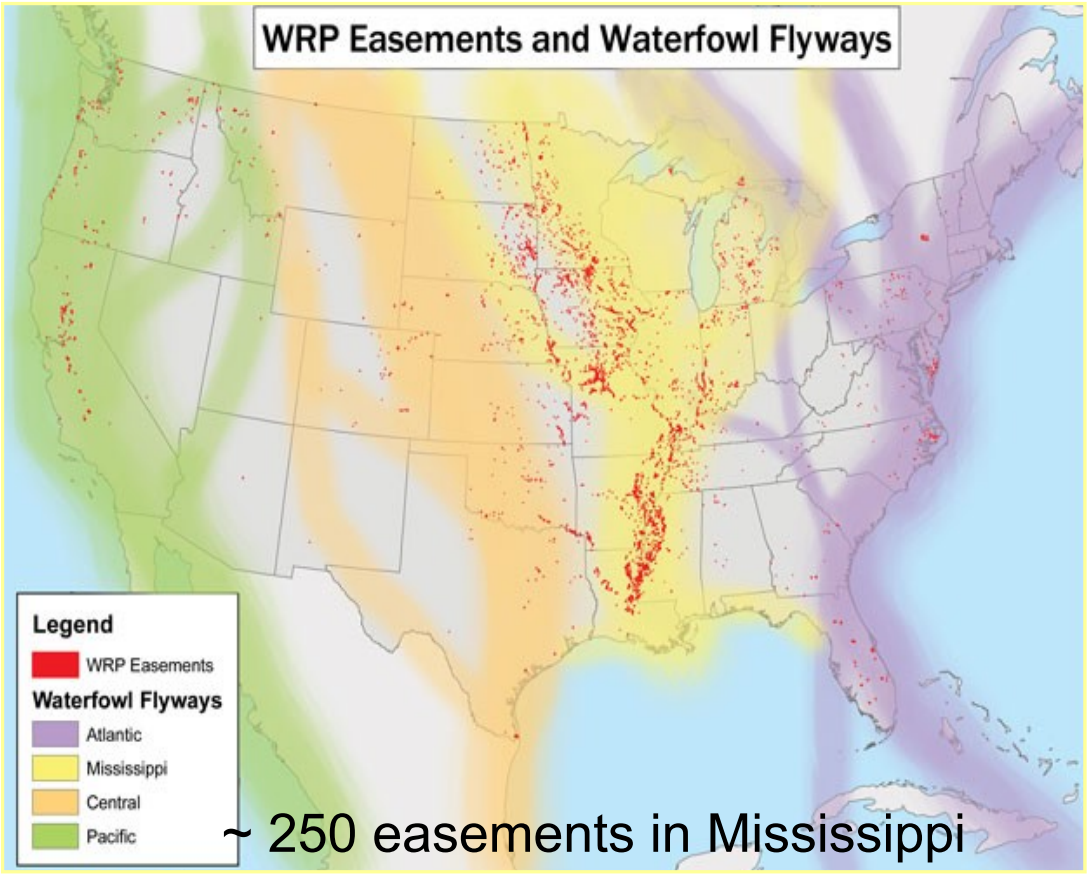
Mississippi Alluvial Valley

- Reduced to 2 million ha
- 20% of the original floodplain
- Loss of bottomland hardwoods and associated wetlands



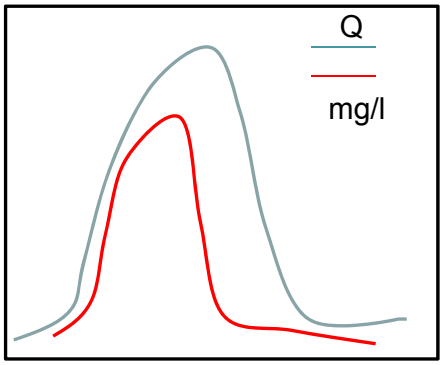
Moist-Soil Management

- Managed seasonal wetlands
- Promotes early successional plants
- Great seed and tuber production



~ 250 easements in Mississippi

Moist-soil Wetland Water Quality



- 1 published study in the MAV
  - Maul and Cooper 2000
- No current estimates of nutrient and solid loads
  - Needed for GOM nutrient management
- General interest from landowners

Objectives

Objective 1

Compare nutrient and sediment concentrations in effluent from moist-soil wetlands and agriculture fields

