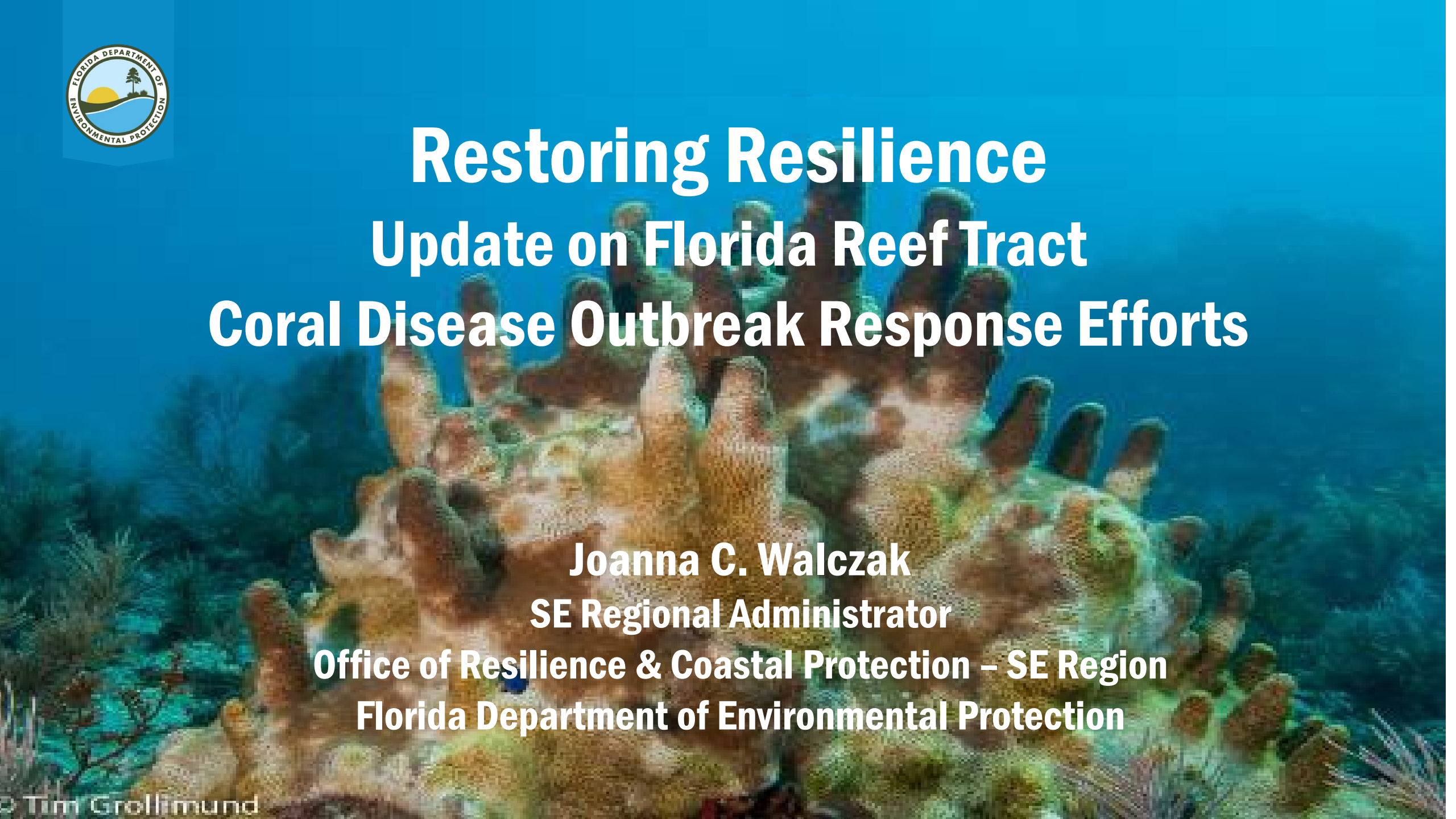
Restoring Resilience

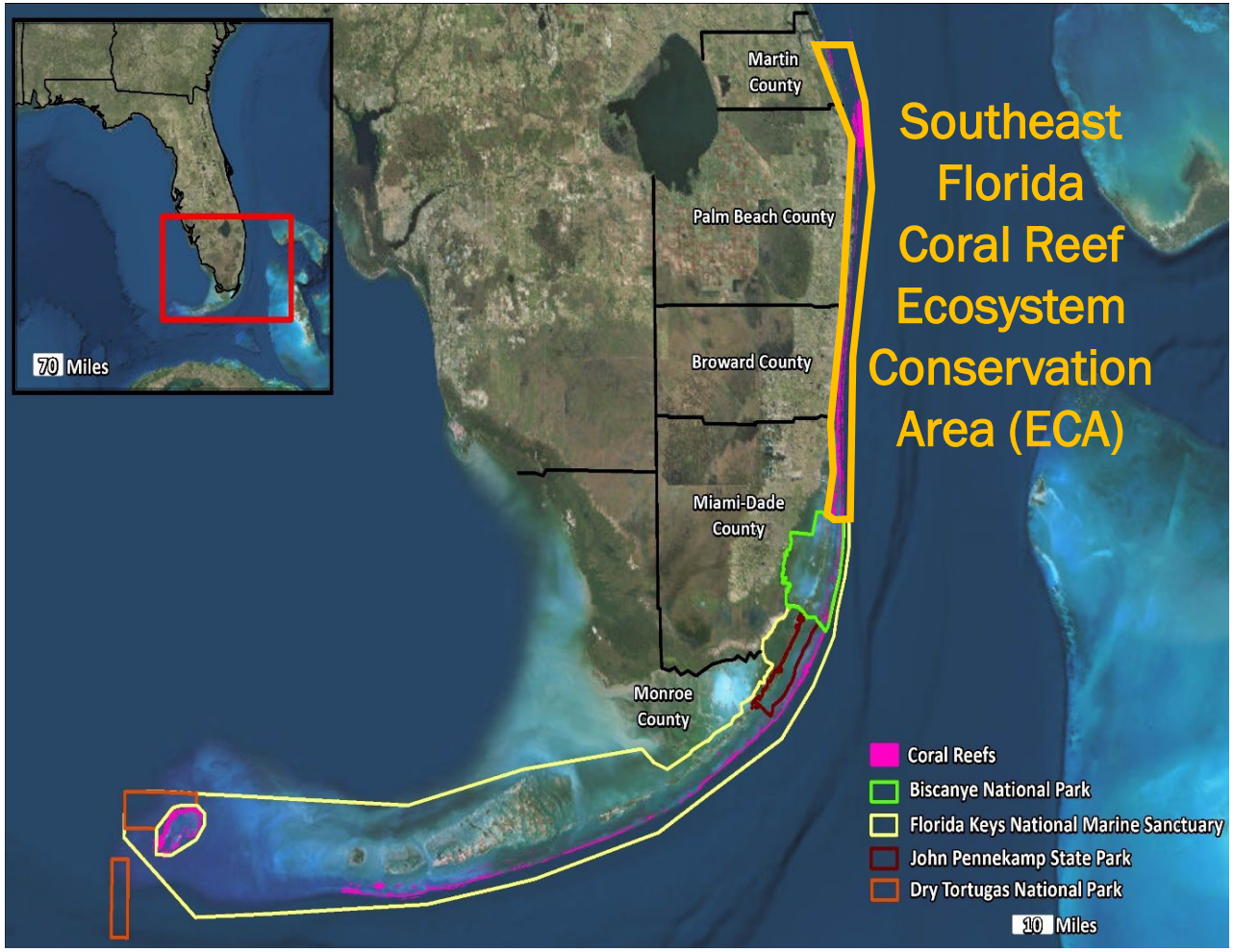
Update on Florida Reef Tract Coral Disease Outbreak Response Efforts



