

Climate Change & Everglades Restoration

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**Hydrology of the Everglades in the Context of
Climate Change**

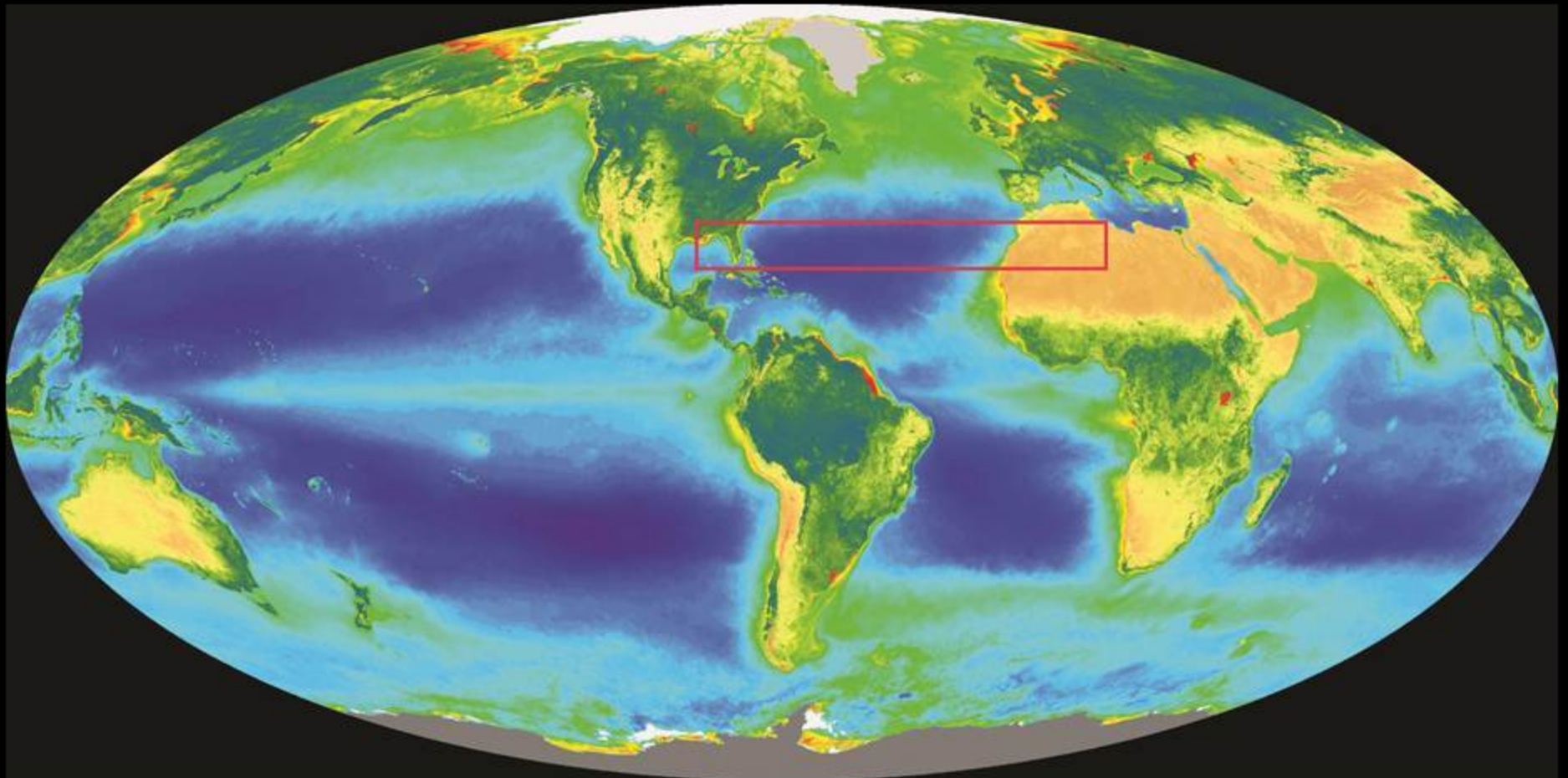
**USGS, Sea Grant & CES Workshop, Davie, FL,
30 March 2012**

“La Florida:

A Land of

FLOWERS

on a Latitude of Deserts”



Cairo, Egypt: 30.0° N
Orlando, Florida: 28.5° N

A map of the United States and surrounding regions, overlaid with a fine grid representing a 0.1-degree by 0.1-degree latitude-longitude resolution. The map shows topographic features and state boundaries. The text is centered over the map.

