

Florida Red Tide

A disturbance of unknown duration

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UCF launches UCF Coastal to Combat Sea-Level Rise, Algal Blooms

BY ROBERT WELLS | AUGUST 20, 2018



(Photo by Katie Arcic)

Protecting and preserving Florida's shores from sea-level rise and algal blooms among other threats is critical to the state's economic future, and the University of Central Florida can serve as the mechanism to turn that desire into reality.

Core members



Sergio Alvarez
Tourism, Events &
Attractions



Christopher Emrich
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Kristy Lewis
Biology



Thomas Wahl
Civil, Environmental &
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Jacopo Baggio
Political Science



Salvador Moreno
Biomedical Sciences



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Construction Engineering

**College of Community Innovation
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Burnett School of Biomedical Sciences

College of Medicine:
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College of Sciences:
Department of Anthropology
Department of Biology
Department of Chemistry
Department of Physics (Geosciences)
Department of Political Science
Department of Sociology

**Rosen College of Hospitality
Management:**
Department of Tourism, Events &
Attractions

National Headlines



ange Wildlife Energy **Pollution**

Florida red tide sweeps away Republican Rick Scott's Senate poll lead

- Governor blamed for weakening environmental protections
- Red tide spreads to Atlantic waters off Miami and Palm Beach



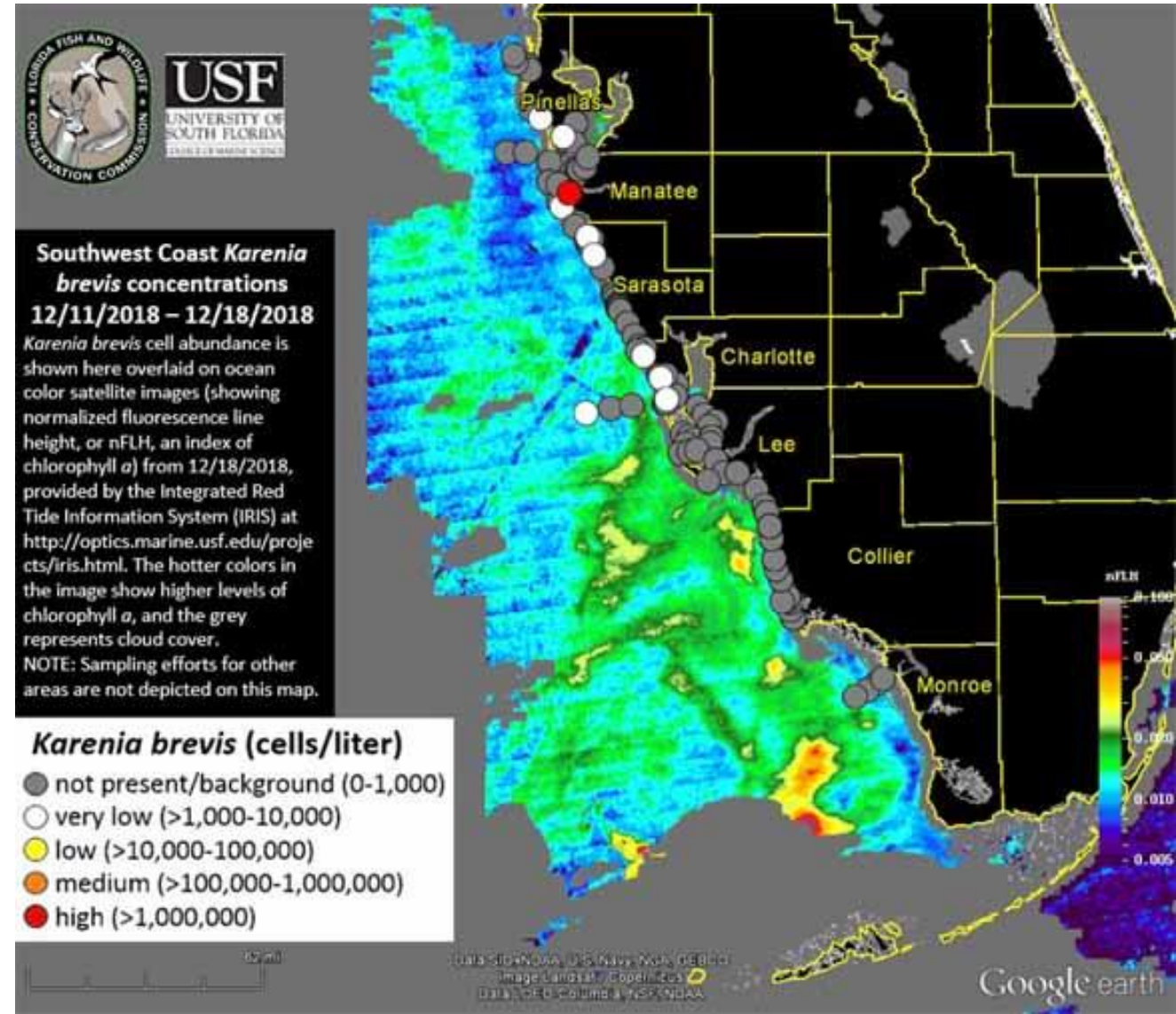
▲ Dead fish lie on the beach at Sanibel, on Florida's Gulf coast in August. The red tide that killed them has now spread to the state's Atlantic coast. Photograph: Joe Raedle/Getty Images