Joanna C. Walczak
SE Regional Administrator
Office of Resilience & Coastal Protection – SE Region
Florida Department of Environmental Protection

Florida's Coral Reefs

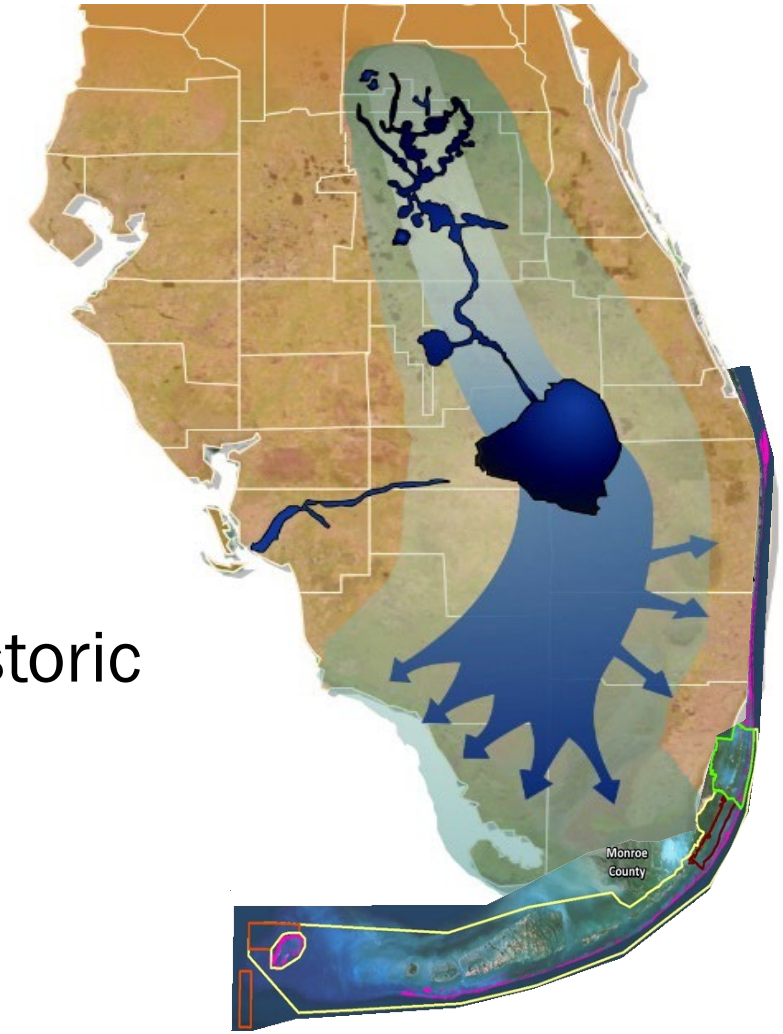
Florida Reef Tract



Images: DEP, D. Gilliam, NOAA

Florida's National Treasures

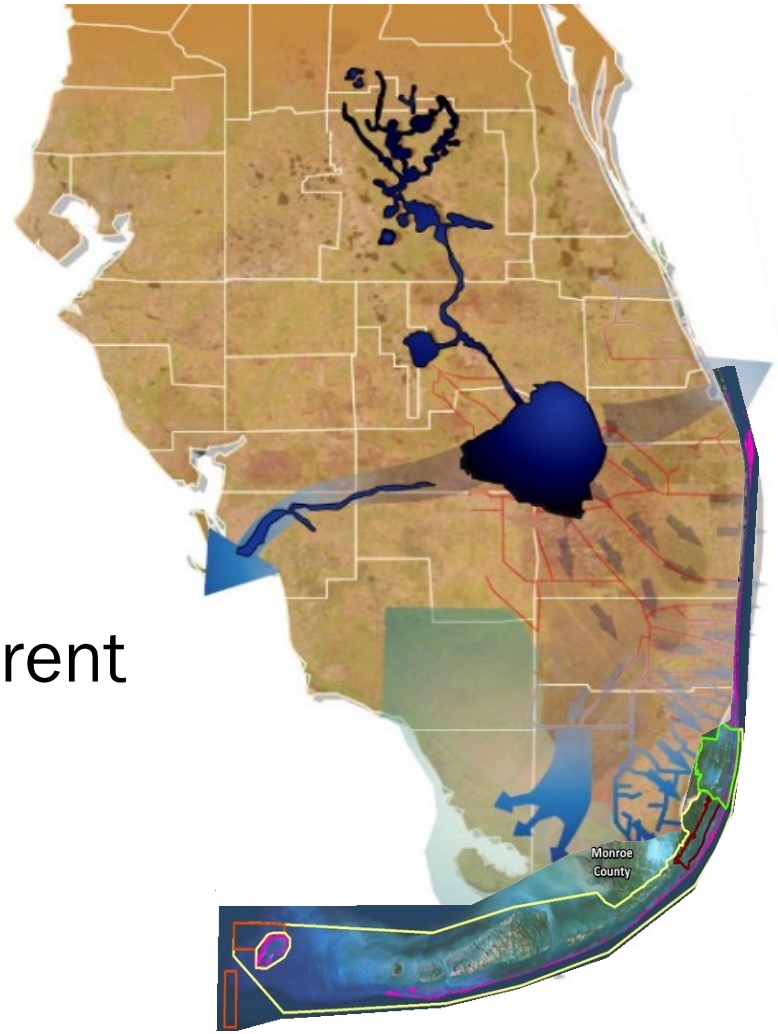
The Everglades and the Florida Reef Tract