Dynamic Down-Scaling

Regional Spectral Model

0.1° by 0.1° Lat-Lon

JJA

2040

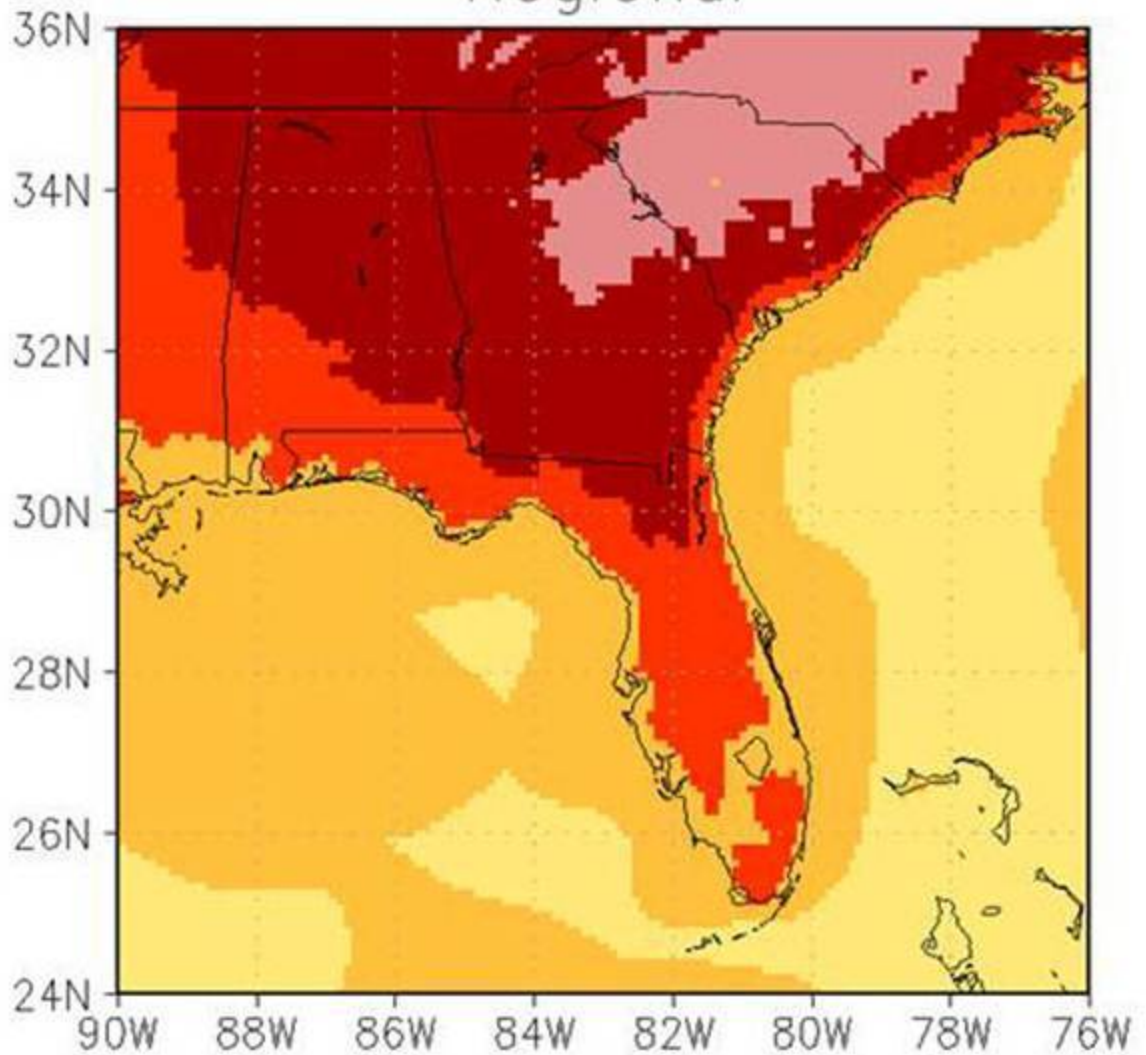
Down scaled

Temperature

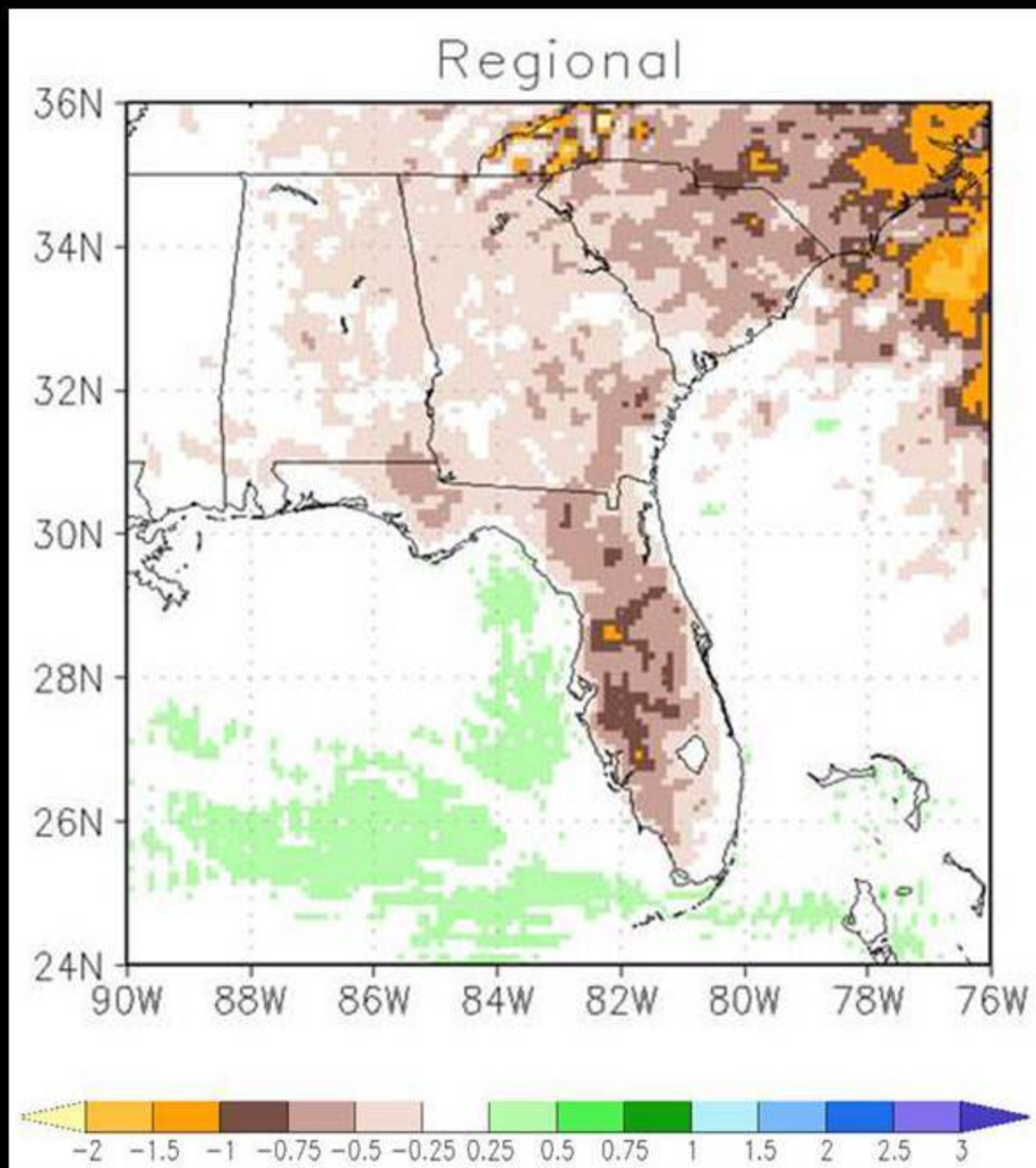
From

CCSM3

Regional



JJA
2040
Down
scaled
Rainfall
From
CCSM3

