Can the Everglades survive climate change?

Beyond Inundation: Climate scenarios modeling using Everglades Landscape Model

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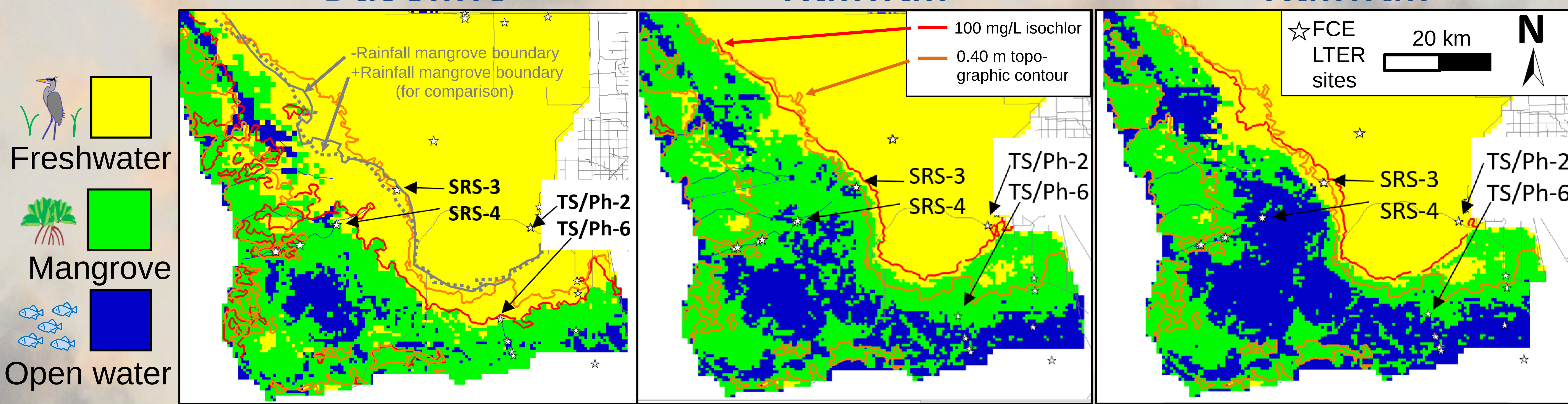


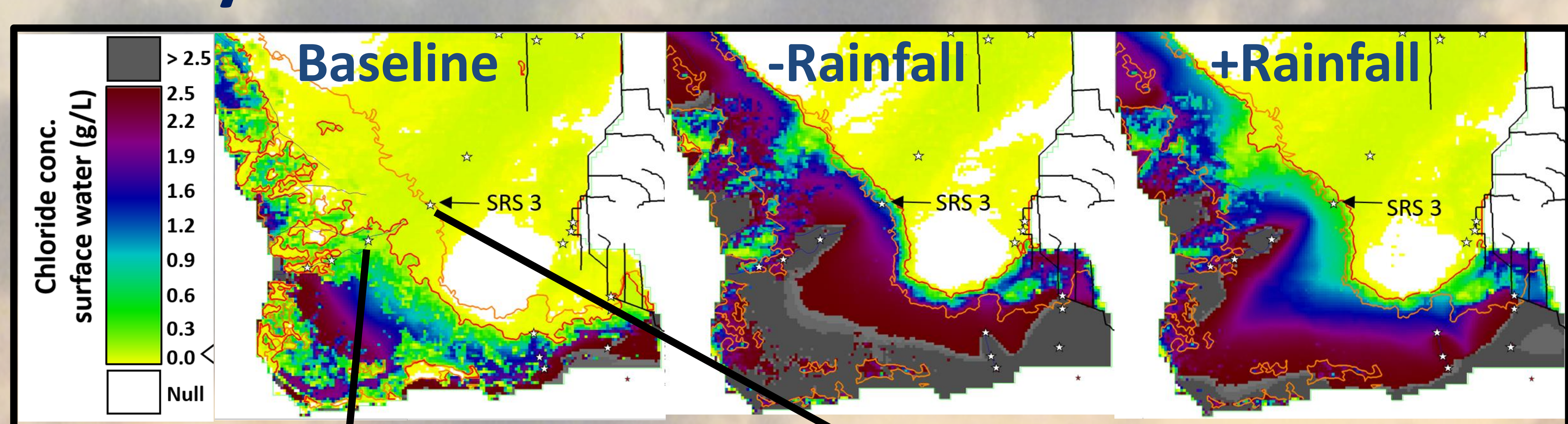
Increased rainfall increased the risk of open water in the marine-influenced zone due to water depths that inhibited mangrove establishment.

