

Evaluating Future Success of a Freshwater River Re-Introduction to the Floodplain Forests of Maurepas Swamp, Louisiana

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committed to our coast

Acknowledgements

Technical Advisory Group:

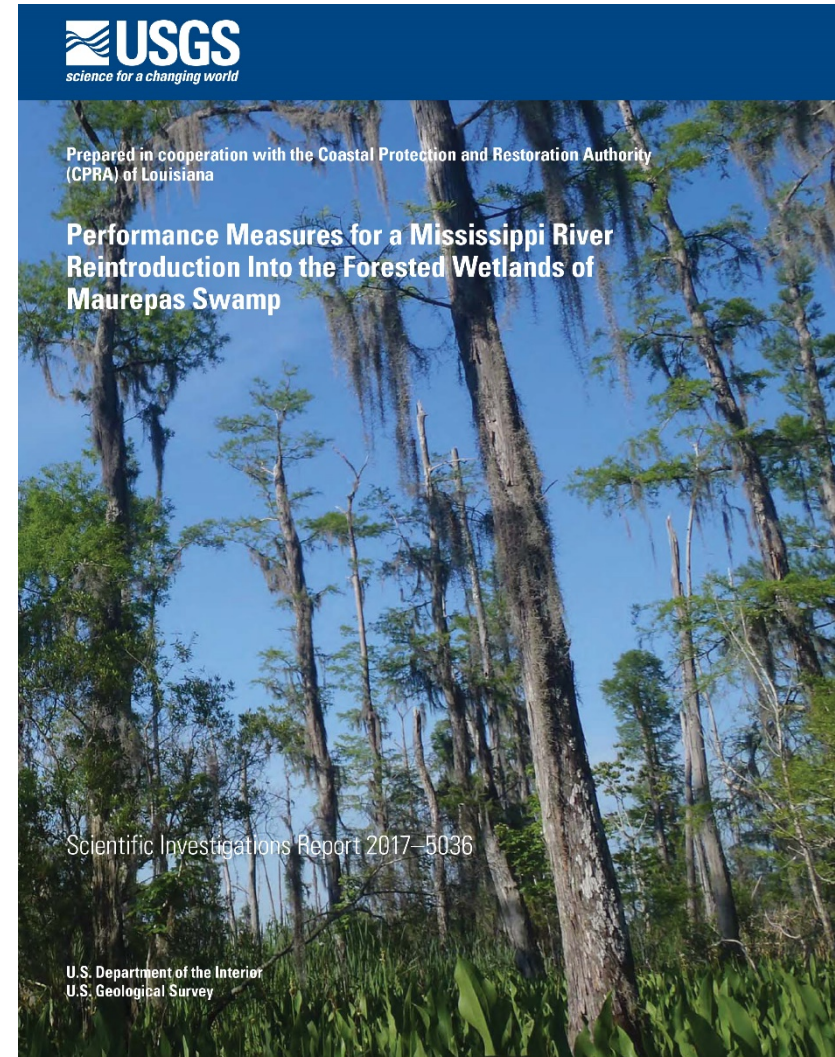
Ken Krauss, Jim L. Chambers, Richard F. Keim, Gary P. Shaffer

CPRA:

Bernard Wood, Danielle Richardi, Honora Buras,
Carol Parsons Richards, Brad Miller

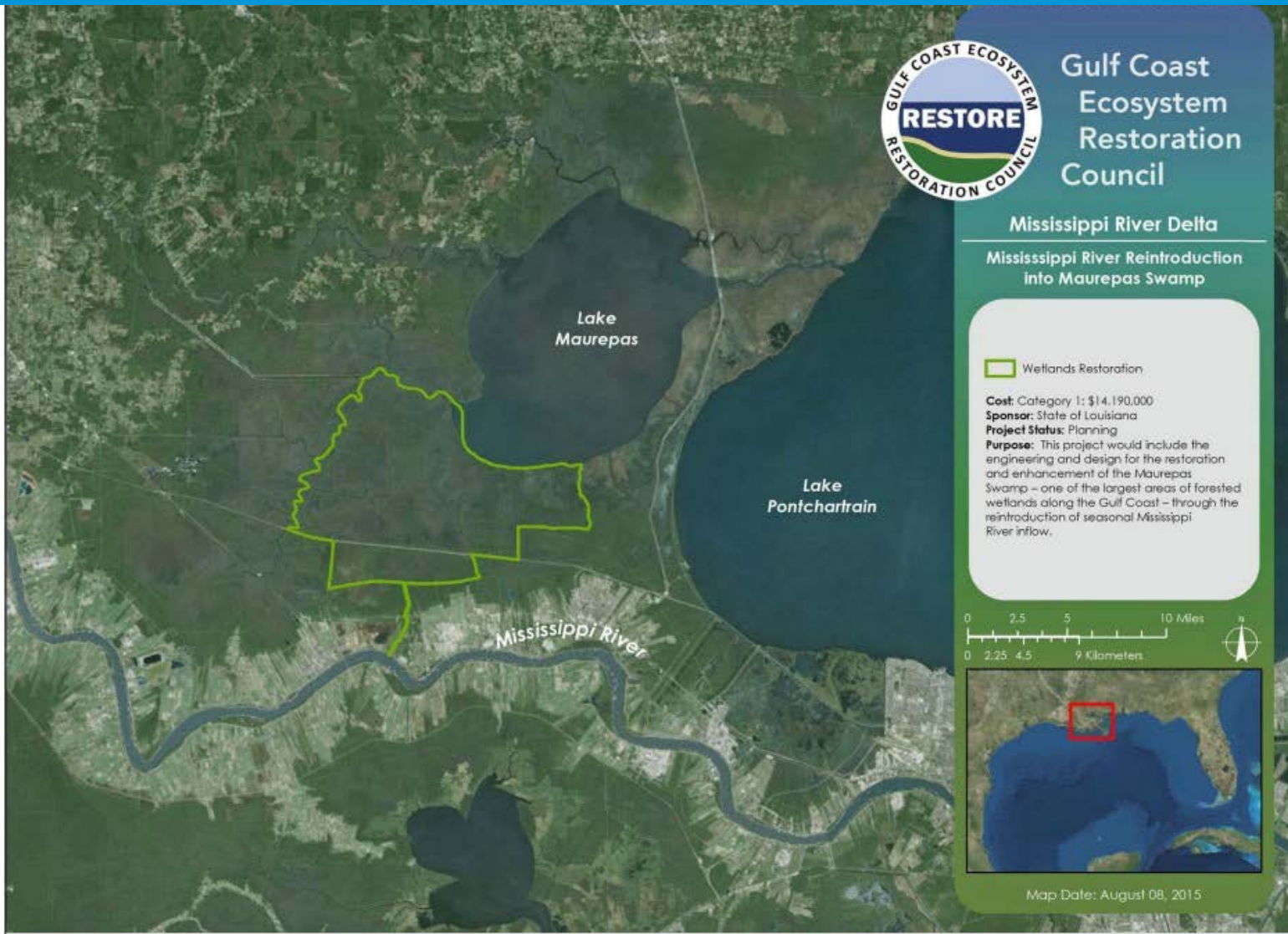
USGS Scientific Investigations Report 2017-5036

