Forecasting Ecological Outcomes in the Everglades

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Required Everglades Background Slide

Multi-annual patterns of rainfall over a low-elevation landscape drive the **rhythmic and cyclical** productivity of Florida's Everglades ecosystem.

Going back to the 1930's, disruptions to these cycles from extensive **draining** and implementation of **water control structures** have resulted in population declines of indicator species across the Everglades food web.

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Modern water and wildlife managers of this ecosystem are tasked with:

1) Making informed long-term decisions to facilitate Everglades restoration.

2) Executing short-term operations procedures for flood control and human use, while considering wildlife that depend on cyclical productivity.

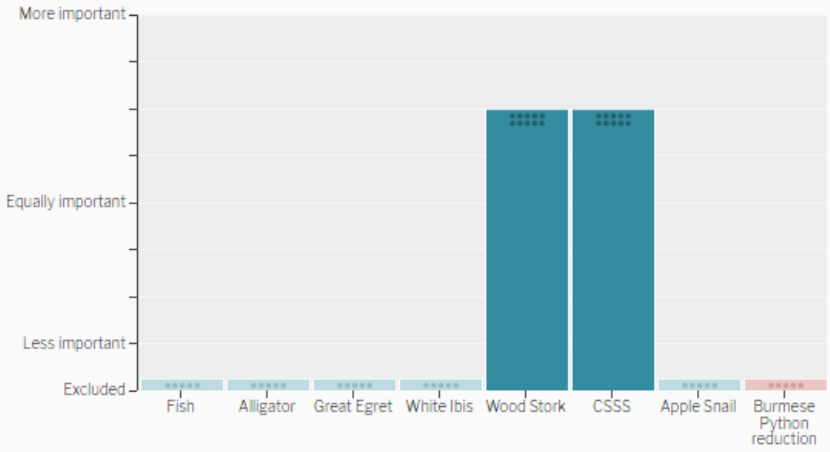
Common Data and Smart Decisions

1) The complexity of this problem requires an objective, quantitative, and spatial tool.

2) Acts as a shared resource for making informed, and scientifically defensible decisions.

Species prioritization

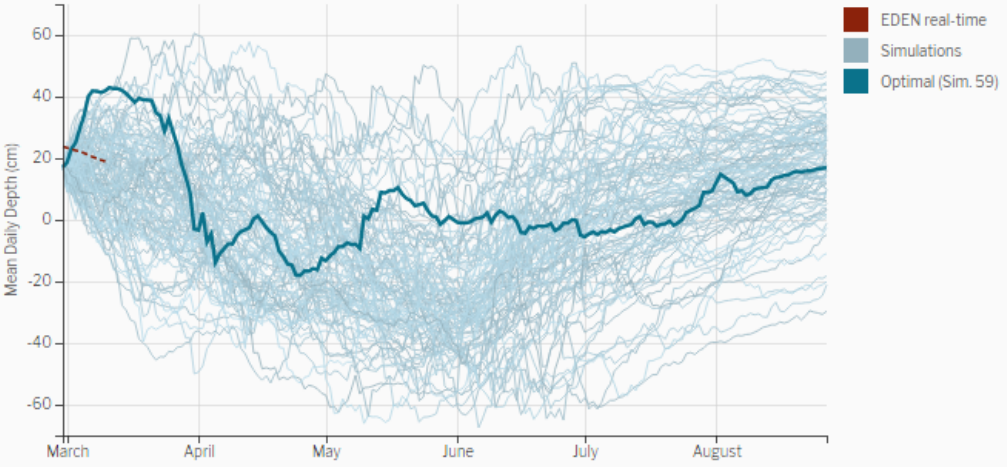
Use the chart below to set the relative importance of each species outcome. Priority can be set by clicking above or below, or by dragging, the top edge of the bar. Alternatively, press the Tab key to focus on a bar and move it with the Up/Down arrow keys. The optimal simulation graph will update in real-time as weights are changed.



Optimal simulation

Given the above species prioritization, simulation **59** is the optimal choice, with a weighted average score of **50.00** across all modeled species.