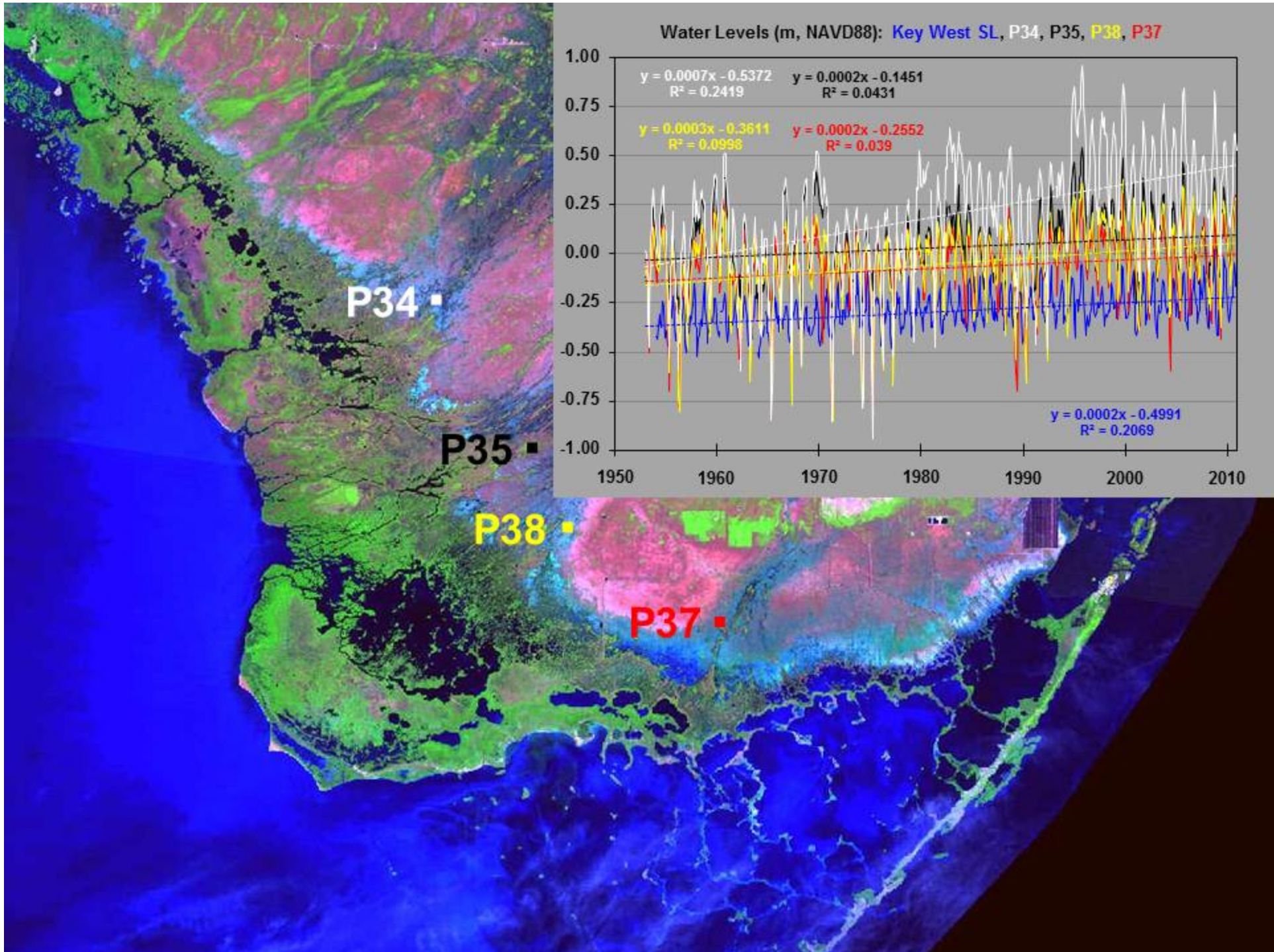


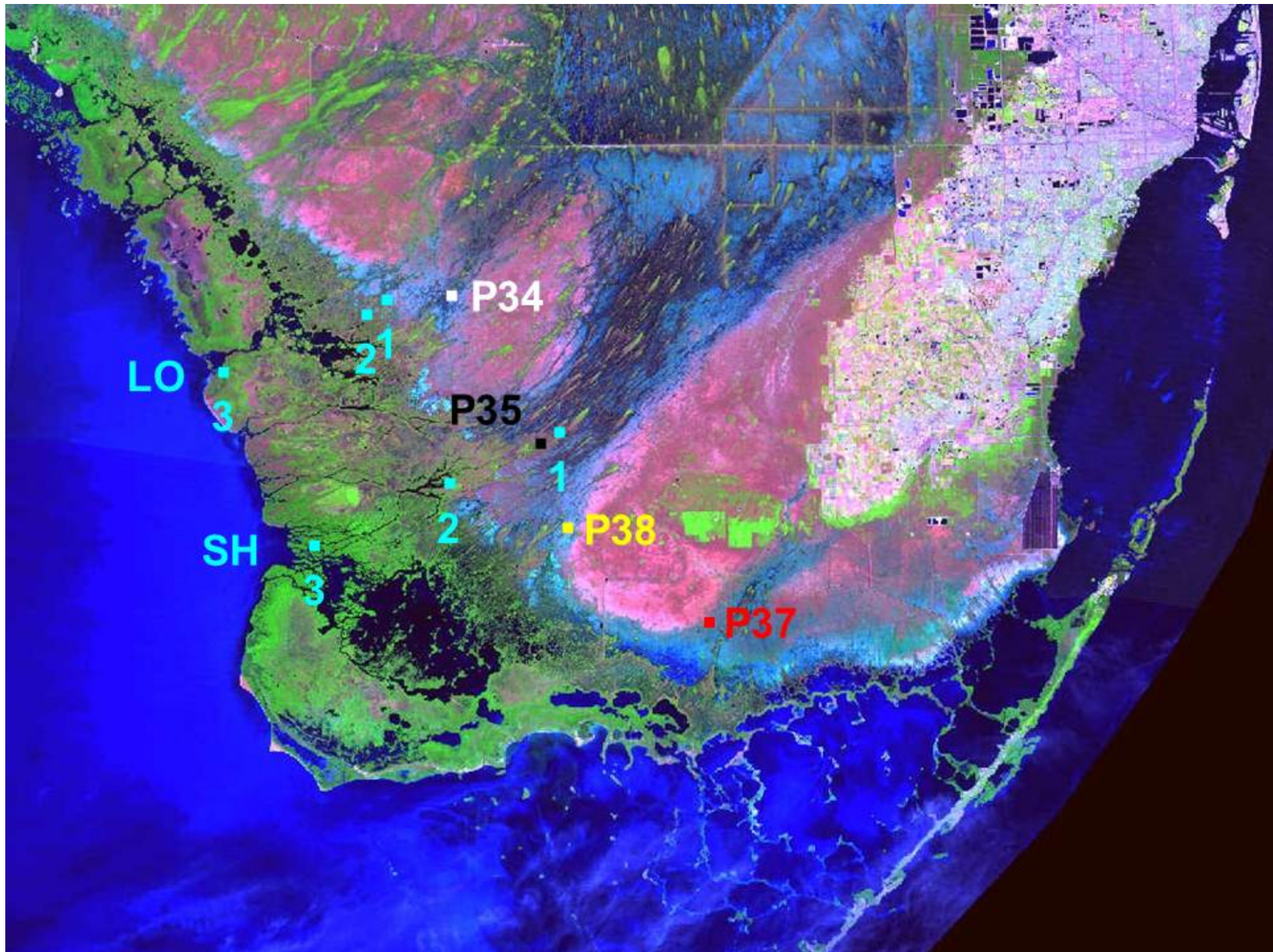
**La Florida
becomes
La Deserta**

??

What else is happening in the Everglades

????

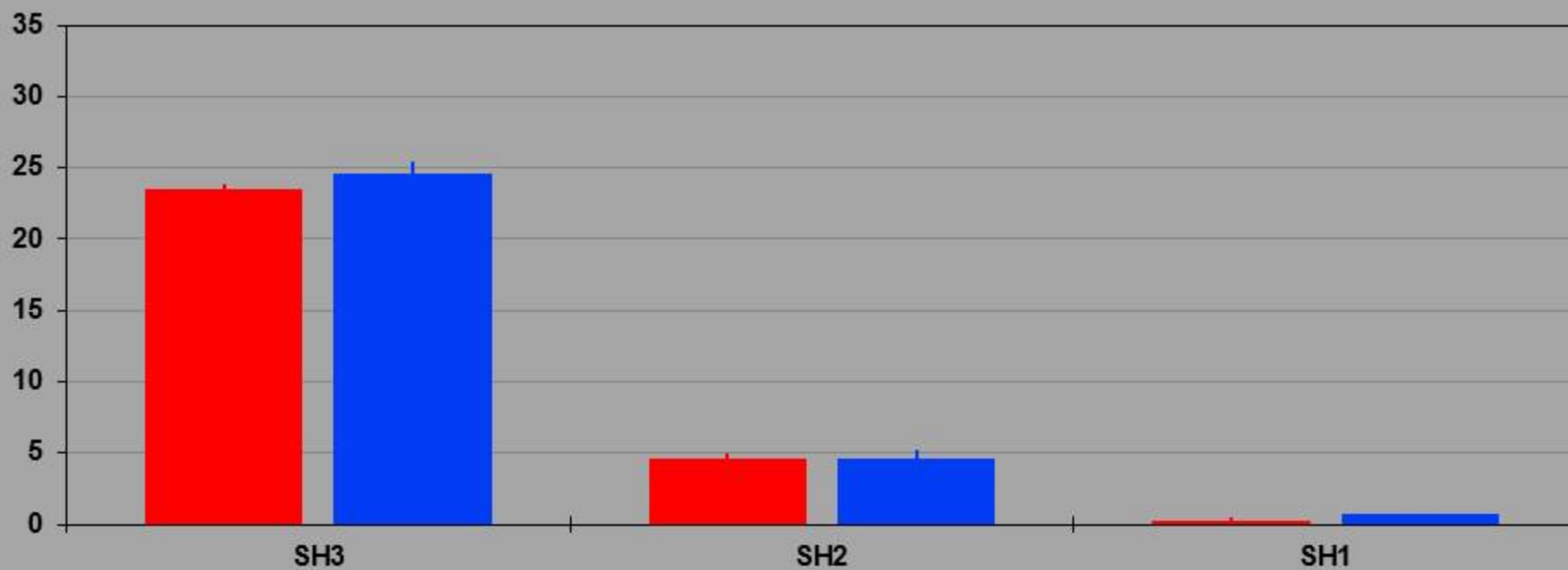
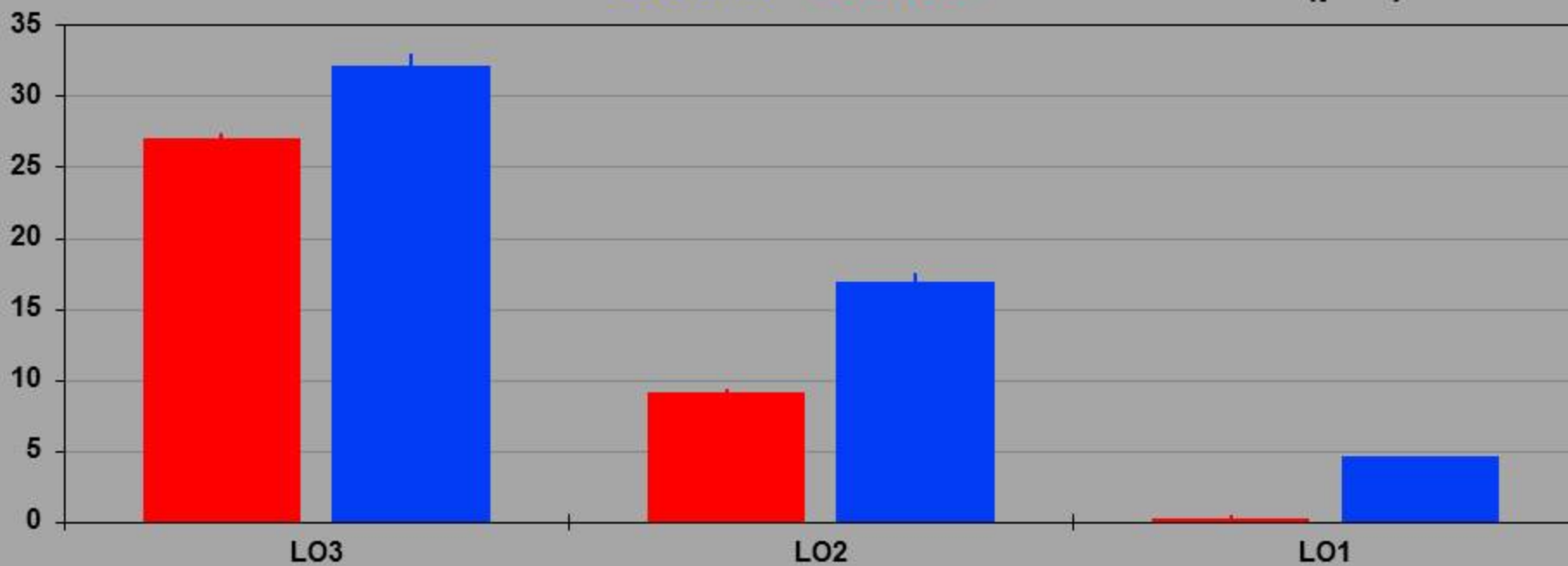