<https://pubs.usgs.gov/sir/2017/5036/sir20175036.pdf>



Historical Habitats

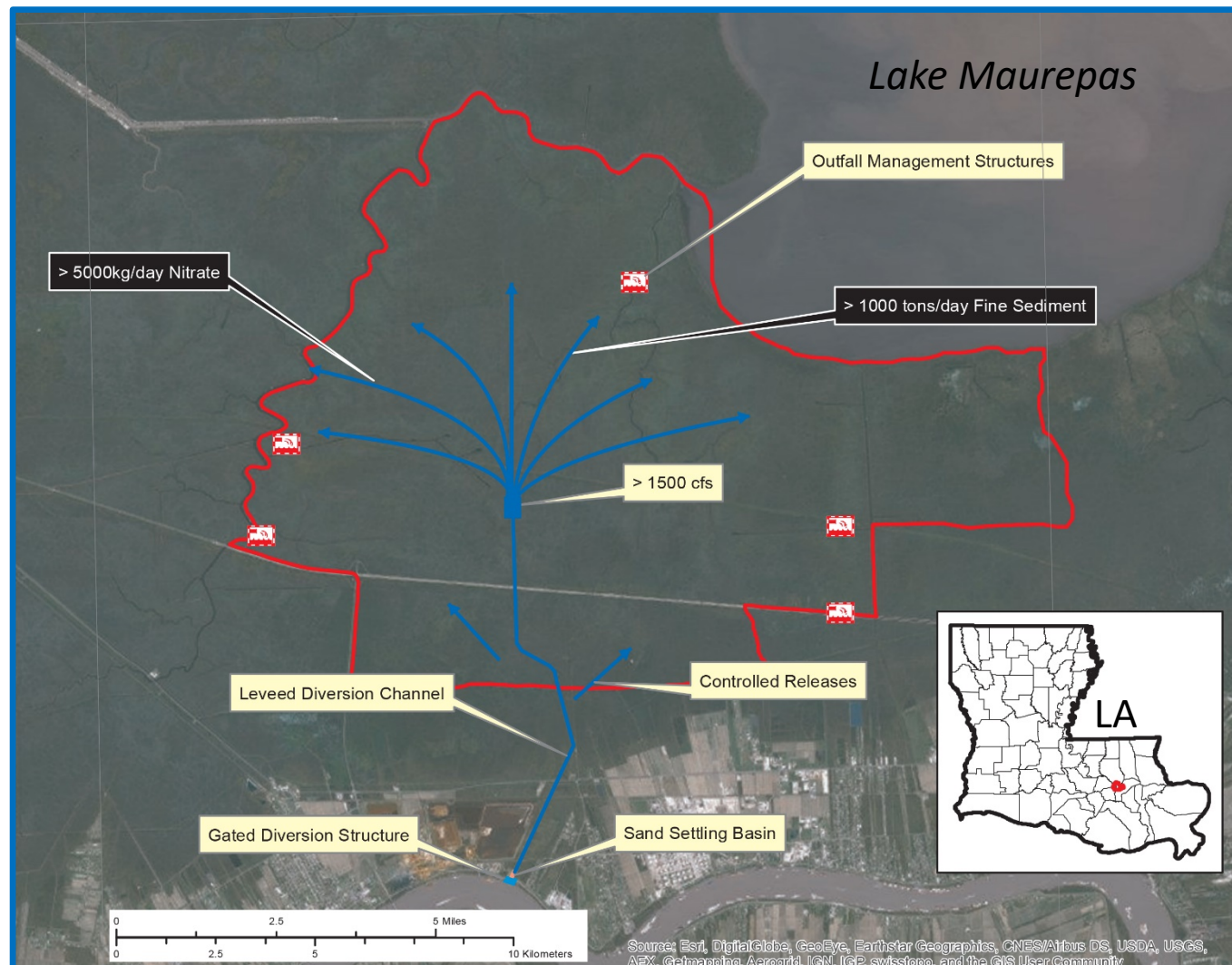




- CWPPRA to 30% E&D (1999-2008)
- CPRA to 95% E&D (2008-2014)
- **NFWF for OMMAM Planning**
- **RESTORE Act Construction ready**
- RESTORE Bucket 2 or Corps of Engineers WSLP mitigation for Construction?