Simulated hydrographs



Modern Sensor Technology

1) Leverages NOAA climate forecasts and historical hydrologic variation to simulate a composite of likely ecological conditions given the current state of the ecosystem

2) Forecasts water depth daily using EDEN framework

3) 6-month depth forecasts feed species-specific ecological models

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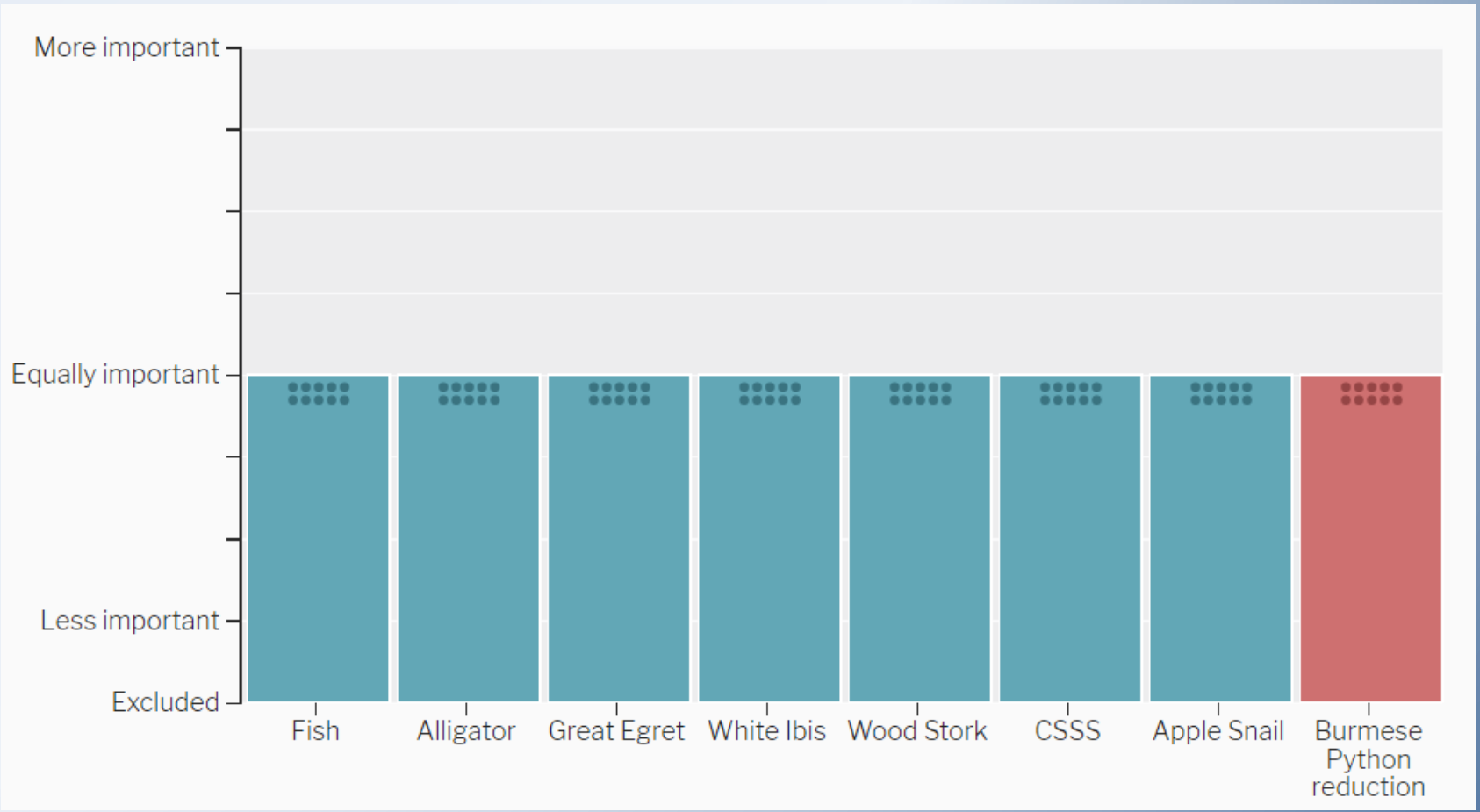
Everglades Depth Estimation Network (EDEN)