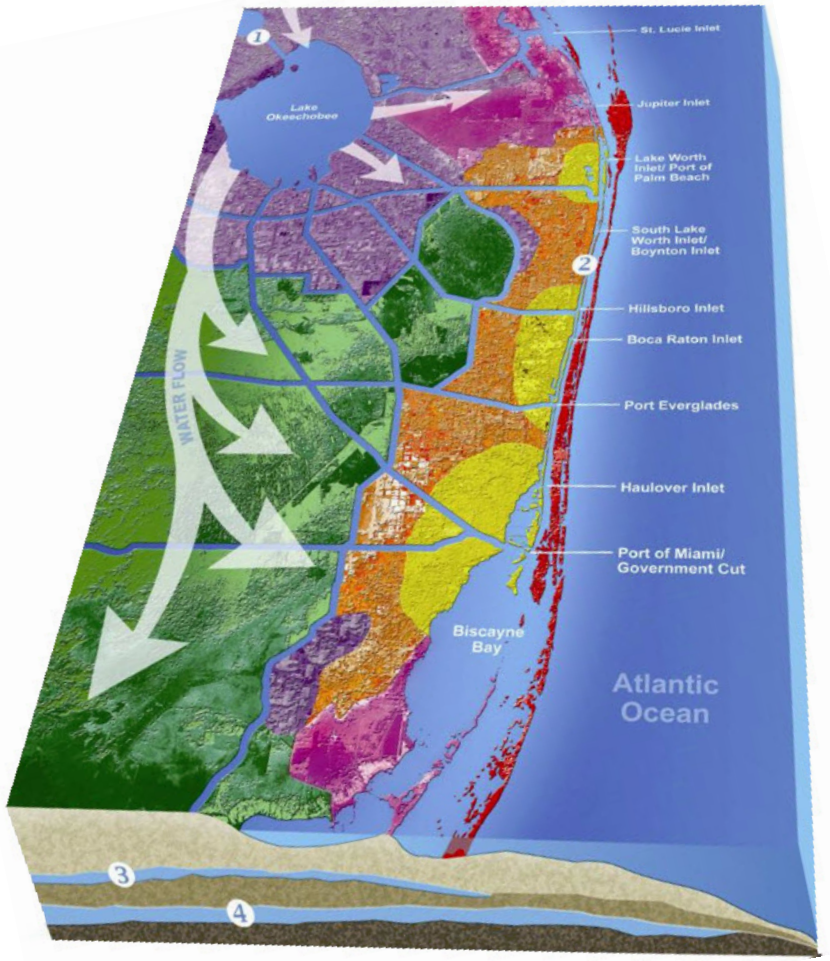
Historic

Florida's National Treasures

The Everglades and the Florida Reef Tract



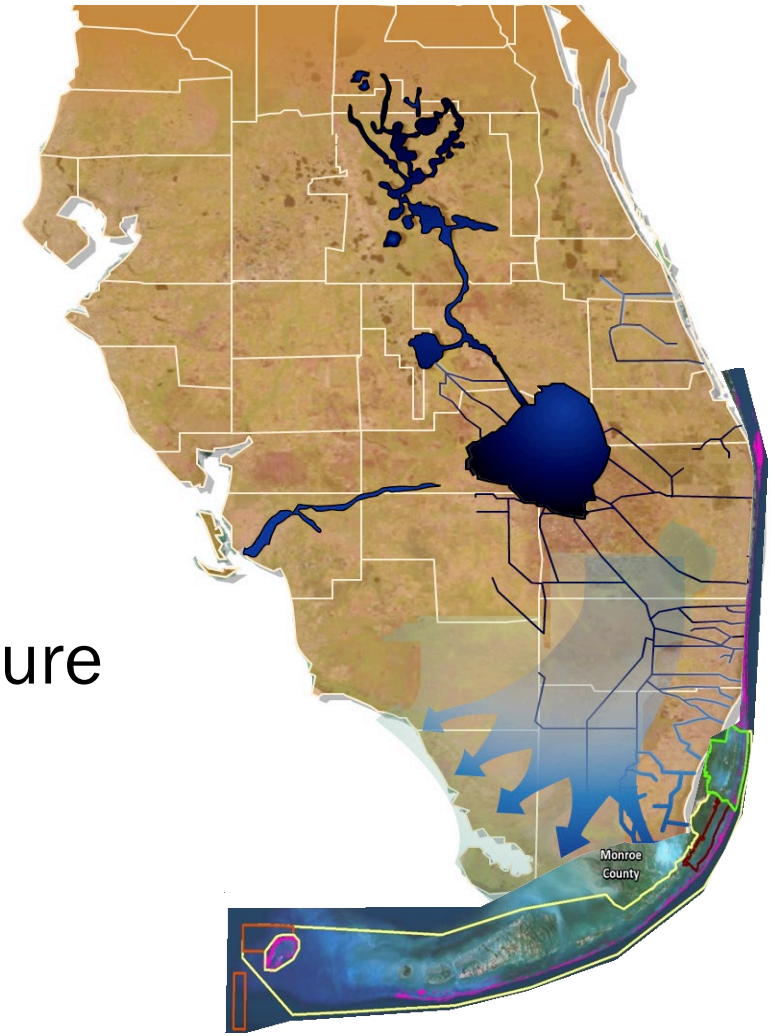
Current

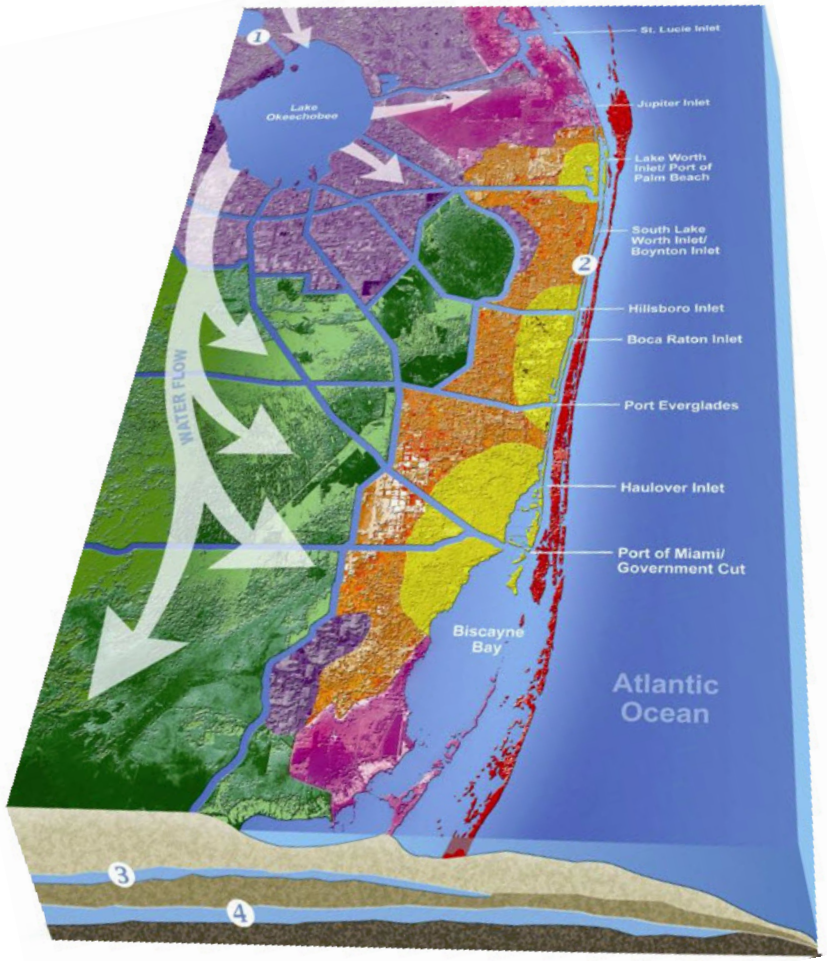


Florida's National Treasures

The Everglades and the Florida Reef Tract

Future



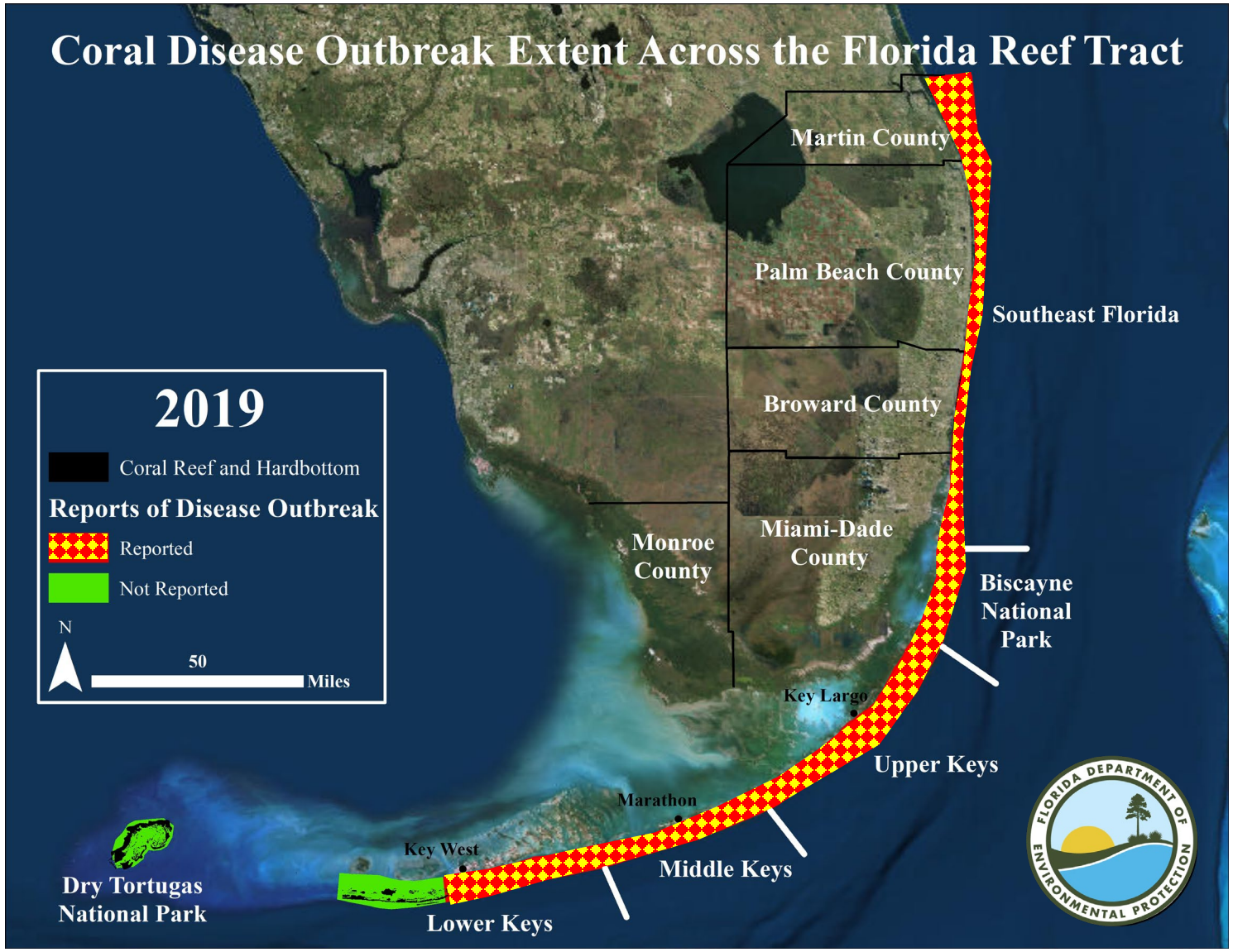


Stony Coral Tissue Loss Disease

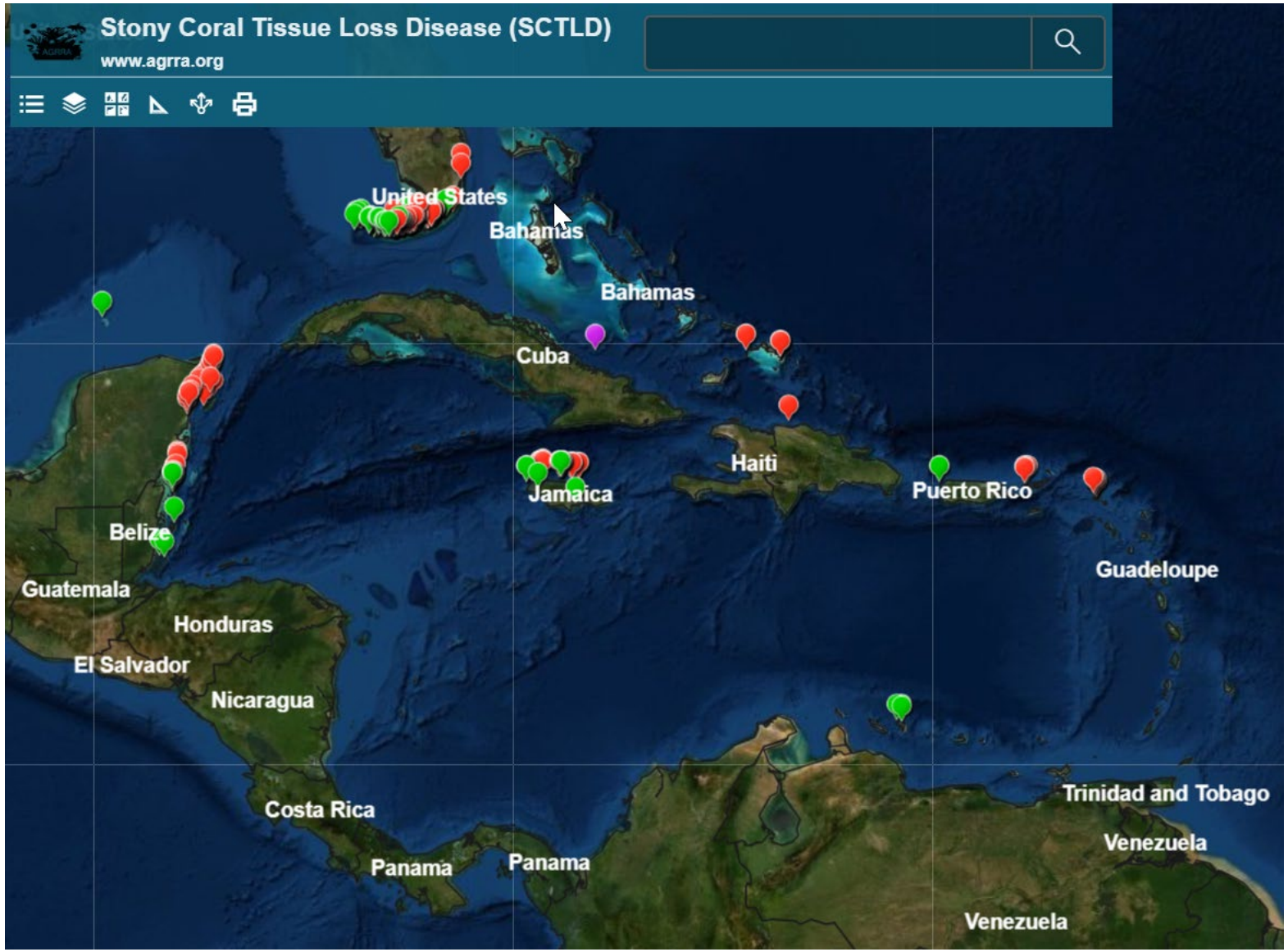