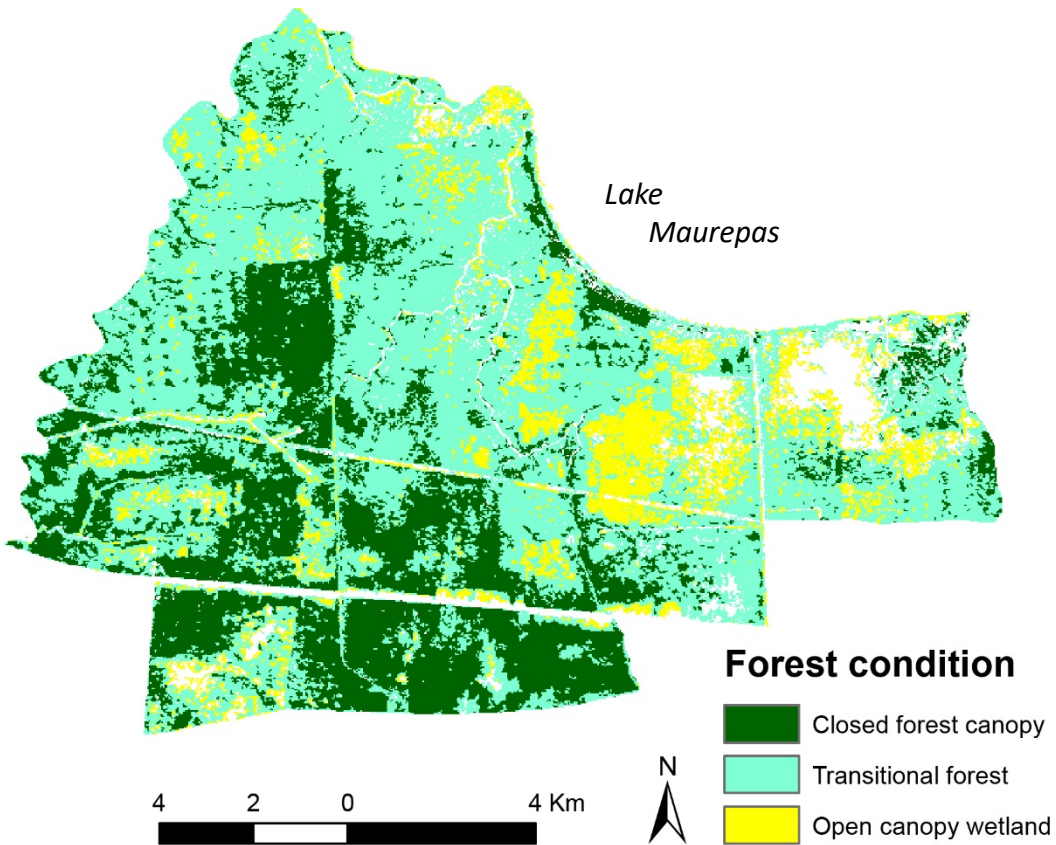
The Freshwater Re-Introduction to Maurepas Swamp

- Maurepas Swamp was cut off from the Mississippi River in **1814**
- **Small re-introduction** – designed to divert $57 \text{ m}^3/\text{s}$ of water at the inflow, which is further restricted to $42 \text{ m}^3/\text{s}$ from the outflow channel
- **Idea** – Rehabilitate forested wetlands; deliver $5,000 \text{ kg NO}_3$ and up to $1,000 \text{ Mg}$ of fine sediment each day



The Wetland Habitats

- Area of influence includes **16,583 hectares (45,000 acres)** of wetland habitat



4,991 ha
Closed forest canopy



9,672 ha
Transitional forest



1,920 ha
Open canopy wetland (marsh)



Surmountable Goals of River Re-Introductions (aka Diversions)

- **Unprecedented** in scope and application
- **Setting Expectations** – Project will...

increase the health of the Maurepas Swamp forested ecosystem by delivering fine sediment and nutrient subsidies and simultaneously flushing stagnant water and metabolites from the system to keep salinity intrusion within acceptable limits