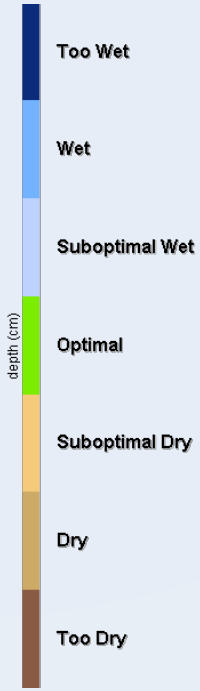
An integrated network of water-level gages, ground elevation and surface-water level models

Providing daily water-depth and water-surface maps at 400-m resolution

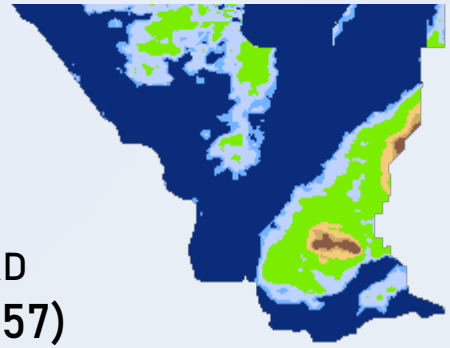
Current Ecological Models

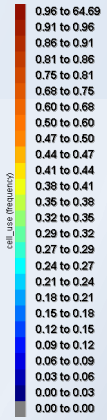


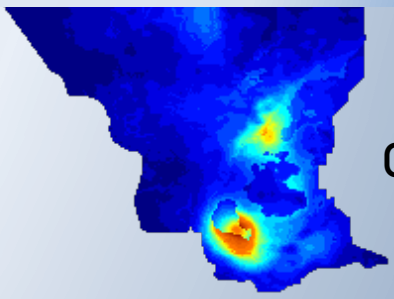
Daily Outputs for 100 Alternatives (software generated)



CSSS Depth (Sim 24)

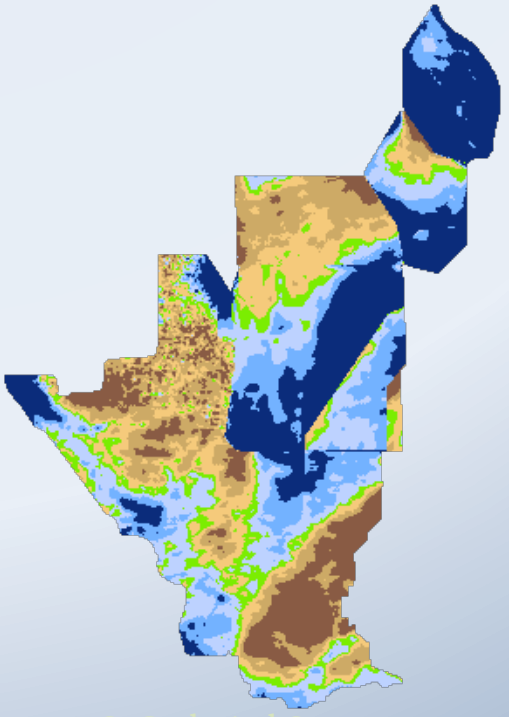




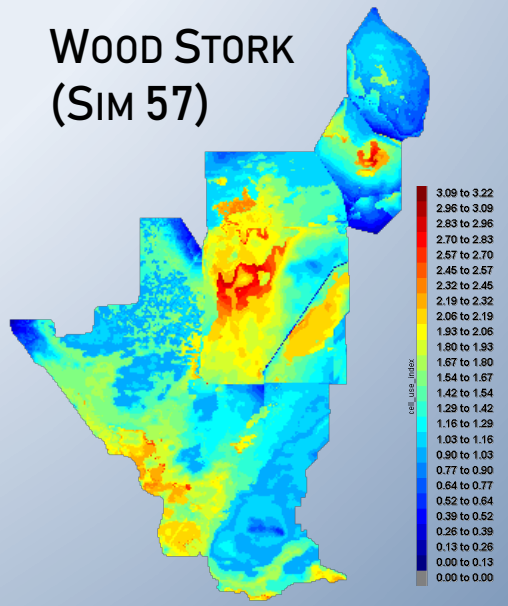


CSSS (Sim 24)

Wading Bird Depth (Sim 57)



Wood Stork (Sim 57)



James M. Beerens, U.S. Geological Survey.