Objective 2

Calculate nutrient and sediment loads from wetlands during runoff events

Water Sampling

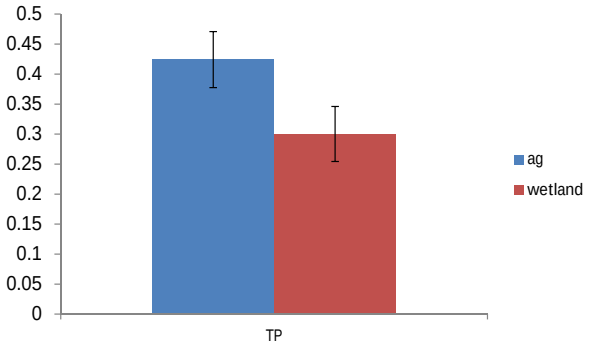
- 5 wetlands
- 4 adjacent ag fields
- December – April
- 2010-2012
- Permanent stations
- NWS and USGS websites monitored
- Samples retrieved within 24 hours

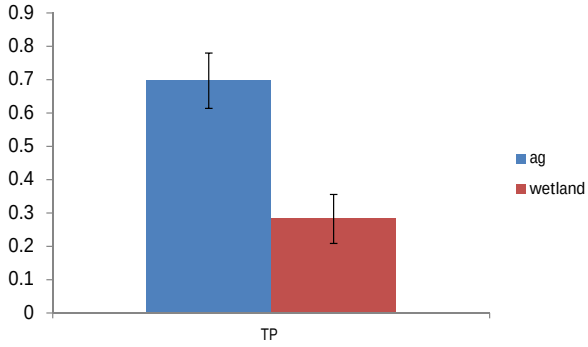
Analysis

- Concentrations (mg/l) of NO_3-N, NH_3-N, TIP, SRP determined colorimetrically
- TSS (mg/l) determined by filtration
- Mean concentrations compared in random effects model in SAS ($\alpha = 0.1$)

- Barometric pressure reference water level logger (Troll 3000) data downloaded in Win-Situ
- Discharge (Q; m^3/sec) estimated from suppressed rectangular weir equations
- Hydrographs developed for each wetland and total volume (L) discharged per storm event estimated
- Average load (kg/ha) per runoff event estimated