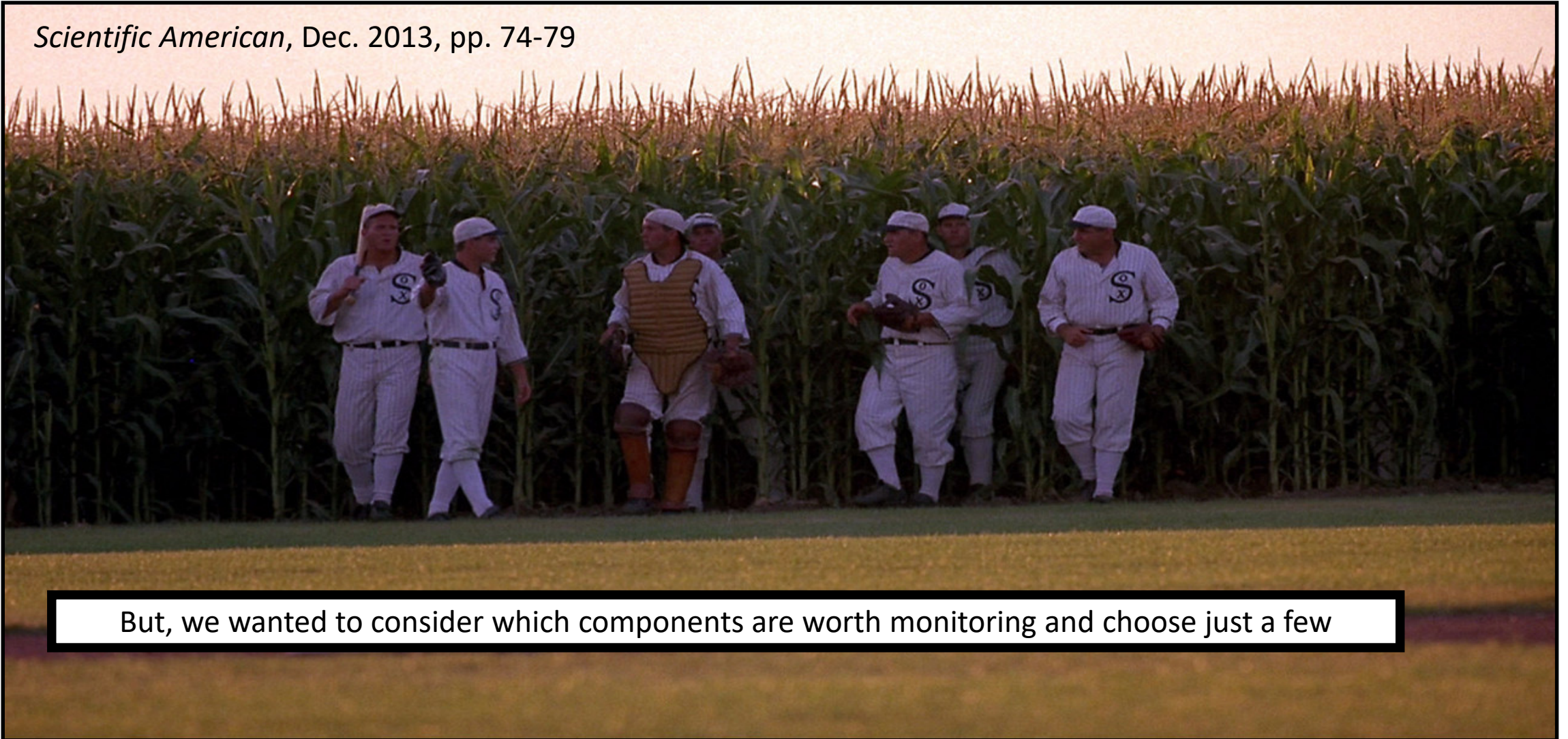


- To establish **performance measures** that can be used to rate the success of the freshwater re-introduction project into Maurepas Swamp over time
- Focus is on improving **FORESTED HABITAT**
- Ensure that the performance measures established target **structure, function, and resilience** of the forested wetland ecosystem into the future
- That they are **reasonable**, can be assessed, and can be used to guide **adaptive management** of the diversion



The field of dreams hypothesis: If you build it, they will come

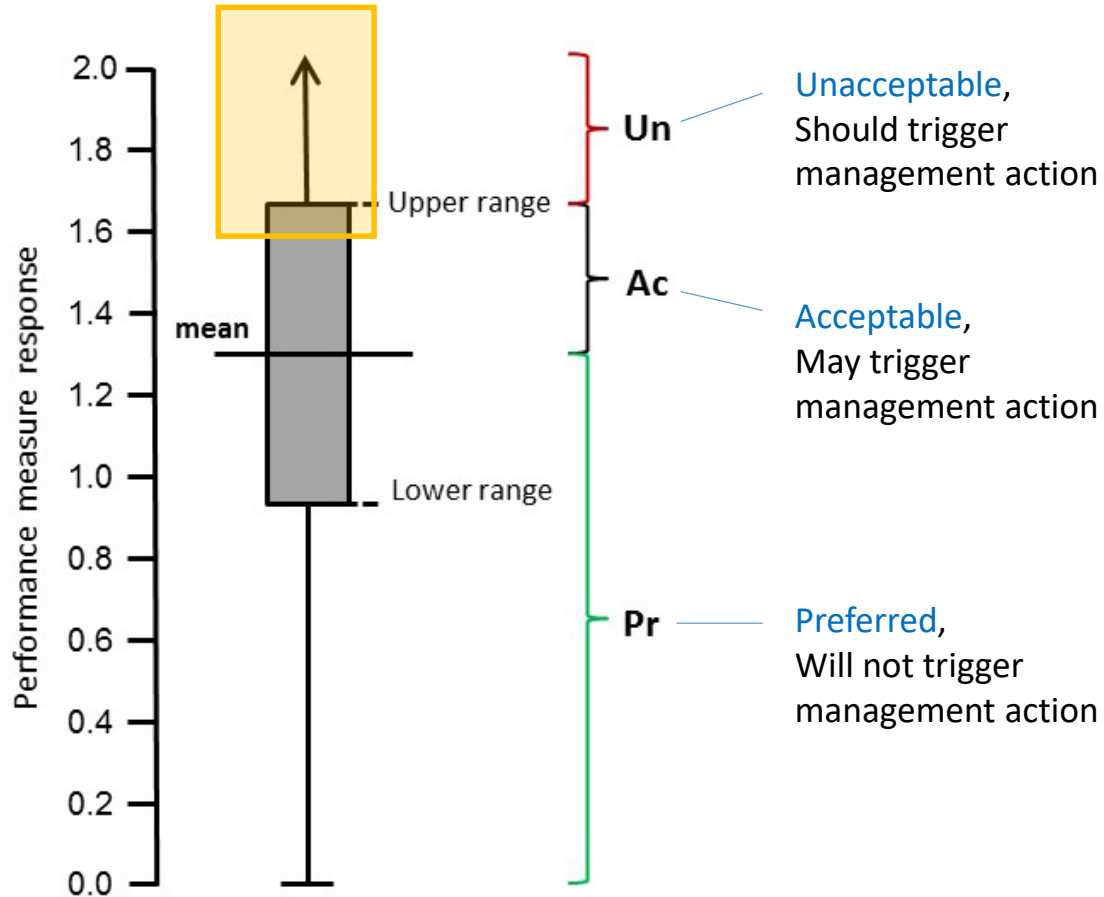
Scientific American, Dec. 2013, pp. 74-79