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Miami Herald

THE EVERGLADES

TIM CHAPMAN Miami Herald file

The Cape Sable seaside sparrow only nests in Everglades National Park and is often blamed for holding up restoration efforts. Environmentalists say the health of the sparrow is a measure of healthy marshes.

WITH RAINS COME ENVIRONMENTAL WOES

■ Once again, an endangered Everglades bird is at the center of controversy over how the South Florida Water Management District and U.S. Army Corps of Engineers manage flood waters.

BY JENNY STALETOVICH
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After record rain sent water levels soaring across farmland south of Lake Okeechobee and water conservation areas from Palm Beach to Broward counties last month, South Florida water managers raced to flush the peninsula, pumping billions of gallons out to sea and into Biscayne Bay, and opening floodgates normally closed to protect endangered Cape Sable seaside sparrows.

Within three days, what remained dry in sparrow nesting grounds was under water. Ma-

seas Highway, turned nearly fresh — salinity this week remained a third of what it should be. And in the Everglades, Taylor River contained more saltwater than fresh.

"They're just not putting it in the right places. They're dumping it," said Audubon Florida's Research director Jerry Lorenz. "I recognize the need for emergency action with as much rain as we got. I just think it could have done better than just dumping it."

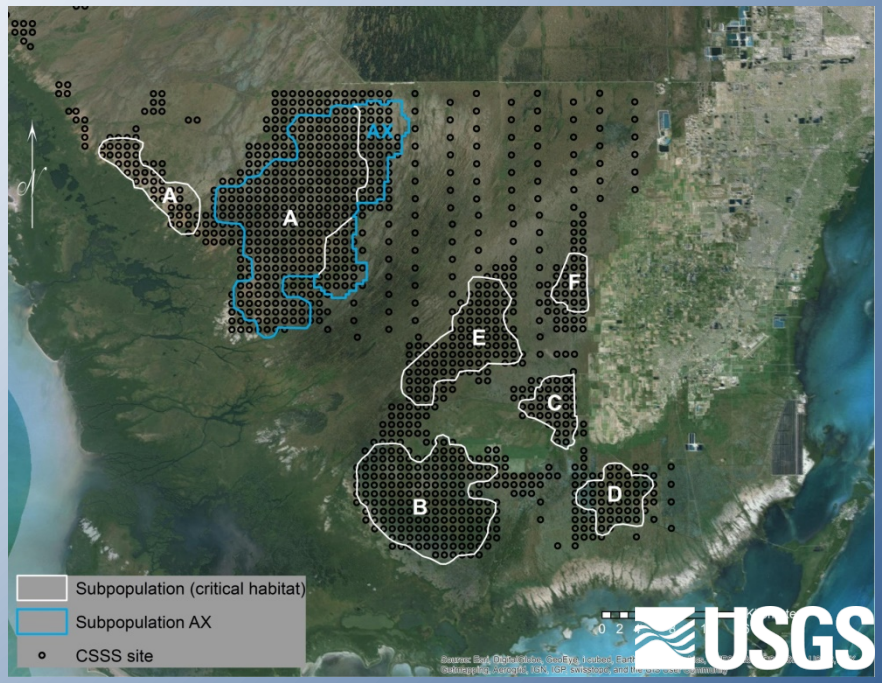
The struggle to balance flood control and protect the environment in South Florida is nothing new. Two summers ago, a prolonged drought triggered a seagrass die-off that spread across 62 square miles in Florida Bay. By winter, unseasonal rain left dozens of Miami-Dade County farmers with ruined winter crops. The following summer, high lake water threatening the lake's aging dike led to massive releases that coated much of the Treasure Coast with smelly, thick algae.