Stony Coral Tissue Loss Disease

- ✓ Highly infectious, waterborne disease
- ✓ Long residence time of pathogen(s) – 5+ years
- ✓ Affects 22+ species of stony coral – over 50% of primary reef builders
- ✓ Prevalence rates of 66-95% in some susceptible species
- ✓ **Mortality rates of nearly 100% of affected colonies – including oldest known colonies (330+ years)**

Florida Coral Disease Outbreak



Caribbean Coral Disease Outbreak



Caribbean Coral Disease Outbreak

EPA & USCG - Exploring Ballast Water as a Coral Disease Vector

BALLAST WATER - Long recognized as a global vector for aquatic invasive species and pathogens

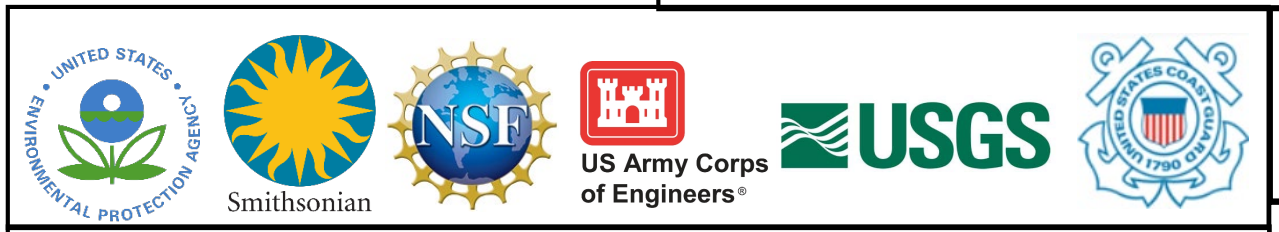
UN International Maritime Organization (IMO) Ballast Water Management Convention – adopted in 2004 and entered into force 2017