But, we wanted to consider which components are worth monitoring and choose just a few

What we chose based on the literature

What the swamp is currently doing

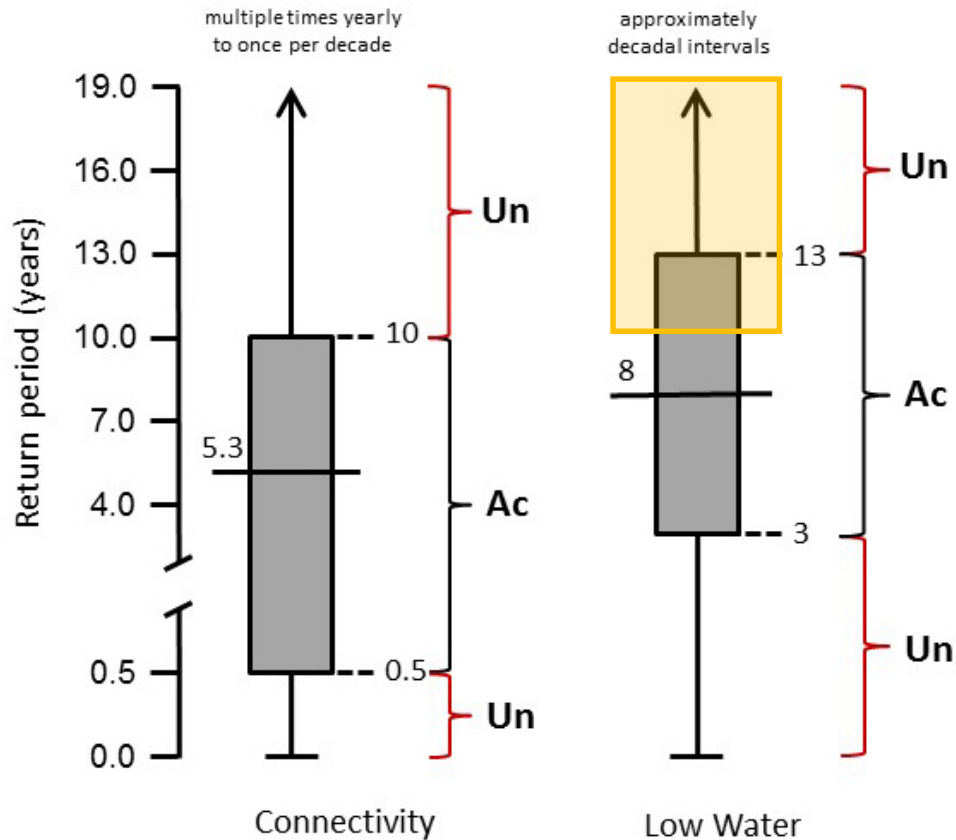


Performance Measures (PM)

- PM1 – Hydrology
- PM2 – Salinity
- PM3 – Surface elevation change
- PM4 – Forest structure
- PM5 – Nutrient uptake and retention