This year once again revealed the high environmental costs of flood control. The water that swamped sparrow nests in prairie grasses inches from the ground provided just a half inch of relief in the water conservation area, wildlife officials said. And while the South Florida Water Management District has taken steps to increase water into Everglades National Park and down to Florida Bay, much

SEE SPARROW, 2A

July 25, 2017

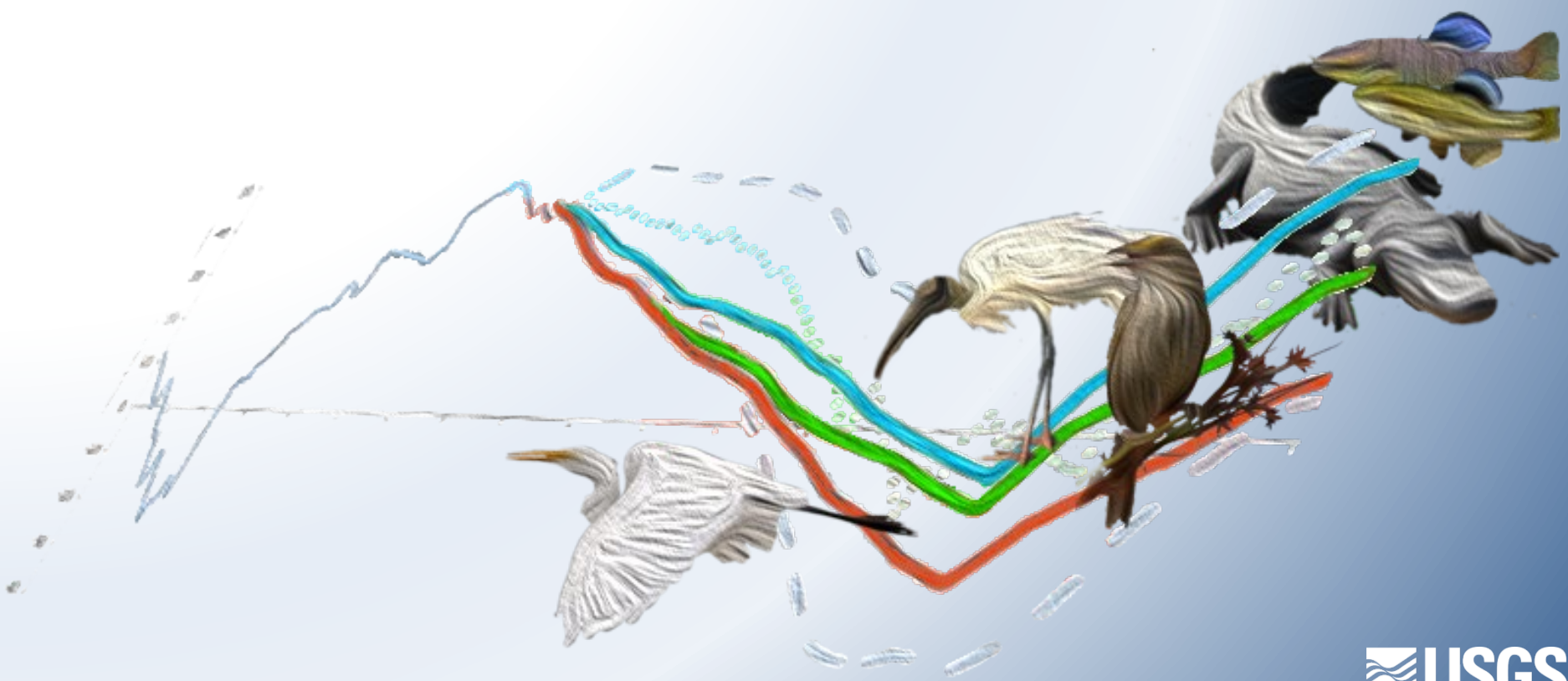
"Deriding protections as 'single species management' at the cost of restoration, they've repeatedly blamed the sparrow over the decades for standing in the way of restoration…"



Next implementations:

1) Spatial output that matches gage-based decisions with ecological unit of interest.

2) Goal is direct relevance to real-time water management decisions.



E4C provides:

1) a spatial assessment of the benefits and costs of each hydrologic path for each species and,

2) a comprehensive assessment across species with flexibility to modify species weighting according to desired management objectives.

https://jem.gov/ever4cast/

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