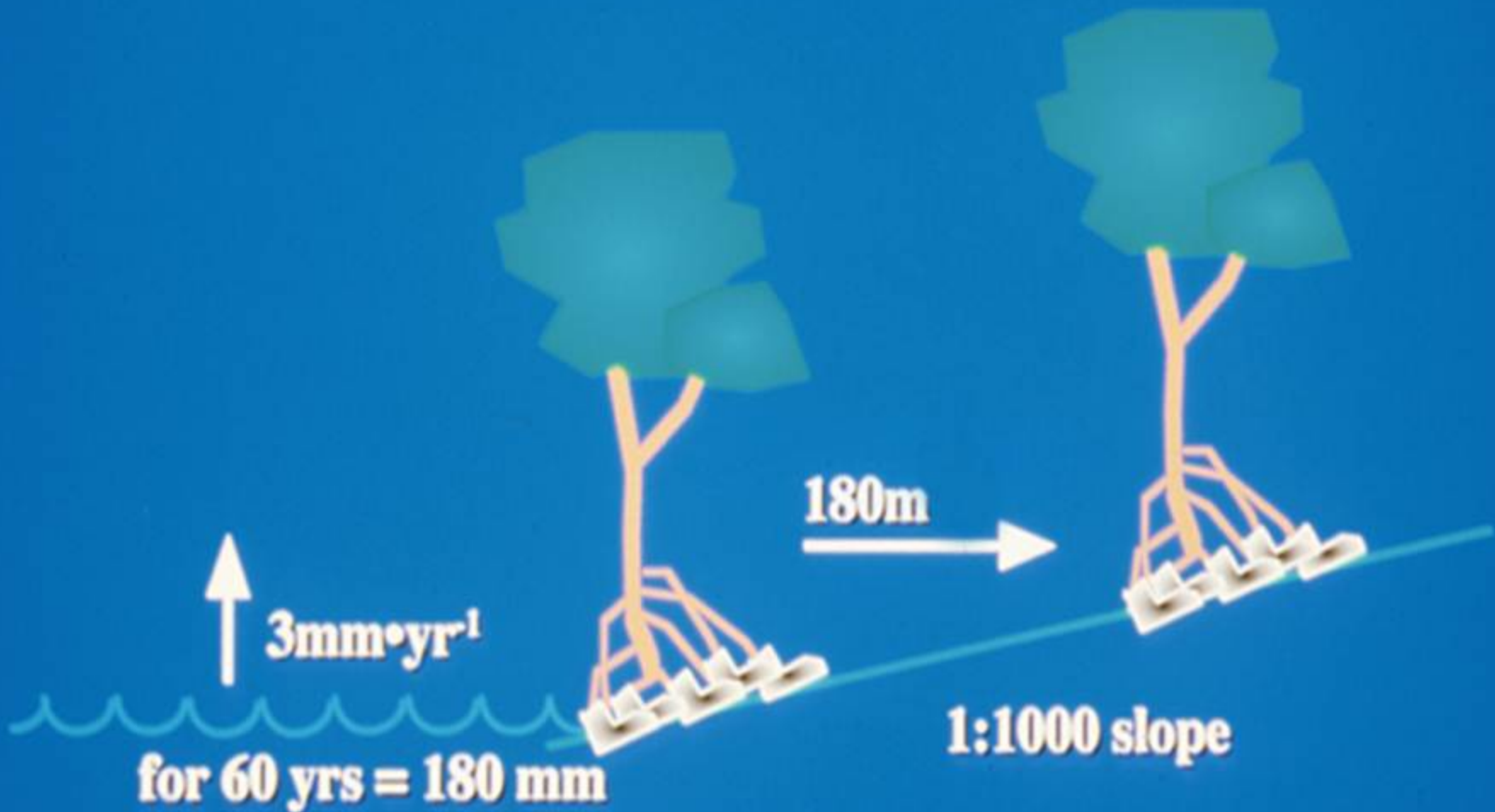
What does DECREASED rainfall mean for runoff and salinity patterns in the coastal Everglades

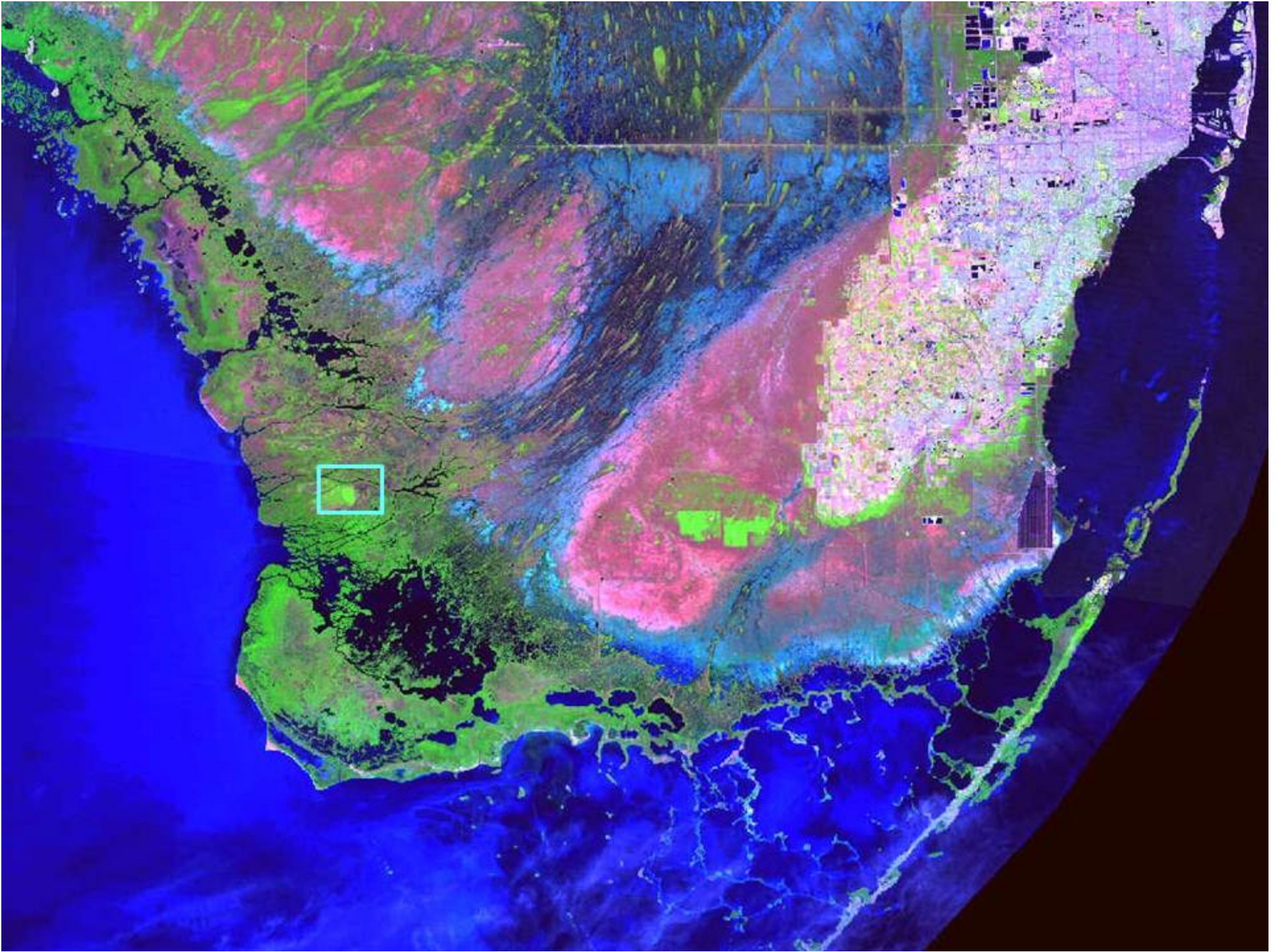
????