* Spatial variability in response *

PM1 - Hydrology

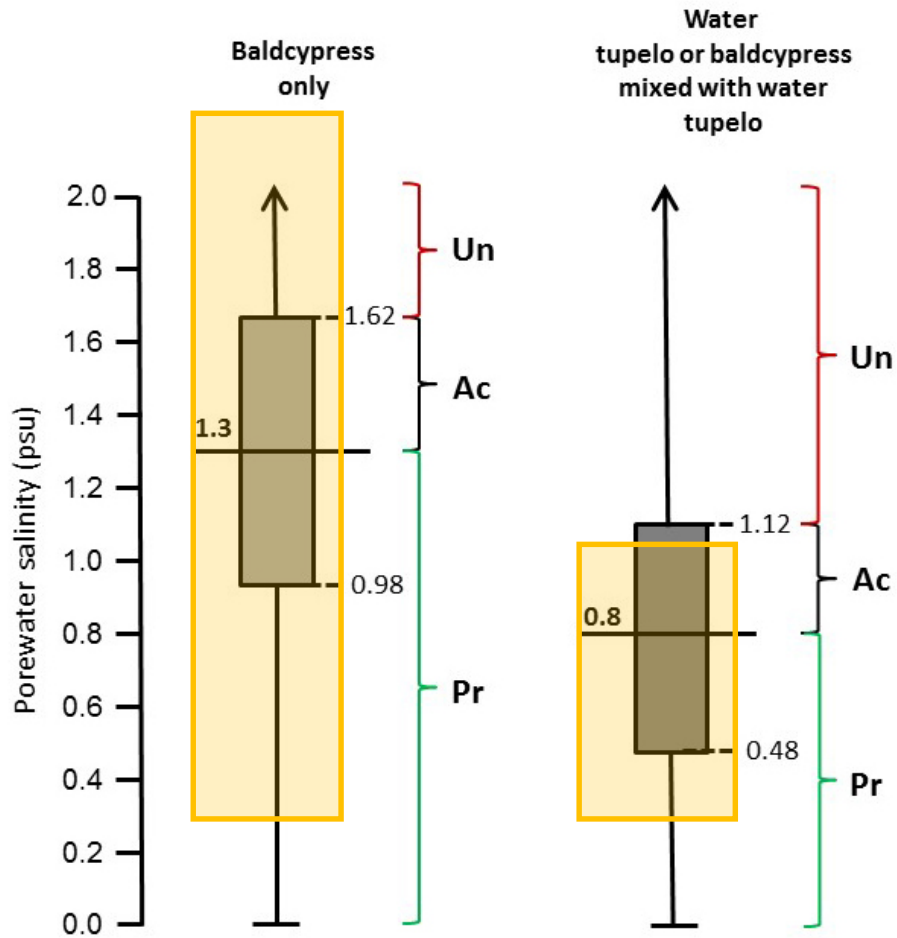


What the swamp is currently doing

Connected with MS River between twice per year and once every 10 years, depending on habitat

Experience water drawdown once every 3-13 years, depending on habitat

PM2 - Salinity



What the swamp is currently doing

Mean annual porewater values

Different ranges established for the two different forested wetland habitat types

For baldcypress only, salinity should be < 1.6 psu

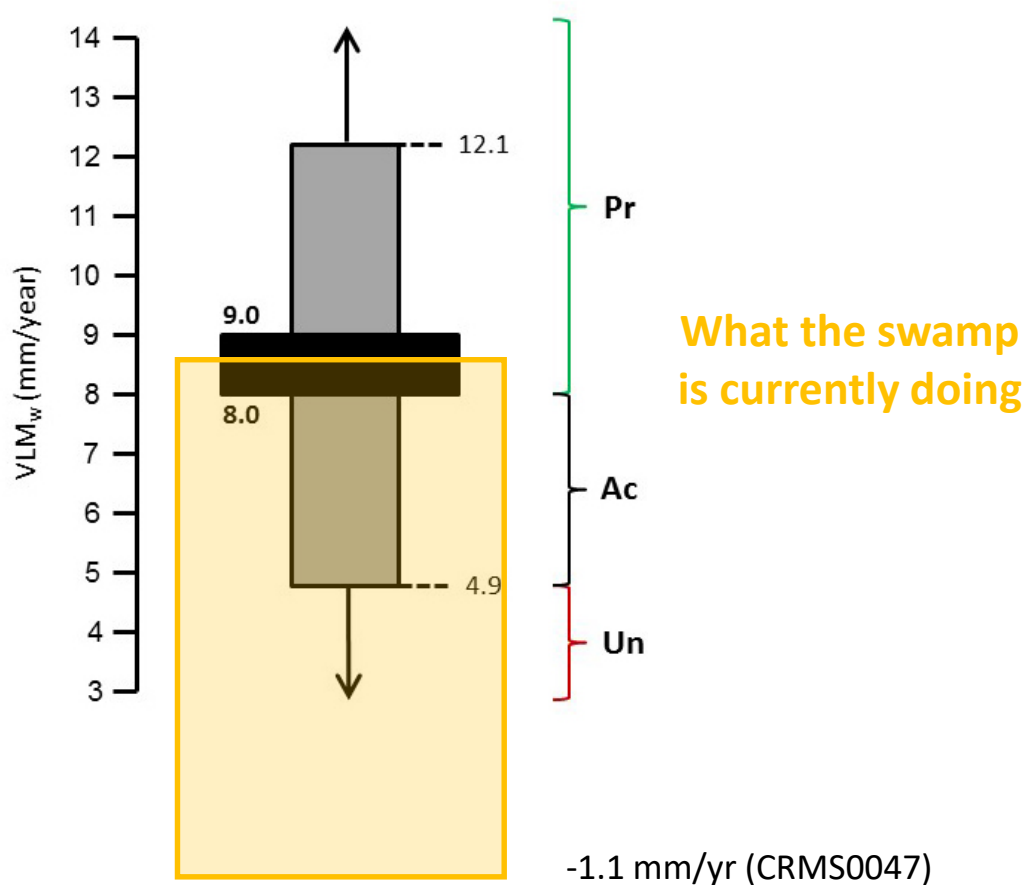
For water tupelo, salinity should be < 1.1 psu

Closure of the Mississippi River Gulf Outlet (MRGO) in 2009



THE TIMES-PICAYUNE

PM3 – Surface Elevation Change



Surface elevation change AKA vertical land motion at the wetland surface (VLM_w) should range from 4.9 – 12.1 mm/year

May be ambitious, but relative SLR trend is 9.07 mm/year at Grand Isle tide gauge