U.S. Regulations largely mirror IMO BWM Convention – include regulations prohibiting discharge in the vicinity of coral reefs

Source: GloBallast

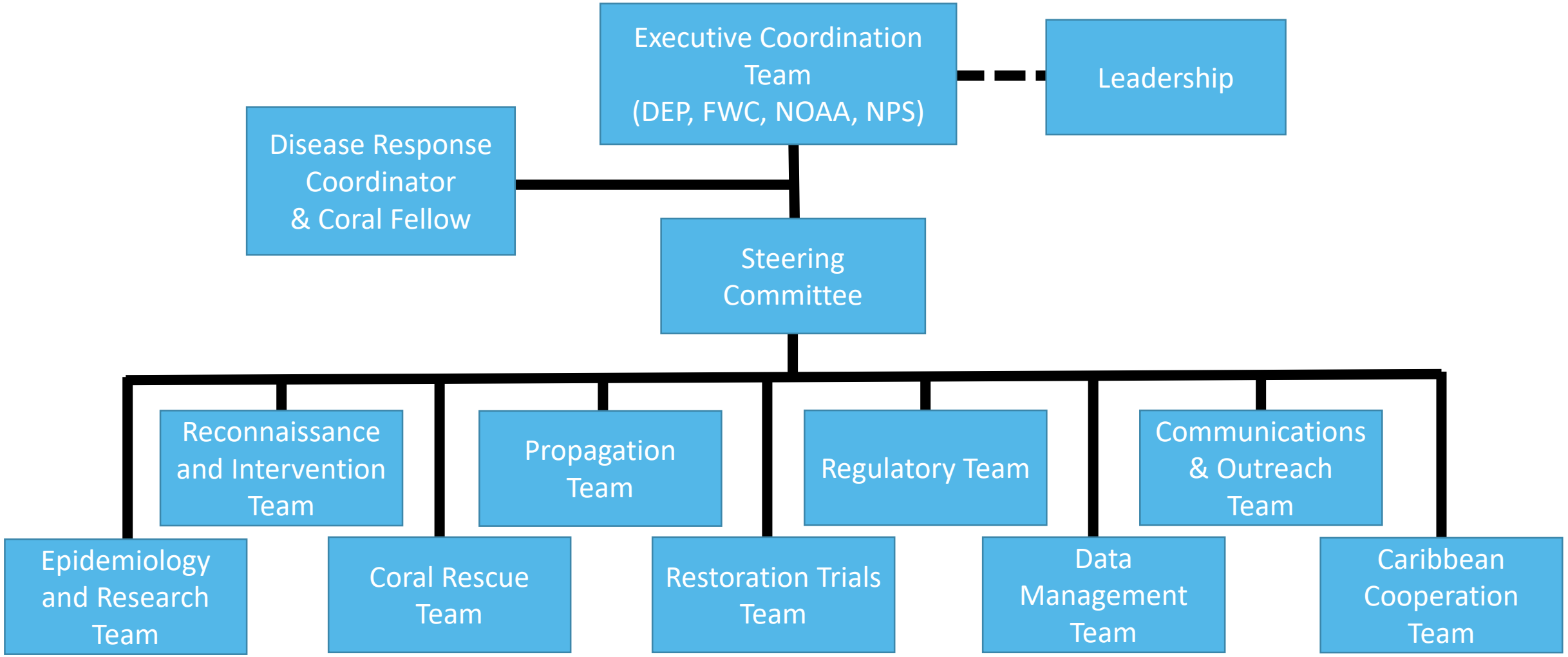
Florida Disease Response Partners

Coordinated Multi-Faceted Response Effort



Florida Disease Response Structure

Since July 2018



Restoring Resilience

Short Term:

Enhance Disease Response Capacity

=

Triage

Long-term:

Reduce Local Stressors & Restore Environmental Conditions

=

Resilient Reefs

Restoring Resilience

Path Forward – Short Term

FY15-18: Mapping, Research, Lesion Intervention, Coral Rescue

FY 18-23: Colony Intervention, Survivor Rescue & Propagation (incl. building land-based infrastructure), Research, Restoration Trials

FY 23+: Site Intervention, Survivor Propagation (maintaining infrastructure), Research, and Ecosystem Restoration

Technical Expert Workshops

November 2017, July 2018, August 2019

Coral Disease Technical Workshop:

- Intervention action framework
- Coral rescue & propagation
- Restoration trials
- Regulatory permitting & project considerations

Research & Epidemiology

Identify Pathogen(s) and Characterize the Disease

Bacterial & viral profiling

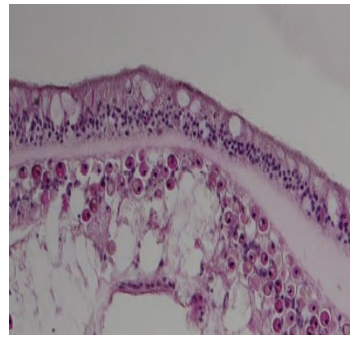
- Determine the differences in bacterial & viral communities in healthy vs. diseased corals

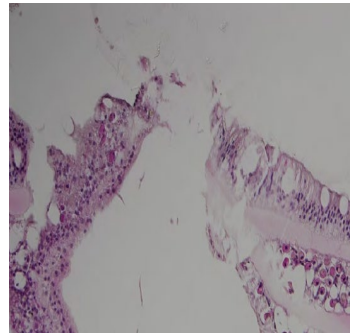
Histopathology & '-omics'

- Look at changes in tissue caused by disease by studying the genes, proteins, and certain molecules related to disease progression

Environmental factors

- Identify any environmental factors (nutrients, temperature, sedimentation, salinity, etc.) that drive disease