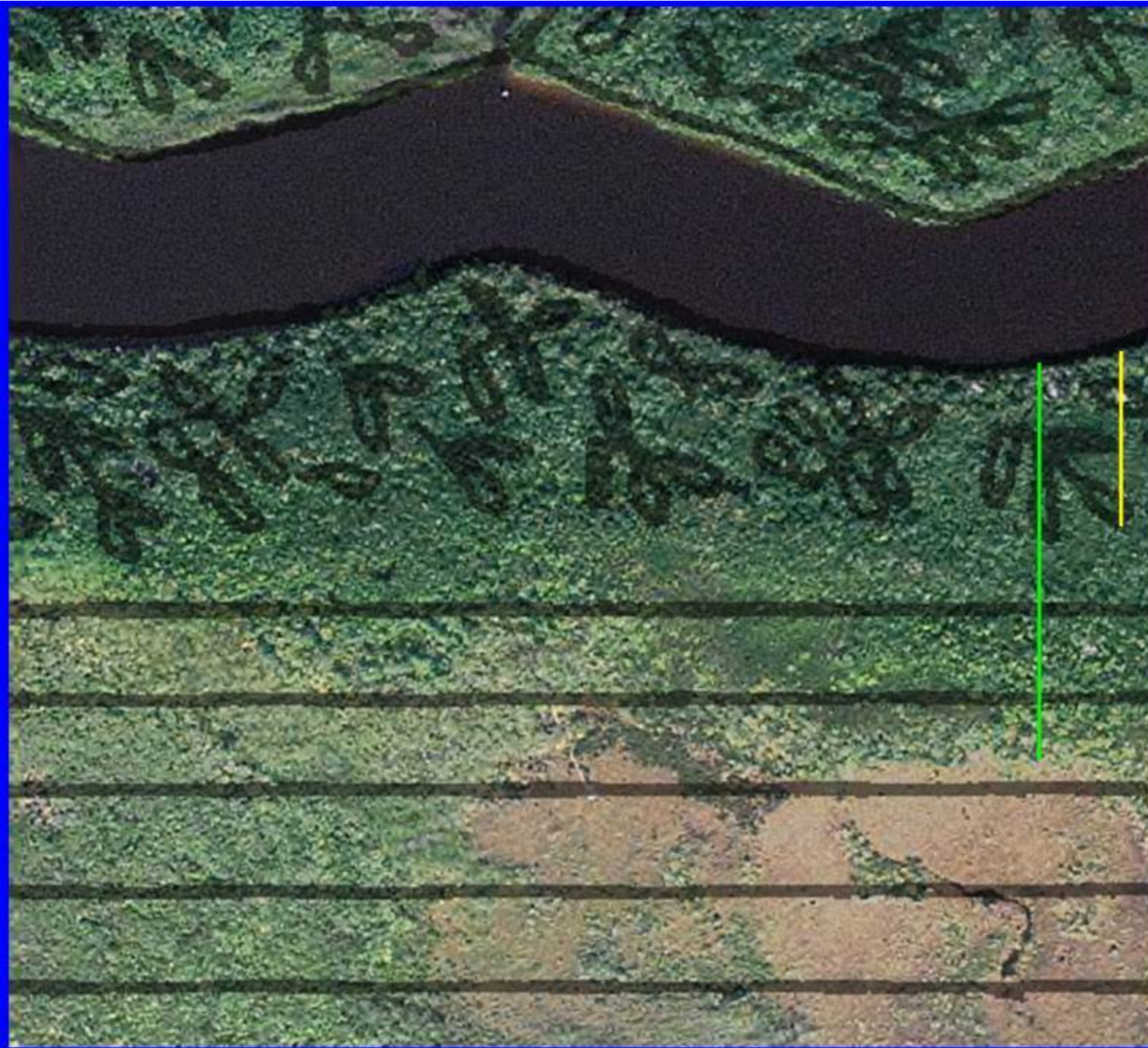
Lostmans & Shark: **Ground** & **Surface** Water Salinities (psu)



Will mangroves move upslope ?