Significant **mangroves drowned** along northern Florida Bay in both climate change scenarios due to sea level rise.

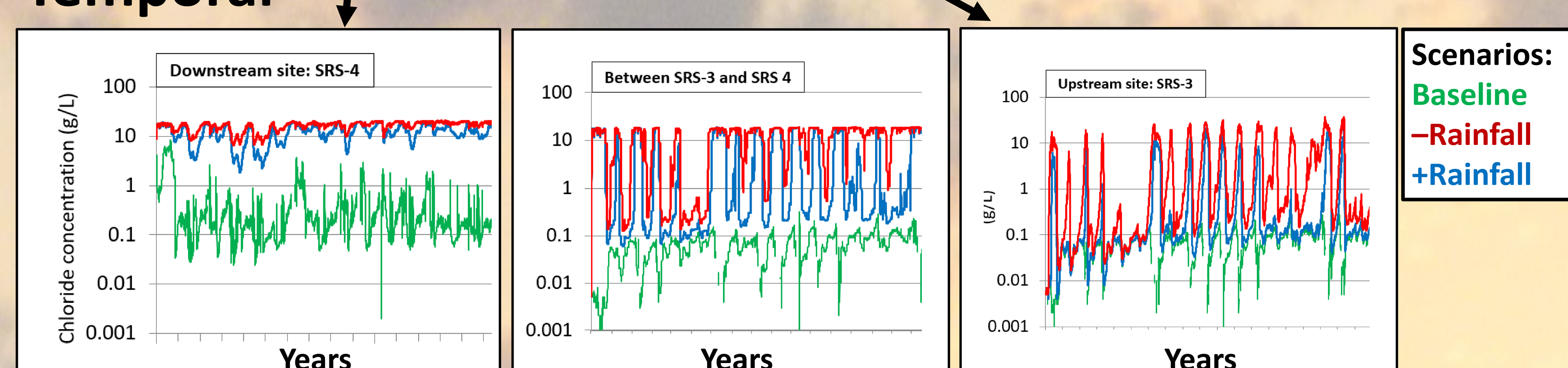
Even very low salinity matters: As little as 100 mg/L chloride concentration strongly affected peat accumulation and phosphorus concentration in the surface water.

Marine influence migrated up to 15 km inland in both scenarios; inland boundary was only slightly affected by rainfall scenario.