Barely a month ago, Republican Rick Scott held a clear lead in the race to become Florida's next US senator. Now a tidal wave of toxic algae threatens to engulf the campaign of the outgoing state governor, whom critics have dubbed 'Red Tide Rick'.

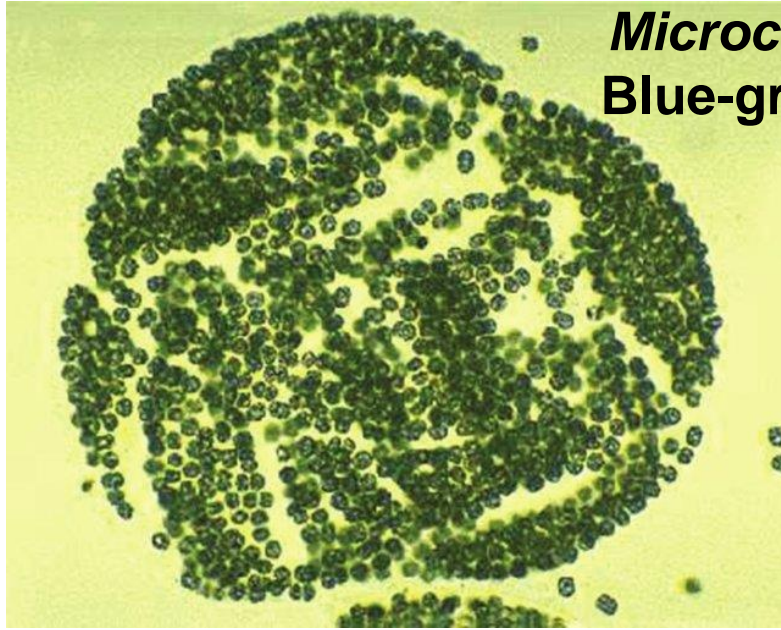
Wildlife officials confirmed on Thursday that the same deadly algae bloom that **overran Florida's south-west coastline** this summer, killing dolphins, fish, manatees and turtles and devastating the area's tourism industry, had washed ashore **on several Atlantic coast beaches**.