SH4-SH5 on
the Harney
River

Mangrove
fringe in
1928: 150 m

Mangrove
fringe in
2004: 300 m

Other events are also occurring



Andrew, 8/92

Freeze, 1/98

Fire, 8/01

January 2009: Prescribed Fire

**What does “hotter & dryer” mean for
fire in the Everglades ??**

ENP

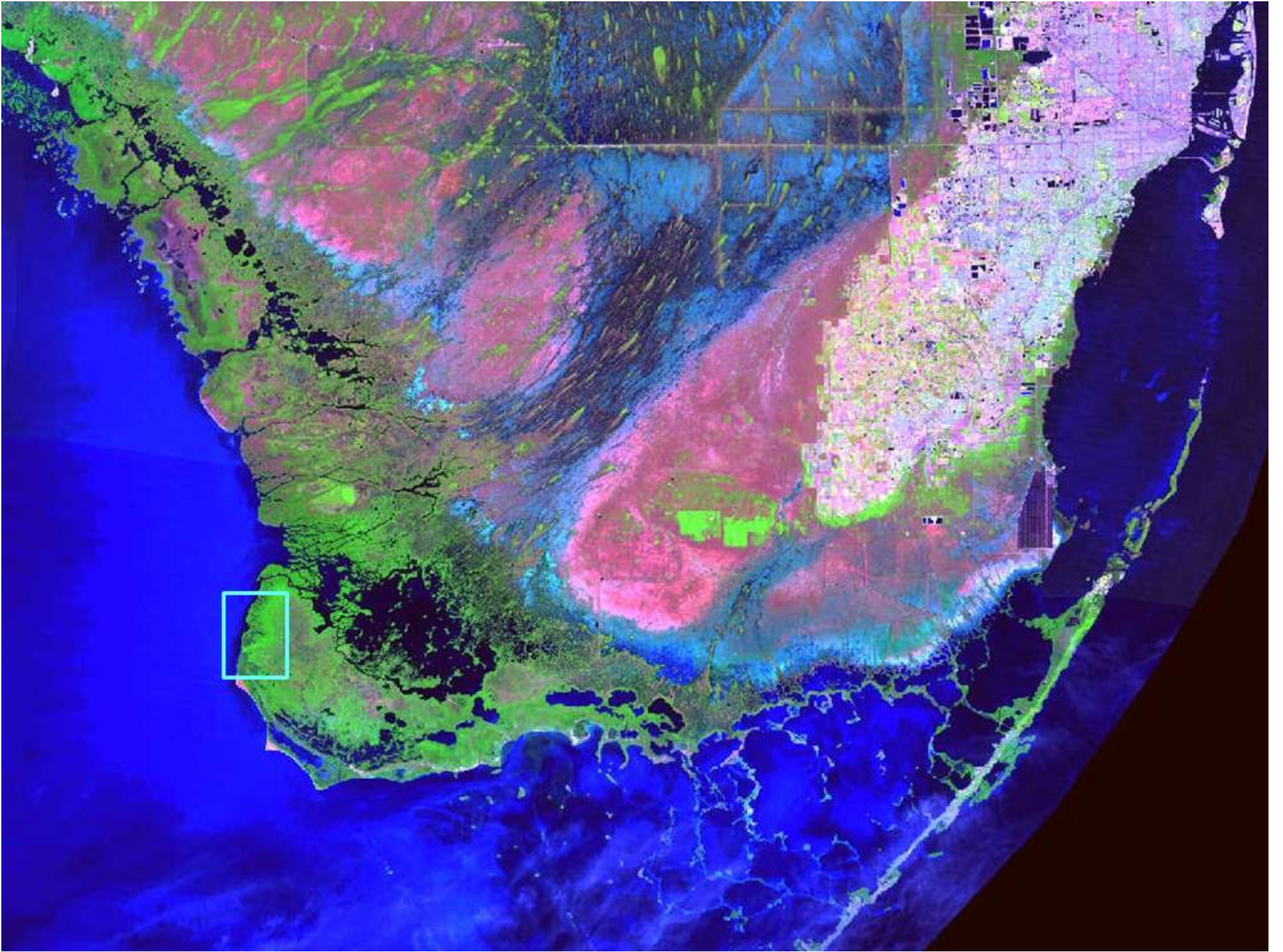
All fires