Total Orthophosphate





<u>2011</u>

29% less in wetlands

No statistical difference

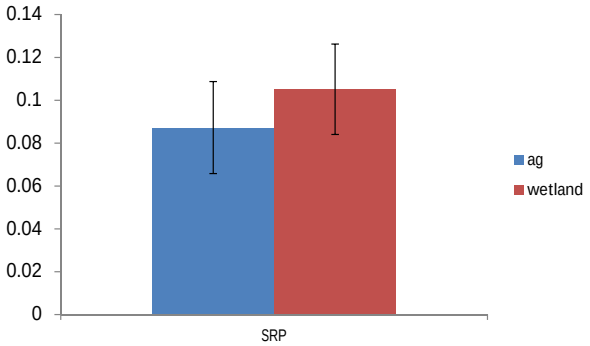
<u>2012</u>

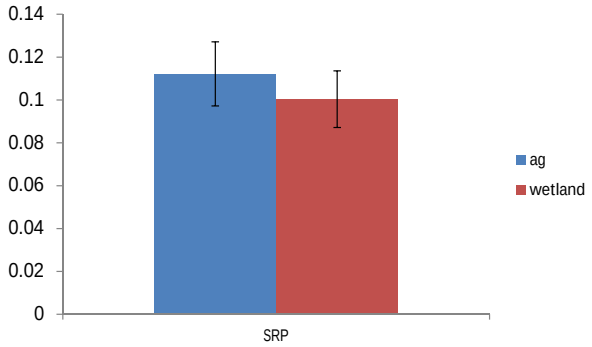
60% less in wetlands

Statistically different

Current criteria for Region X is 0.128 mg/l

Soluble Reactive Phosphorus





<u>2011</u>

17% more in wetlands

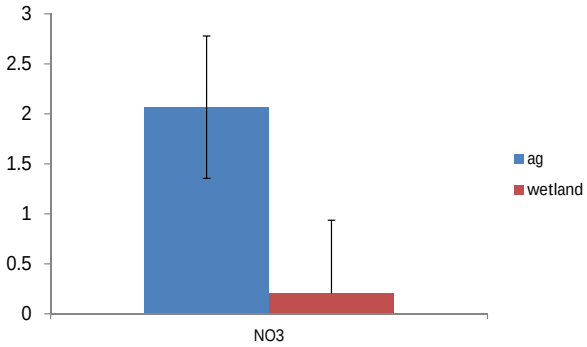
No statistical difference

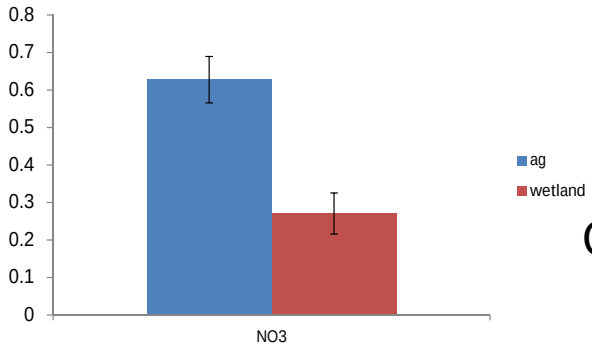
<u>2012</u>

10% less in wetlands

No statistical difference

Nitrate-N





2011

90% less in wetlands

Statistical different

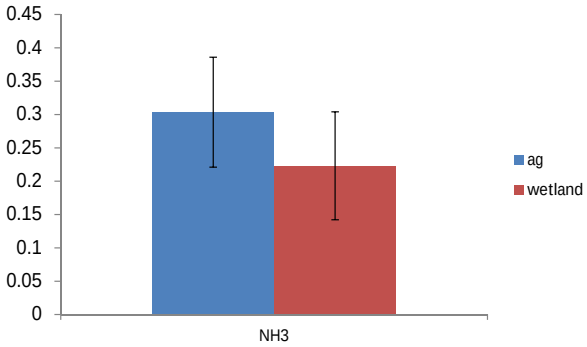
2012

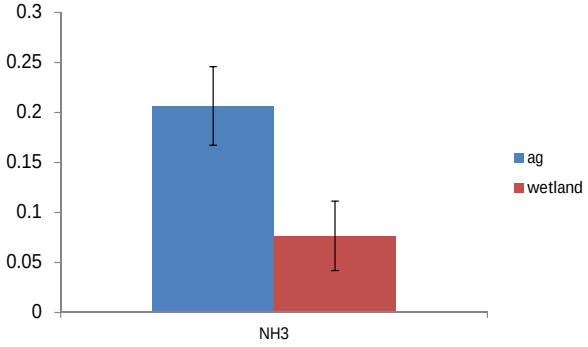
50% less in wetlands

No statistical difference

Current nutrient criteria for Region X is 0.76 mg/l TN

Ammonia





2011

27% less in wetlands

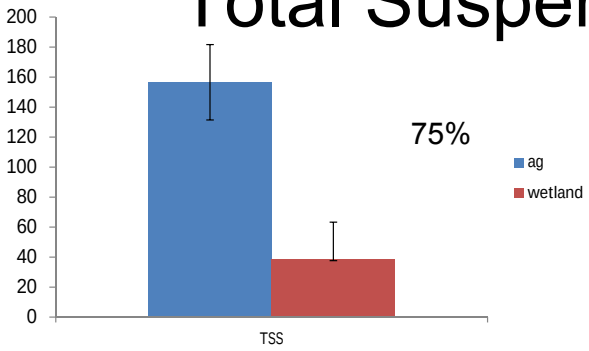
No statistical difference

2012

60% less in wetlands

No statistical difference

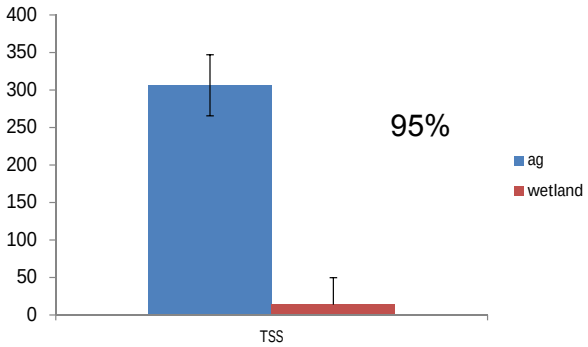
Total Suspended Solids