Some Red Tide Stats

- Lee County: 4 million lbs of debris
- Pinellas County: 3.7 million lbs
- ~193 manatee deaths
- 300 sea turtle deaths
- 74 dolphin strandings
- Decrease in coastal tourism



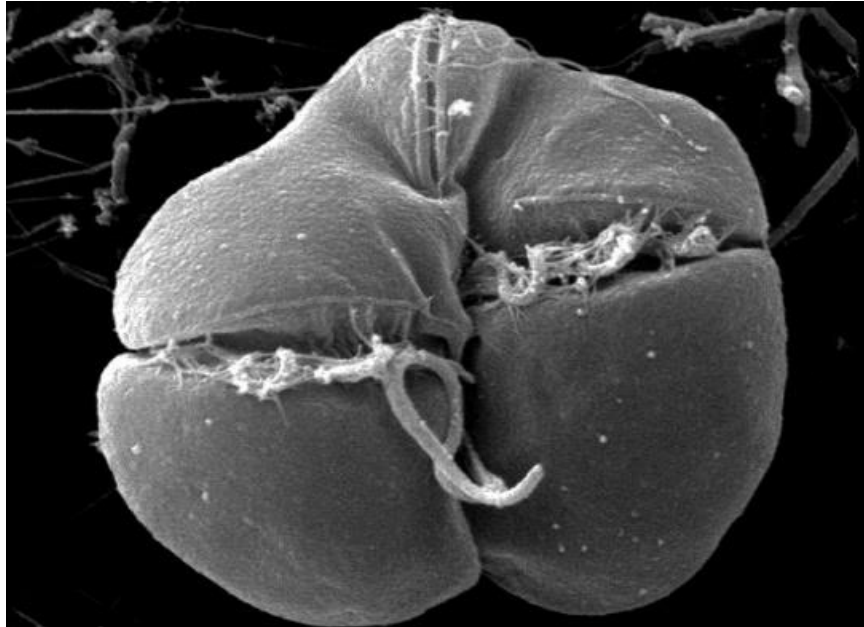
HABs in FL



Microcystis spp.
Blue-green algae



Aureoumbra lagunensis
Brown tide



Karenia brevis
Florida Red tide



Anabaena spp.
Blue-green algae

Drawing a distinction

Sending the correct message to the public



Casey Key (Sarasota County) Before and During Red Tide
Photos by Cody Johnson



Fish kill caused by red tide in Manatee County

Florida Red Tide

Drawing a distinction

Sending the correct message to the public



Franklin lock in the Caloosahatchee river.
Photo by Sanibel-Captiva Conservation Foundation



St. Lucie river in Stuart.
Photo by the Miami Herald

Cyanobacteria bloom



Causes of Florida Red Tide

- Observed in the **15th and 16th** centuries by Spanish explorers (e.g., Cabeza de Vaca)
- The early observations indicate they **can occur naturally** when there has been little disturbance in the system by humans
- Saharan Dust fertilizes Gulf of Mexico, causing Trichodesmium bloom (**nitrogen fixer**)
- Human caused??
 - Since its taxonomic description, more than **twenty theories** relating to nutrient sources and *K. brevis* blooms have been proposed and studied (see Vargo, 2009 for review)
 - Suggests *Karenia brevis* is a **physiologically versatile** organism that has adapted to a physically and chemically dynamic environment



Impacts of Climate Change on Oceans

- Increased sea surface temperature
- Enhanced surface stratification
- Alteration of ocean currents
- Intensifying/weakening of coastal nutrient upwelling
- Ocean acidification
- Changes in volume of freshwater runoff into coastal marine waters