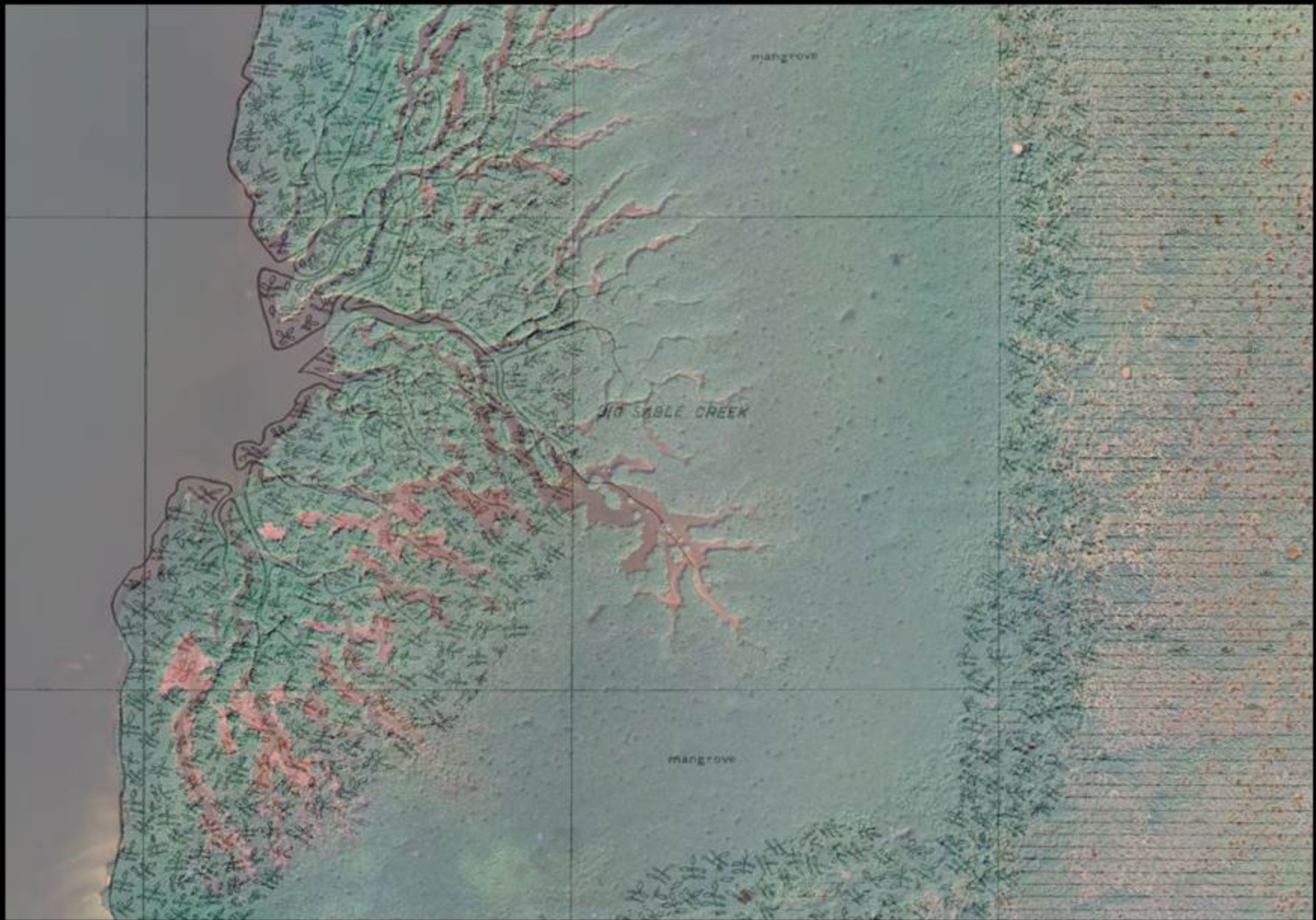
**1948
to
2010**



December 2010 Freeze

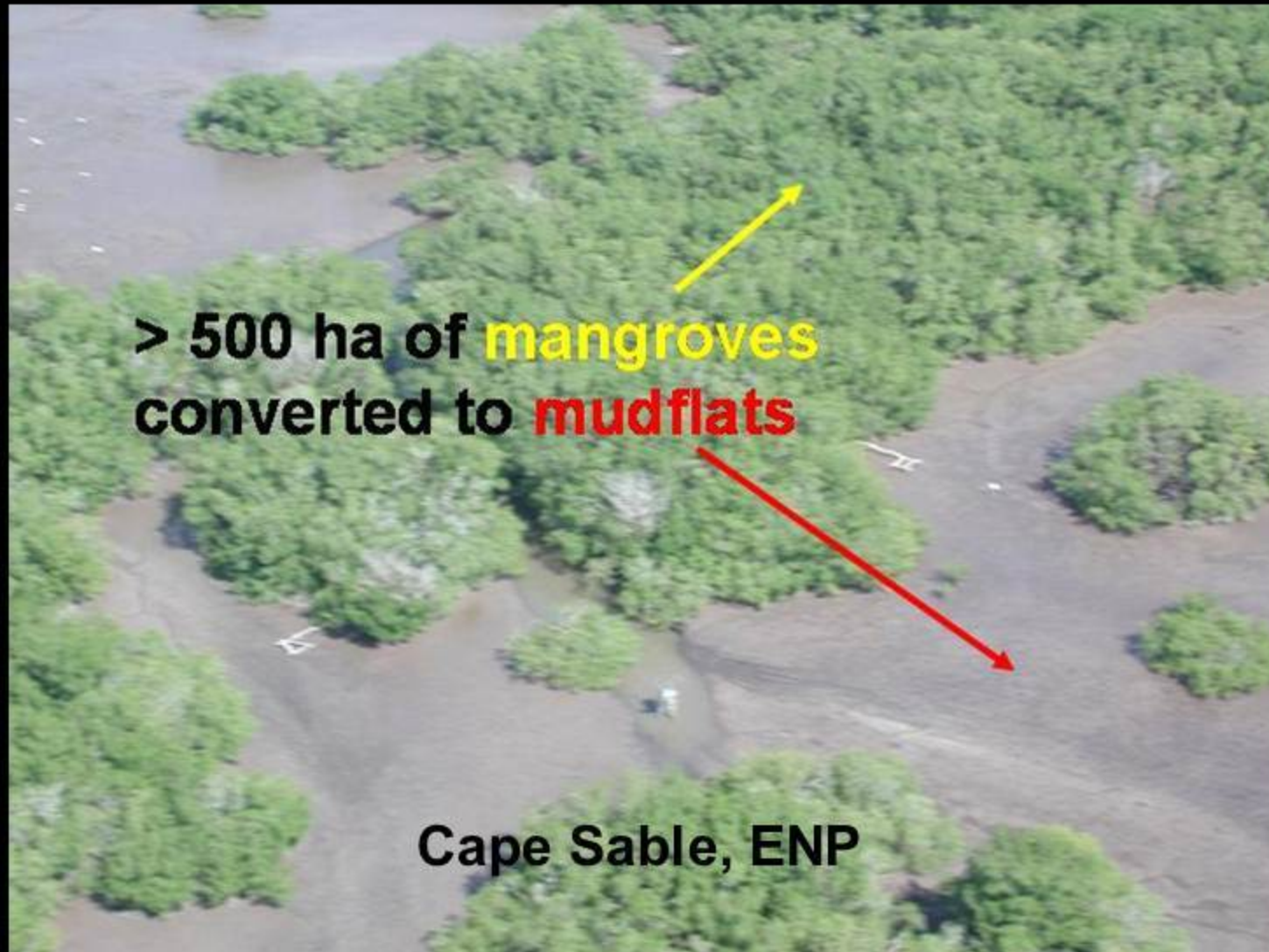






Big Sable Creek: 1928 and 2004

Habitats have changed

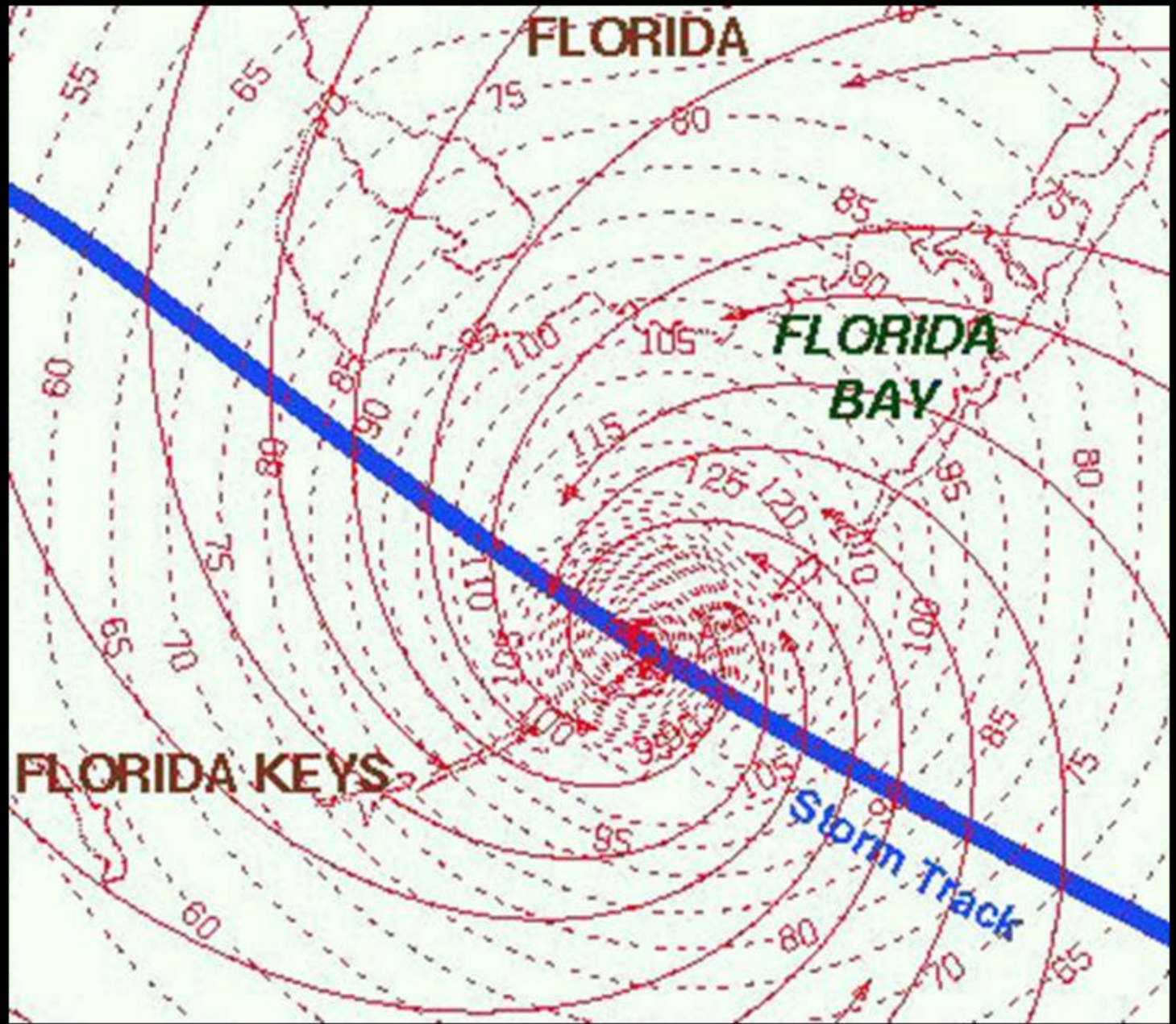




75 cm

Peat Collapse

**Labor
Day
1935**



Courtesy Mark Powell, NOAA

**What are we doing
with all of the
downscaled data**

??