Reconnaissance & Intervention

Track Disease and Treat Priority Corals

Track extent of disease, locate survivors

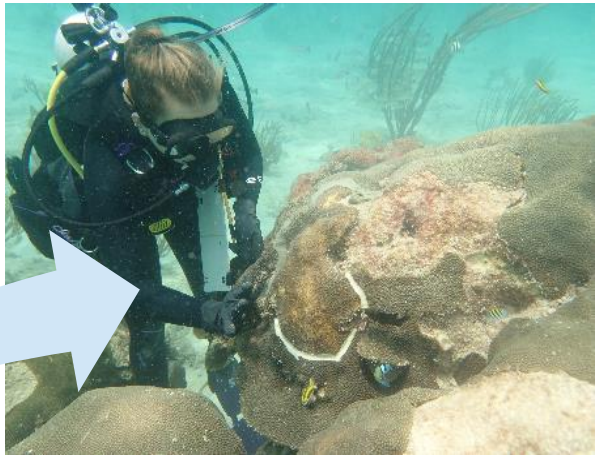
- Track the leading edge of the outbreak
- Find pockets of resilience and high survivorship

Apply treatments to priority corals

- Focus on probiotic treatments (with regulatory approvals)
- Save living tissue on high value corals

Develop and trial new treatments

- Develop new colony and site-level treatments
- Target treatments with smallest environmental footprint



Small-scale field trials

Laboratory trials

Coral Rescue

Rescue Healthy Corals to Preserve Genetic Stock

Save high priority corals in advance of the outbreak margin

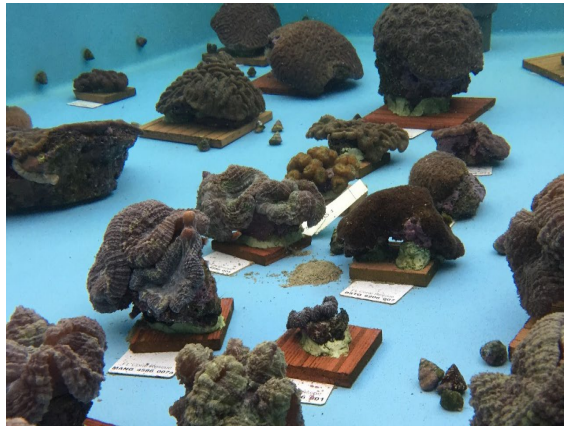
- Goal of 4,400 corals to capture ~95% of remaining genetic diversity

House corals in land-based facilities

- Corals housed with expert aquarists across the country for 3 years
- 5 facilities in Florida, 10 facilities in other states

Rescue genetics from “survivors”

- Determine best management practices to capture genetic information from survivors in disease endemic areas



Coral Propagation

Grow corals for large-scale reef restoration

Create spawning “hubs”

- Create in-water nurseries to spawn disease survivors

Develop land-based infrastructure throughout Florida

- Build the physical infrastructure to house, spawn, and grow corals

Build expertise and new tools

- Train expert aquarists in coral husbandry and cutting edge propagation strategies (e.g. induced spawning)

Rear hearty corals

- Incorporate disease survivor and stress hardened genetics into propagation to ensure resilient coral populations

Restoration Trials & Outplanting

Determine When & What is Appropriate to Outplant

Conduct outplanting trials

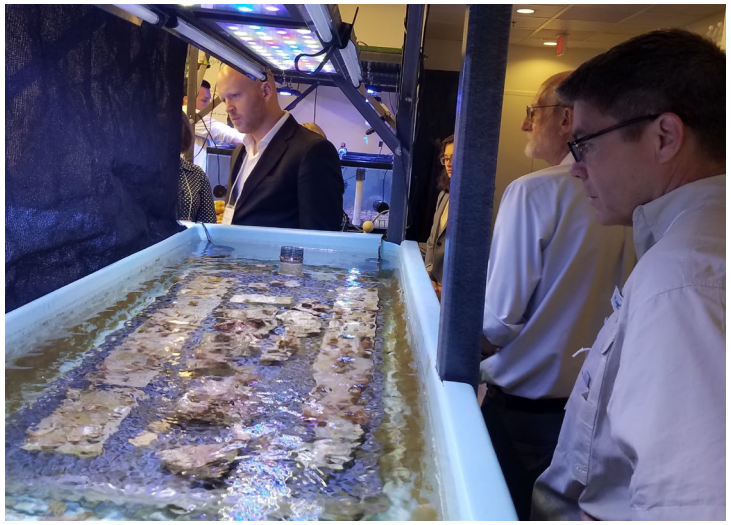
- Replicated outplanting throughout the ‘endemic’ region

Identify restoration sites

- Utilize best available information on ecosystem connectivity, habitat suitability, erosion rates, etc.

Conduct meaningful ecosystem restoration

- Outplanting corals, conduct seagrass, sponge, and herbivores



Communication & Data Management

Sharing Information Internally and Externally

Information availability

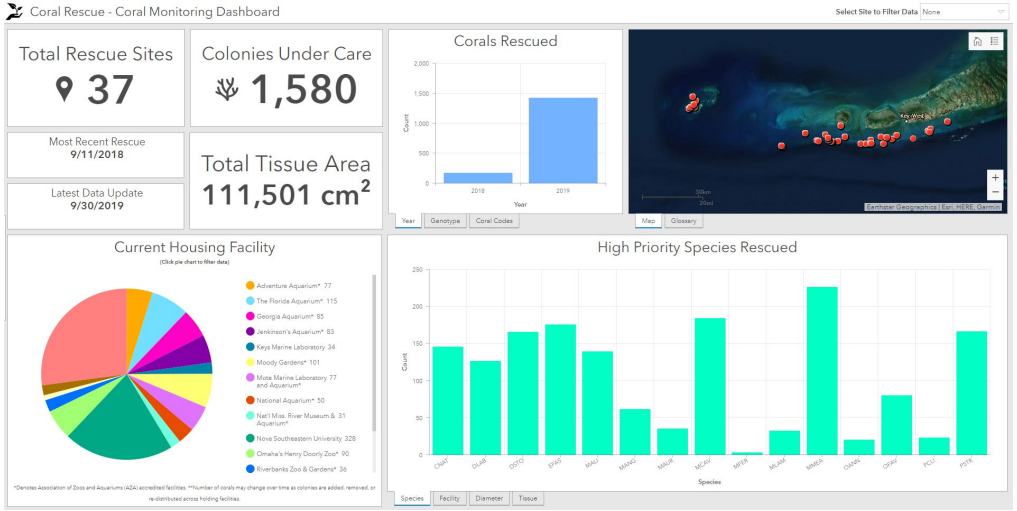
- DEP & FKNMS web portals for Florida-focused information
- AGRRA, GCFI, and TNC websites for the wider Caribbean