Implications of Climate change on HABs

**HAB response will be varied
depending on species**

- ecological and physiological diversity

**Generally accepted: HABs are
increasing in frequency, intensity
and duration on a global scale**

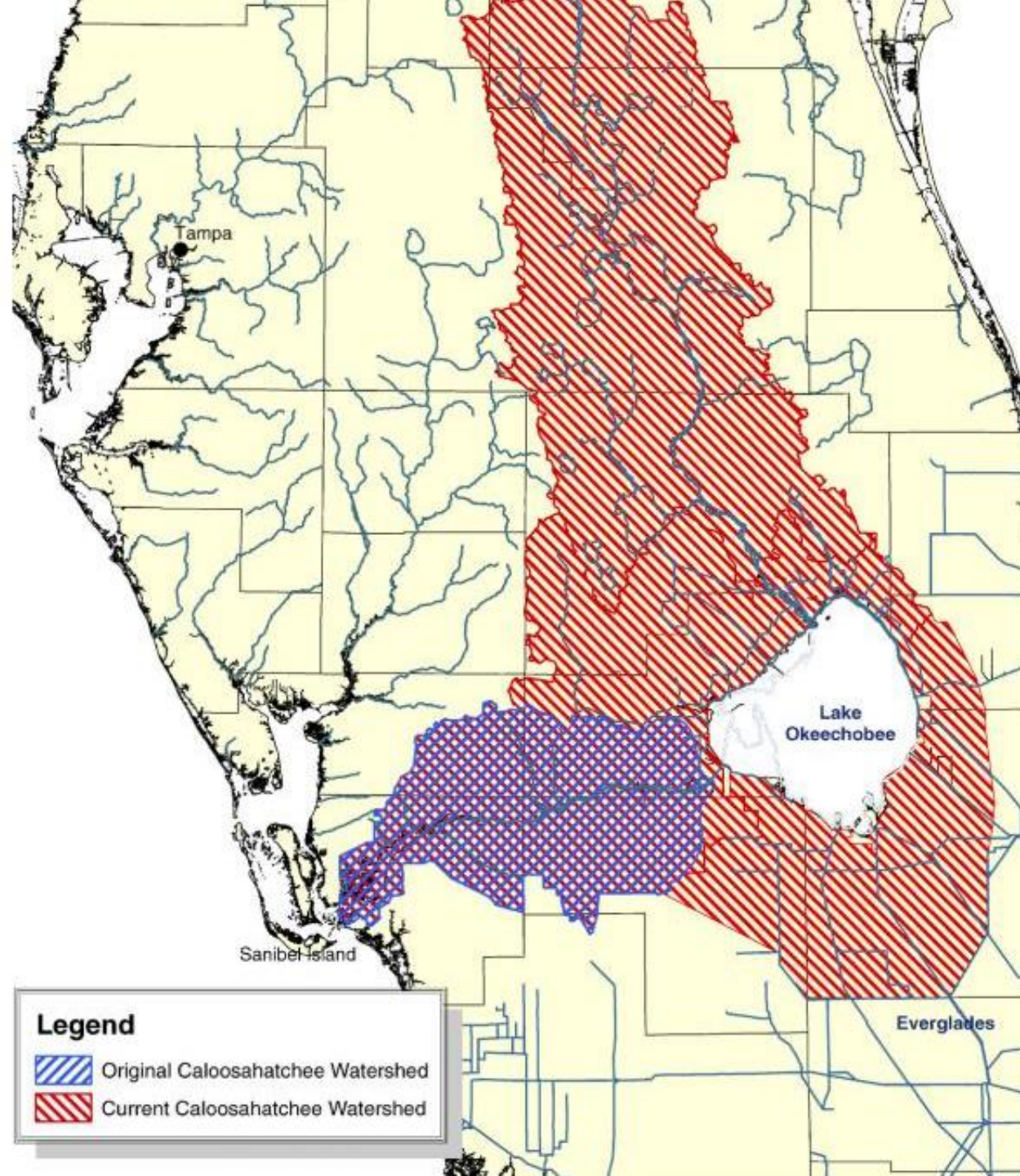
- difficult to disentangle all the drivers of
this increase

Implications of Climate Change on *Karenia brevis*

Compared *K. brevis* concentrations (1954 – 1963 and 1994 – 2002)

- On average, **abundance was 13 – 18 times higher** in the later time period and extended further off shore

- Concentrations **higher onshore** than offshore



(Brand & Compton 2007)