2011

75% less in wetlands

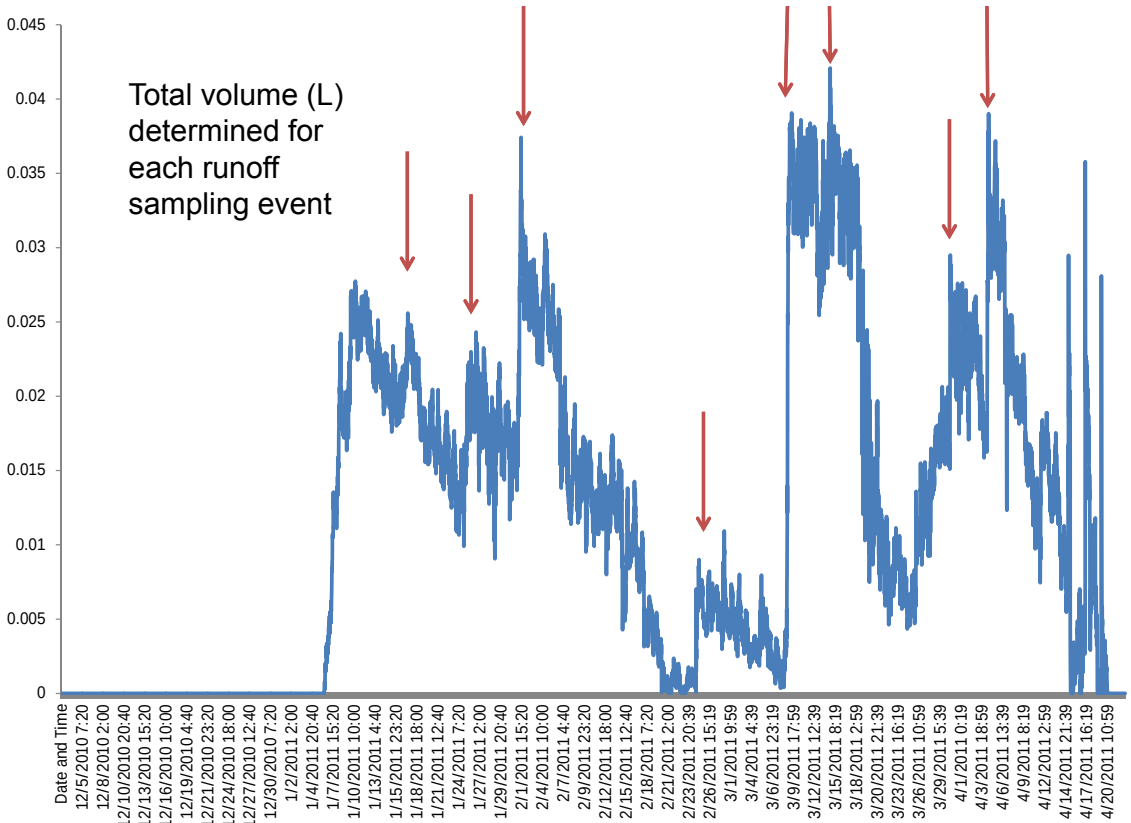
Statistically different



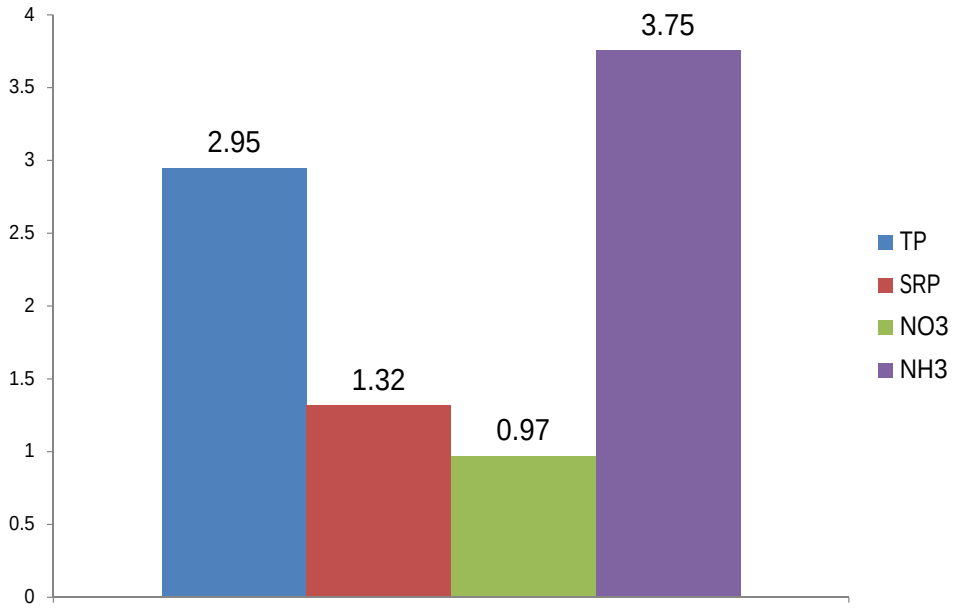
2012

95% less in wetlands

Statistically different



Average Total Load (kg/ha)



TSS = 286 kg/ha

Current assumed average total loads of TP and TN from wetlands in Delta is 1 kg/ha

Discussion

- TSS significant less in wetland effluent
  - Vegetation
  - Maul and Cooper 2000
- Differences in TP detected in 2012 but not in 2011
  - Variation in crop
- Differences in NO_3-N detected in 2011 but not in 2012
  - Samples in late April 2011

Discussion

- Estimated average total TP loads greater than suggested nutrient criteria for MAV
  - Only sampled in Fall-Spring
- Lack of detectable differences
  - Variance due to random storm events
  - Larger sample size?
- Completed analyses

Support

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at Mississippi State University

James C. Kennedy
Endowed Chair in Waterfowl and Wetlands Conservation