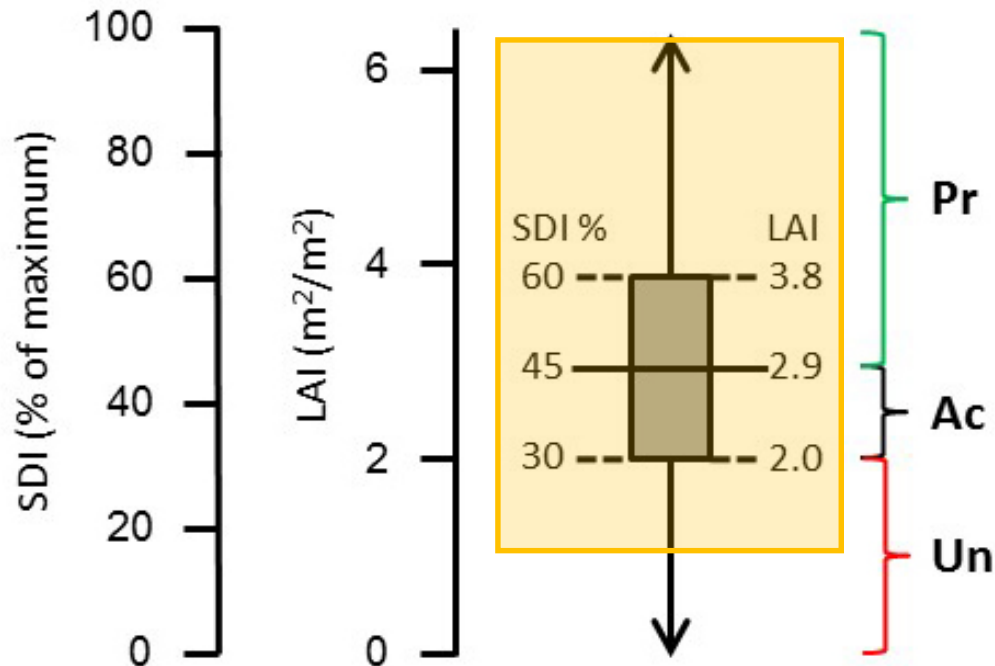
VLM_w trends from nine CRMS stations in basin

PM4 – Forest Structure



Stand density Index > 30% of maximum

Leaf area index > 2.0



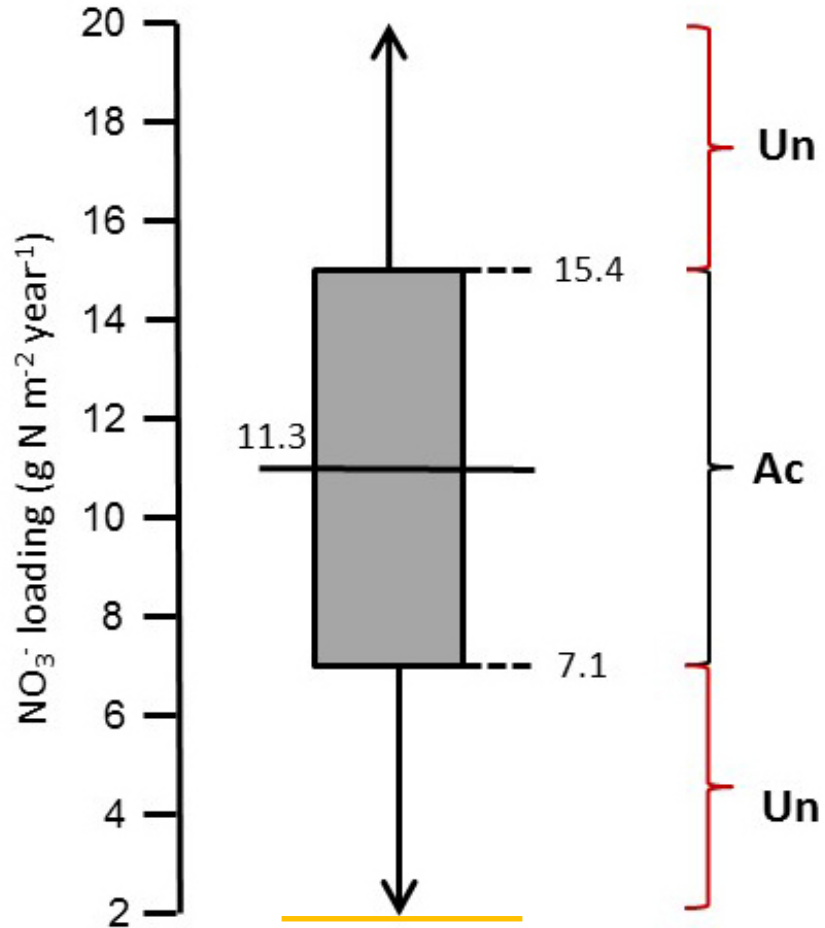
What the swamp is currently doing

Changes in forest structural criteria are important as a measure of forest health improvement

No specific PM for regeneration, because of the difficulties of determining recruitment

However, regeneration and degradation by invasive plants included in a Forested Floristic Quality Index (FFQI) performance measure (*not shown here*)