Salinity Pattern: Rainfall matters

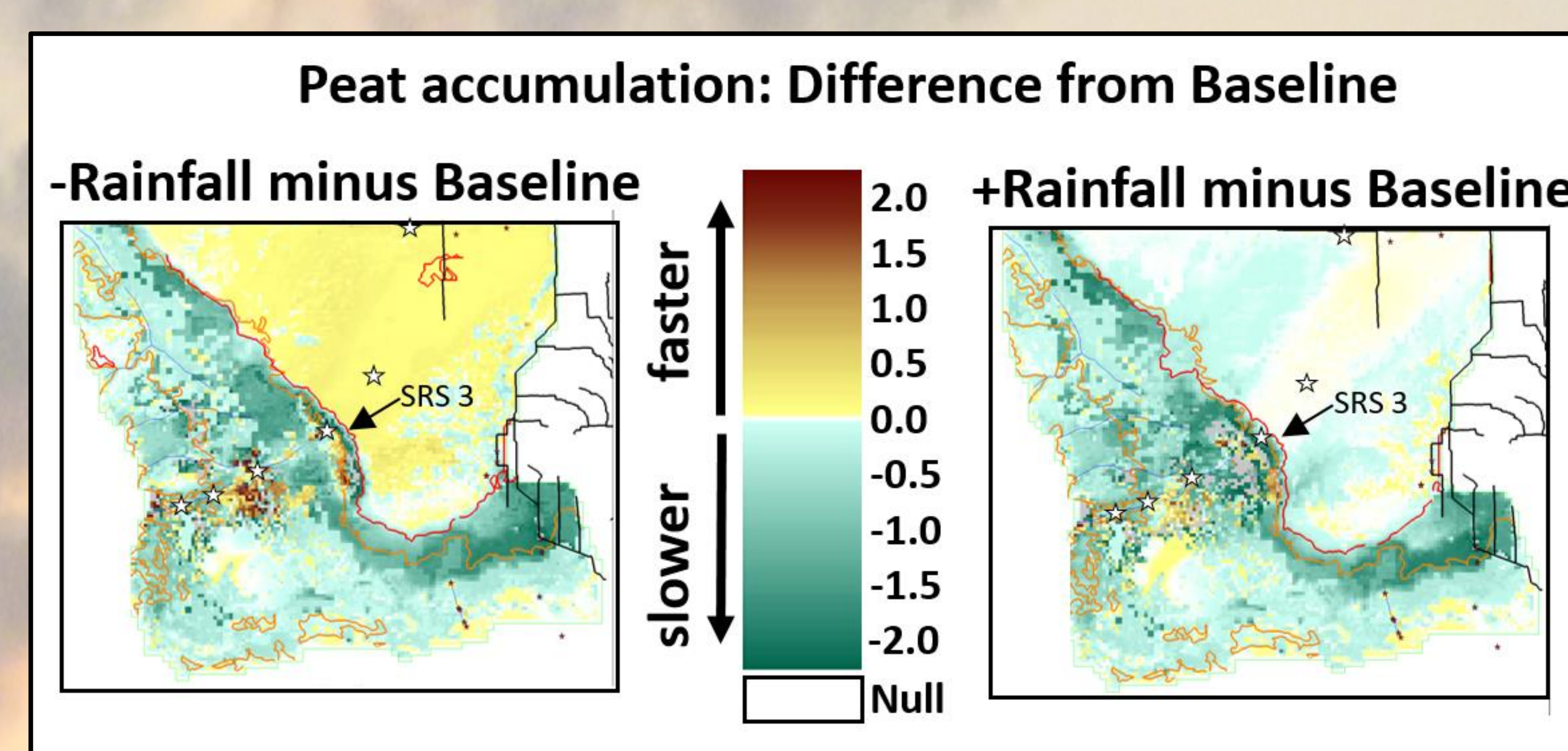


Temporal



Increased rainfall of 10% provided significant **benefits to the spatial and temporal salinity regime** within the marine-influenced zone, providing a more gradual and natural adjustment for at-risk flora and fauna.

Peat Accumulation Rate:



Peat accumulation slowed across the new marine-influenced zone in both climate change scenarios; in the freshwater remnant it increased slightly with -Rainfall

Peat accretion dynamics need to be better understood to predict ecosystem response to deeper water caused by sea level rise and increased freshwater

Objective: Screening-level analysis for planning

1- What ecological responses may occur in the southern Everglades under a "mid-range" estimate of future sea level rise?

2- How may changes in rainfall, temperature, and evapotranspiration interact with sea level rise to alter the vulnerability or resilience of this iconic coastal wetland?

No Change In Water Management

Scenarios for 2060

1. Baseline: 2010 climate
2. -Rainfall
3. +Rainfall

Rainfall ? 10%

50 cm Sea Level Rise

1.5°C

7% Evapo-transpiration

References (1) **Flower**, H., Rains, M., Fitz, H.C. in review, Visioning the Future: Scenarios Modeling of the Florida Coastal Everglades; (2) **Fitz**, H. C. and R. Paudel. 2012. Documentation of the Everglades Landscape Model: ELM v2.8.4. Ft. Lauderdale Research and Education Center, IFAS, University of Florida, Ft. Lauderdale, FL, 364 pages. **(3) Obeysekera**, J., Barnes, J., Nungesser, M., 2015. Climate sensitivity runs and regional hydrologic modeling for predicting the response of the greater Florida Everglades ecosystem to climate change. Environmental management 55, 749-762. **(4) Obeysekera**, J., Irizarry, M., Park, J., Barnes, J., Dessalegne, T., 2011. Climate change and its implications for water resources management in south Florida. Stochastic Environmental Research and Risk Assessment 25, 495-516.

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