Downscaled climate OUTPUTS

are used as INPUTS

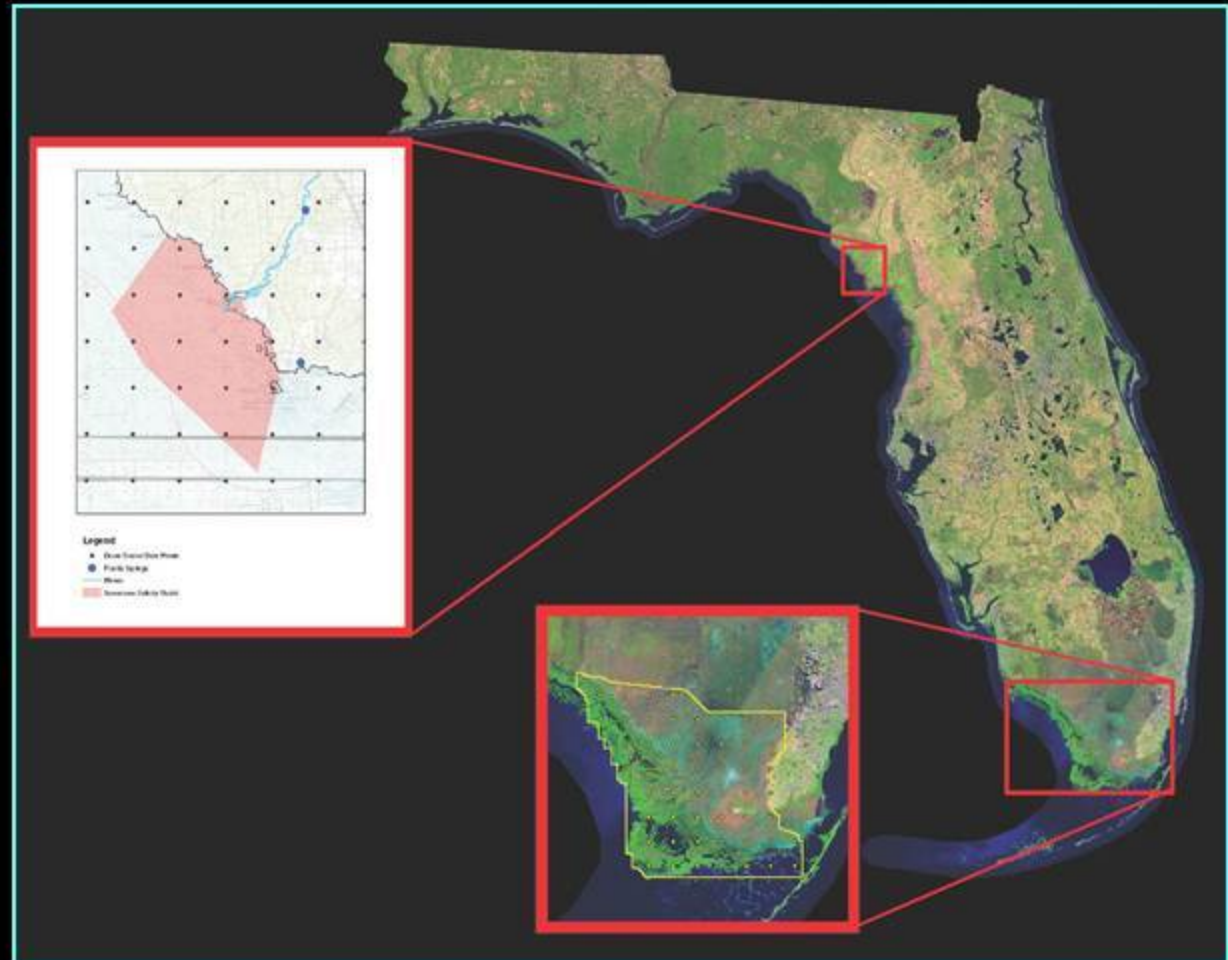
to USGS

hydrology & ecology models

Two hydrodynamic models

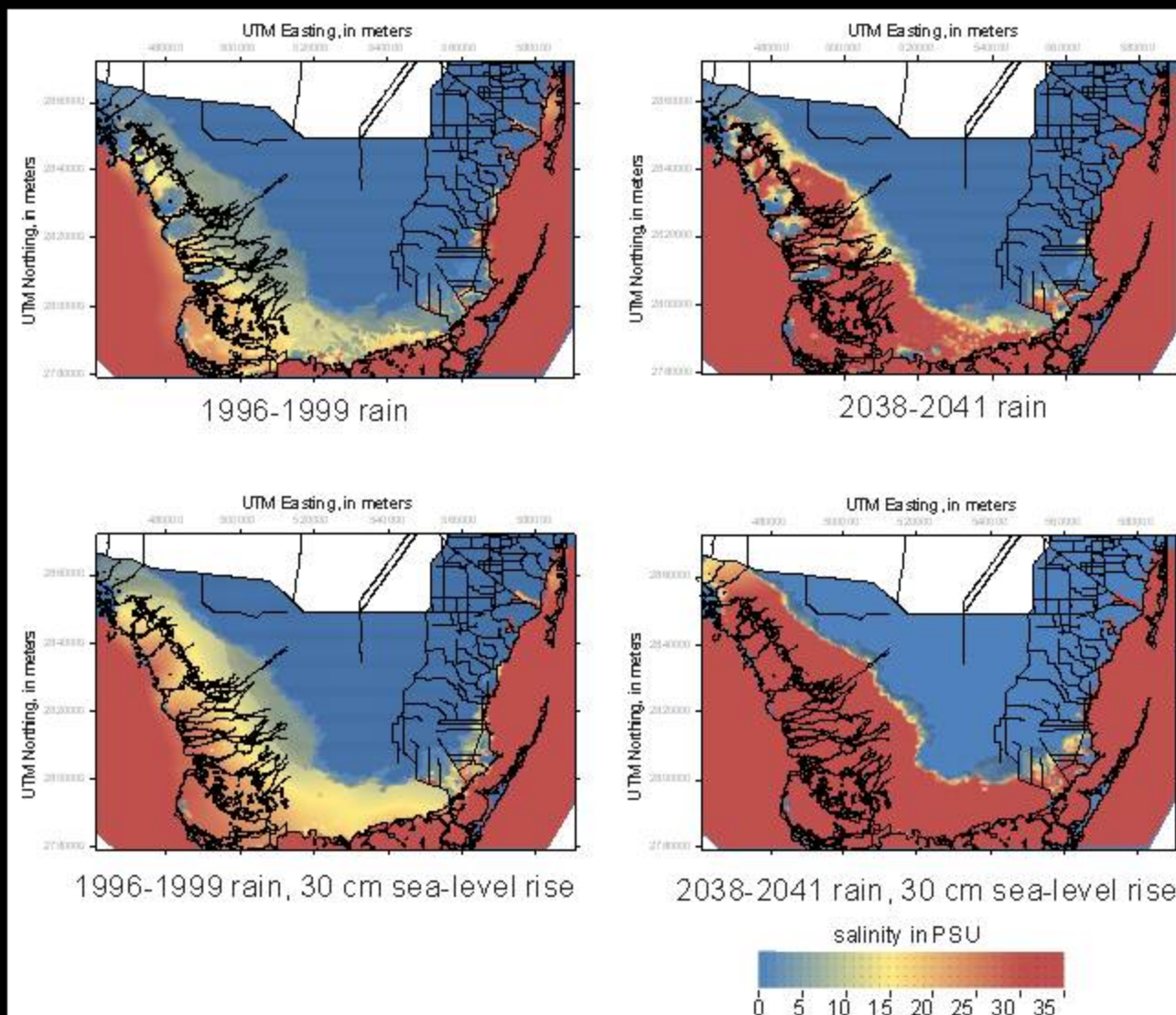
3-D Flow and salt transport for the Lower Suwannee River NWR

Tides & Inflows to the Mangroves of the Everglades (3 NPs & 1 NWR)



Use of downscaled rainfall in TIME

Present SL



+ 30 cm

Present

Less Rain

Across Trophic Level System Simulations (ATLSS)

Spatially Explicit Species Index models (SESI)

Snails and Snail Kites

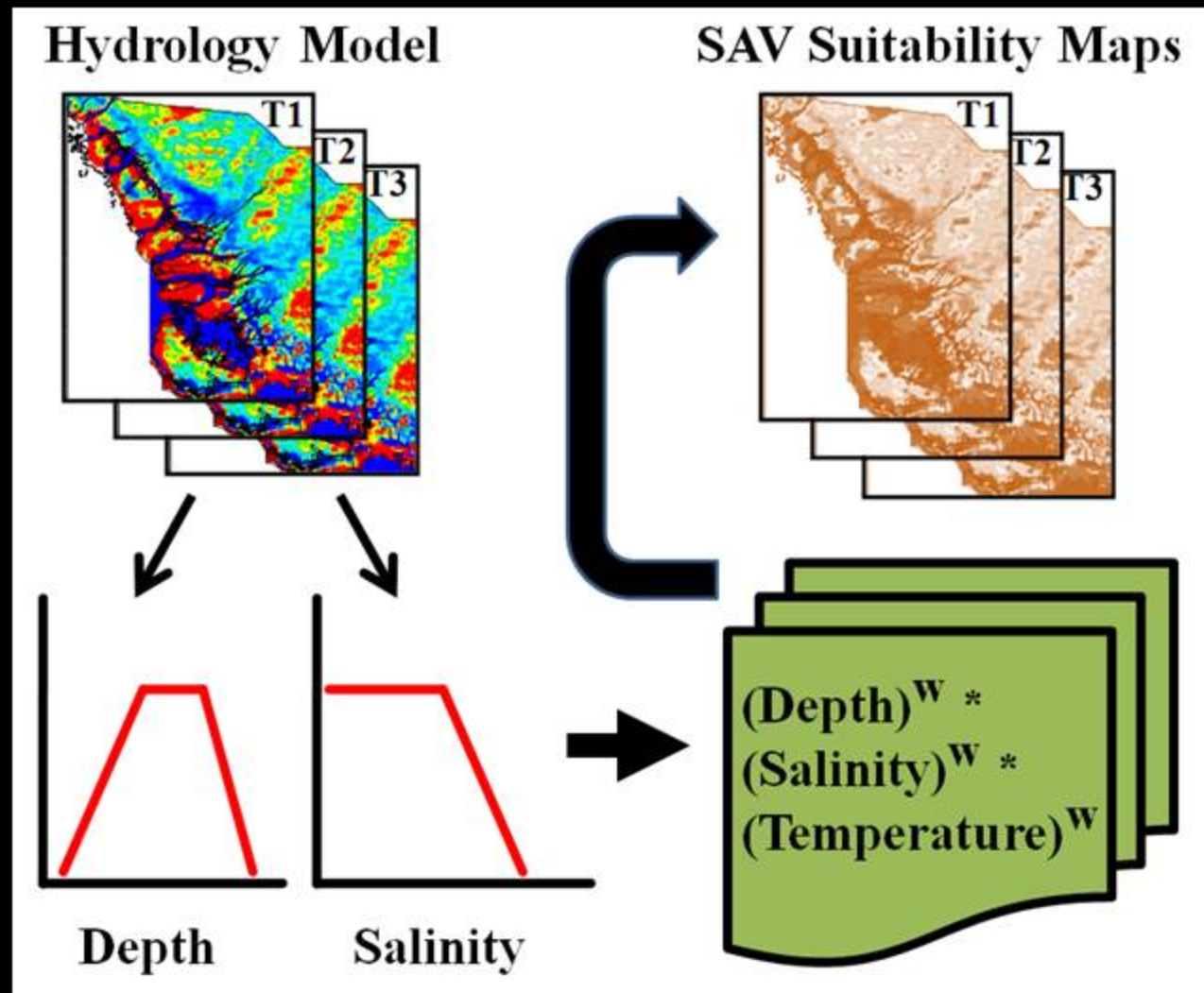


Manatees and Seagrasses



Crocodiles

SESI model for Submerged Aquatic Vegetation



Predicting Potential Range Expansions for Invasive Exotic Plants

>700 planted at Fairchild Tropical Gardens

~10 km north of Biscayne NP

Lumnitzera racemosa

Fairchild

Matheson Hammock Park



ACKNOWLEDGEMENTS



**GEPES, NCCWSC & Terrestrial, Freshwater
and Marine Ecosystems Program**



**US Army COE, RECOVER-MAP:
IA W912-03**



National Park Service



Colleagues with the FCE-LTER