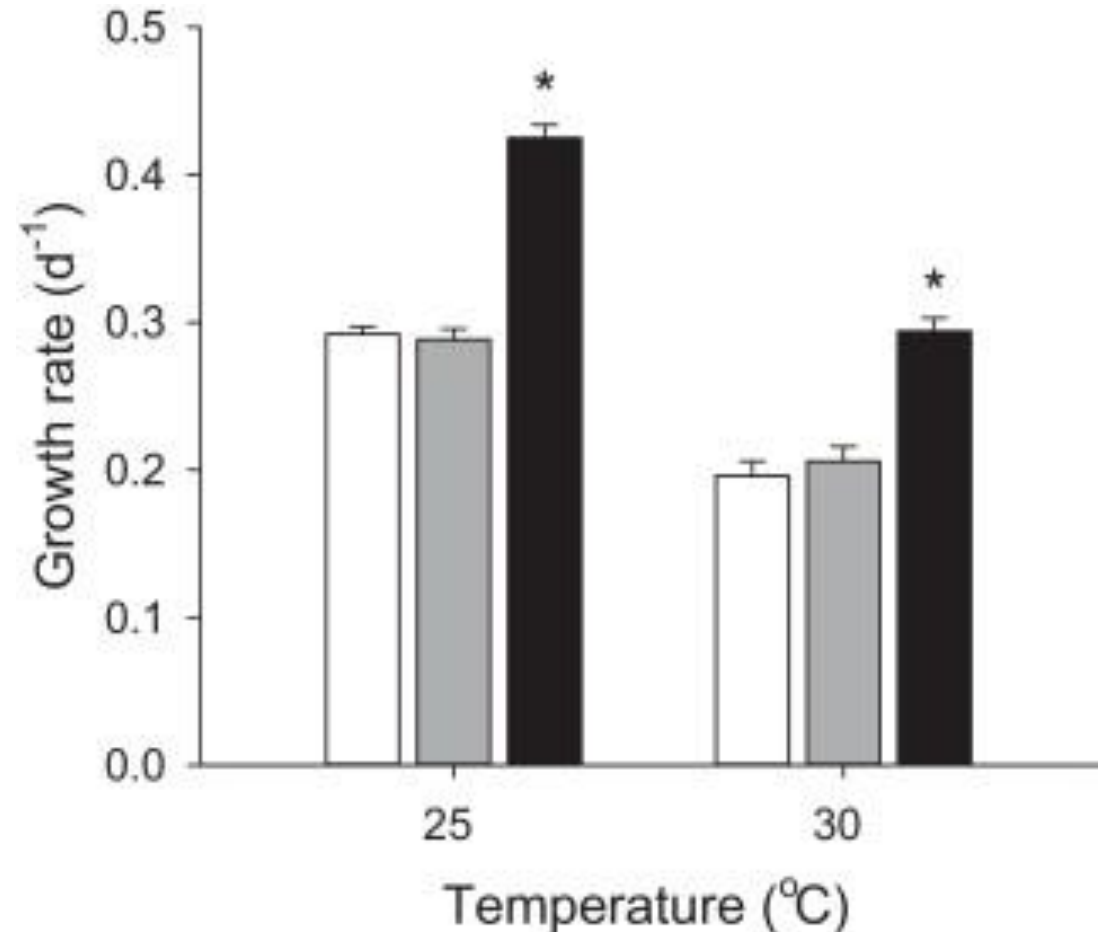
Implications of Climate Change on *Karenia brevis*

Measured growth rates and toxin production between **pre-industrial**, **recent** and **predicted** levels of CO₂

- Growth rate and toxin production are **not linked**

- Temperature and CO₂ **do not** influence toxin production

- Future climate change **has the potential** of producing blooms with higher cell concentrations



Red Tide Mitigation

- Higher concentrations of *K. brevis* nearer to shore **suggest nutrient-rich water** from land based sources is important
 - Recall, however, that over **20 studies** have been done to isolate this issue, **jury is still out**
- Need research to better **monitor occurrence**
 - Expensive/time consuming
- Need research to collate/disperse data-UCF Coastal is seeking funding to create a **Red Tide Playbook** for local jurisdictions and for the state of Florida



LOCAL

September 11, 2018 7:53 PM

Red tide will be a problem again someday.
Manatee County wants a 'playbook' for next time

Thanks!



National Center for Integrated Coastal Research

UNIVERSITY OF CENTRAL FLORIDA



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October 16, 2018

UCF Coastal and Senator Bill Nelson met to discuss a path forward for Red Tide