PM5 – Nutrient Uptake and Retention



What the swamp is currently doing

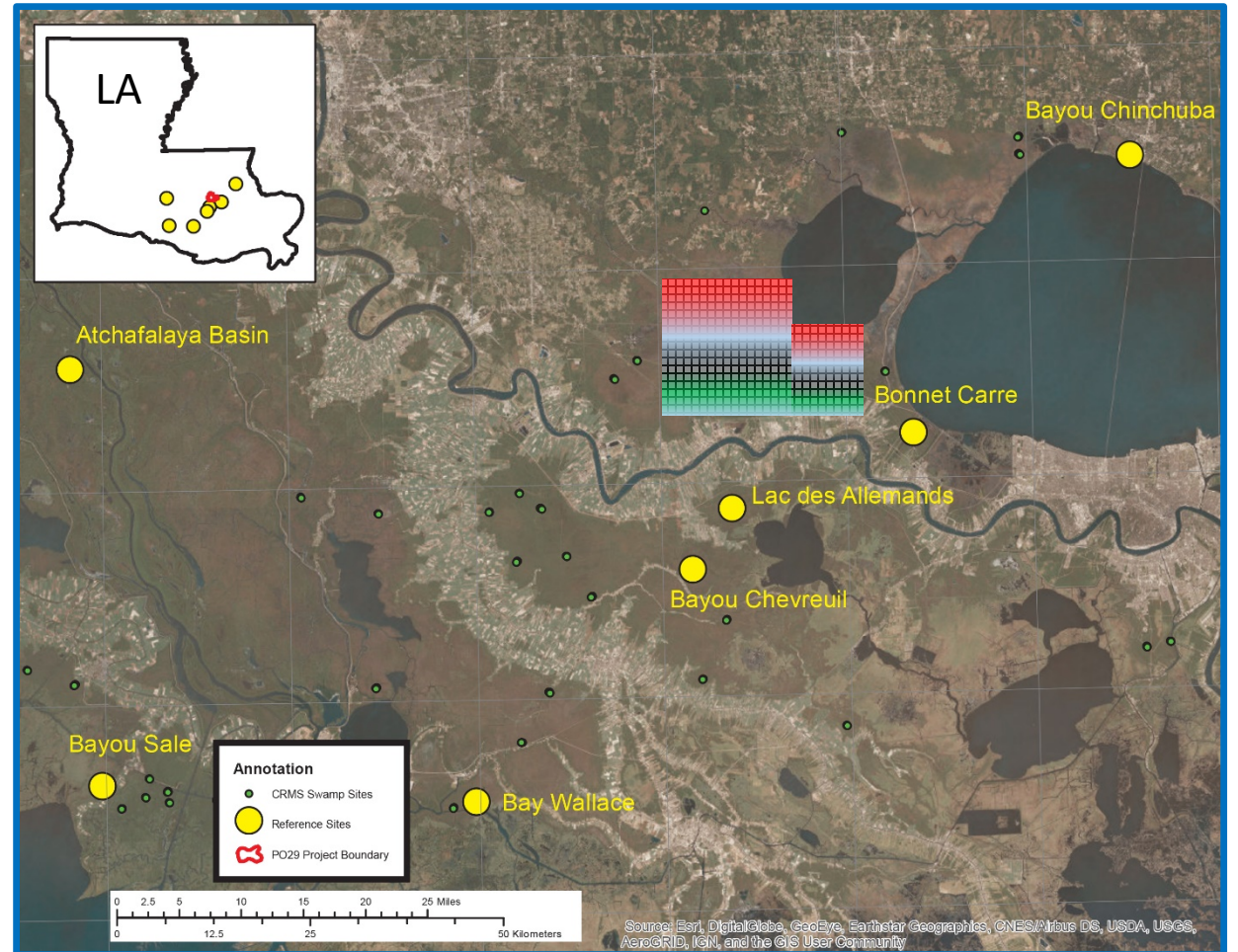
NO₃-N loading from the diversion structure should range from 7.1-15.4 g N m⁻² year⁻¹

Do not know for sure what the swamp is currently receiving from point-sources of run-off, but no NO₃ is currently being derived from the MS River

No PM associated with phosphorus

Additional details...

- Temporal and Spatial variability in response?
- Potential reference sites
- Monitoring plan
- Variable assessment periods pre- and post-construction
- Adaptive Management





For more information:
USGS
Scientific Investigations Report
2017-5036

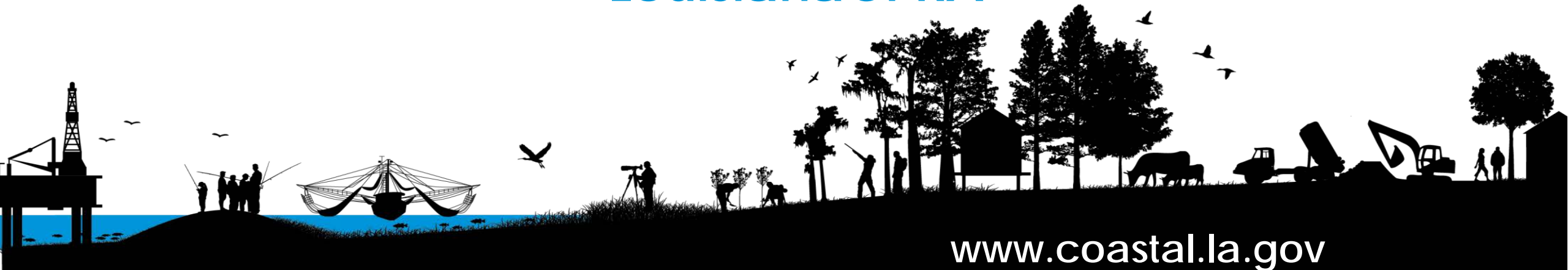
<https://pubs.usgs.gov/sir/2017/5036/sir20175036.pdf>



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