Data visualization

- Dashboards and GIS products

Data collation, organization, and dissemination

- Ensure all data is available to partners for analysis



FloridaDEP.gov/rcp/coraldisease

Restoring Resilience

Path Forward – Long Term

1. Continue Coral Reef Water Quality Monitoring (adapt as needed)
2. DEP Triennial Review of Water Quality Standards – Turbidity Criterion to Protect Corals https://floridadep.gov/dear/water-quality-standards/content/triennial-review-water-quality-standards
3. US Coral Reef Task Force – Jurisdictional assistance to determine appropriate coral reef-specific numeric nutrient criteria
4. Support for Restoring Resilient Reefs Act

Restoring Resilience

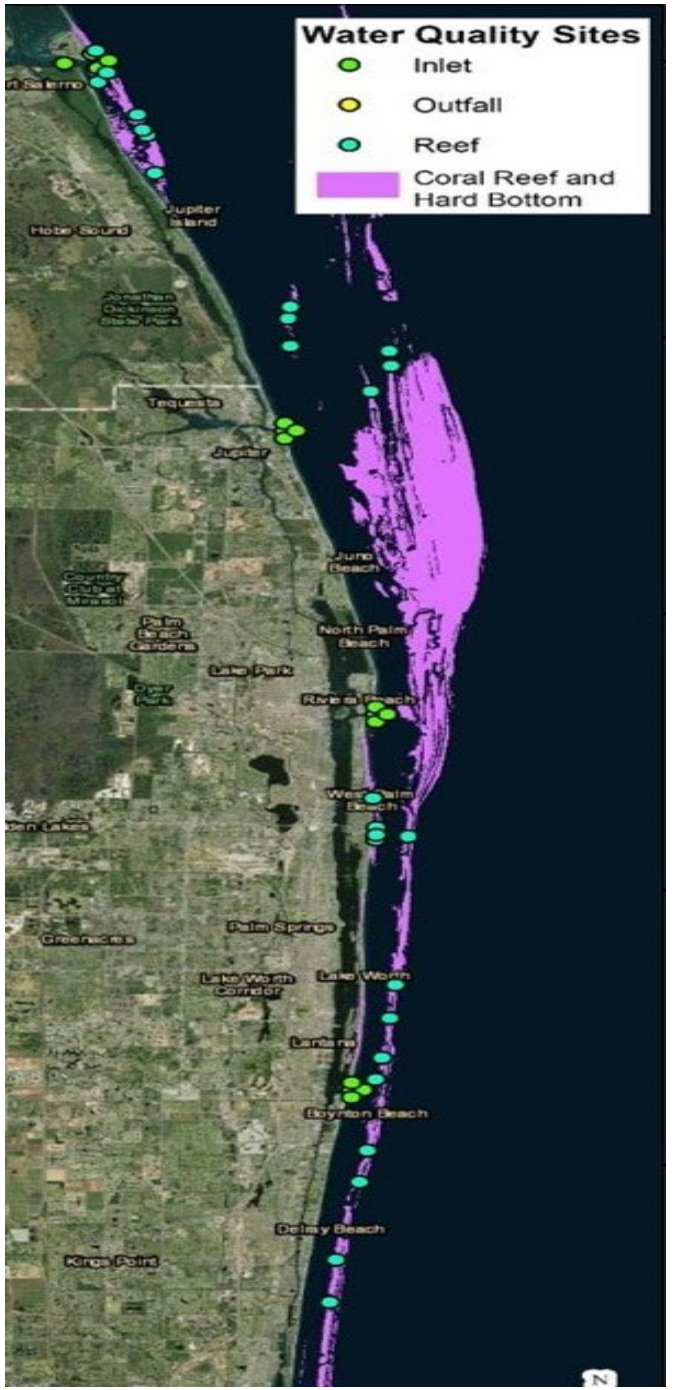
Coral Reef Water Quality Monitoring

Sampling began Sept. 2017 at inlets, wastewater outfalls and reef sites in the SE FL Coral Reef Ecosystem Conservation Area

- 115 sites monitored monthly from Miami to Stuart
- 9 inlets in 4 counties = 105 miles of coastline
- 132,000+ data points generated annually

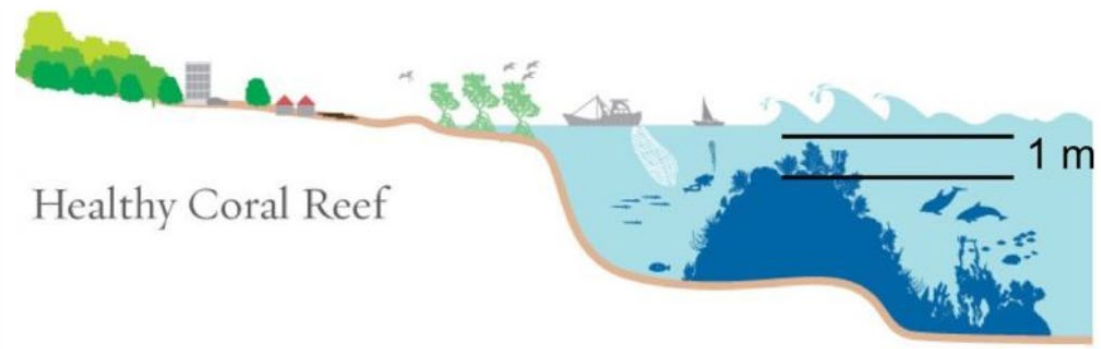
Pilot Project is looking for:

- Potentially harmful levels of nutrients
- Indicators of freshwater sources
- Sedimentation/turbidity



Economically Essential

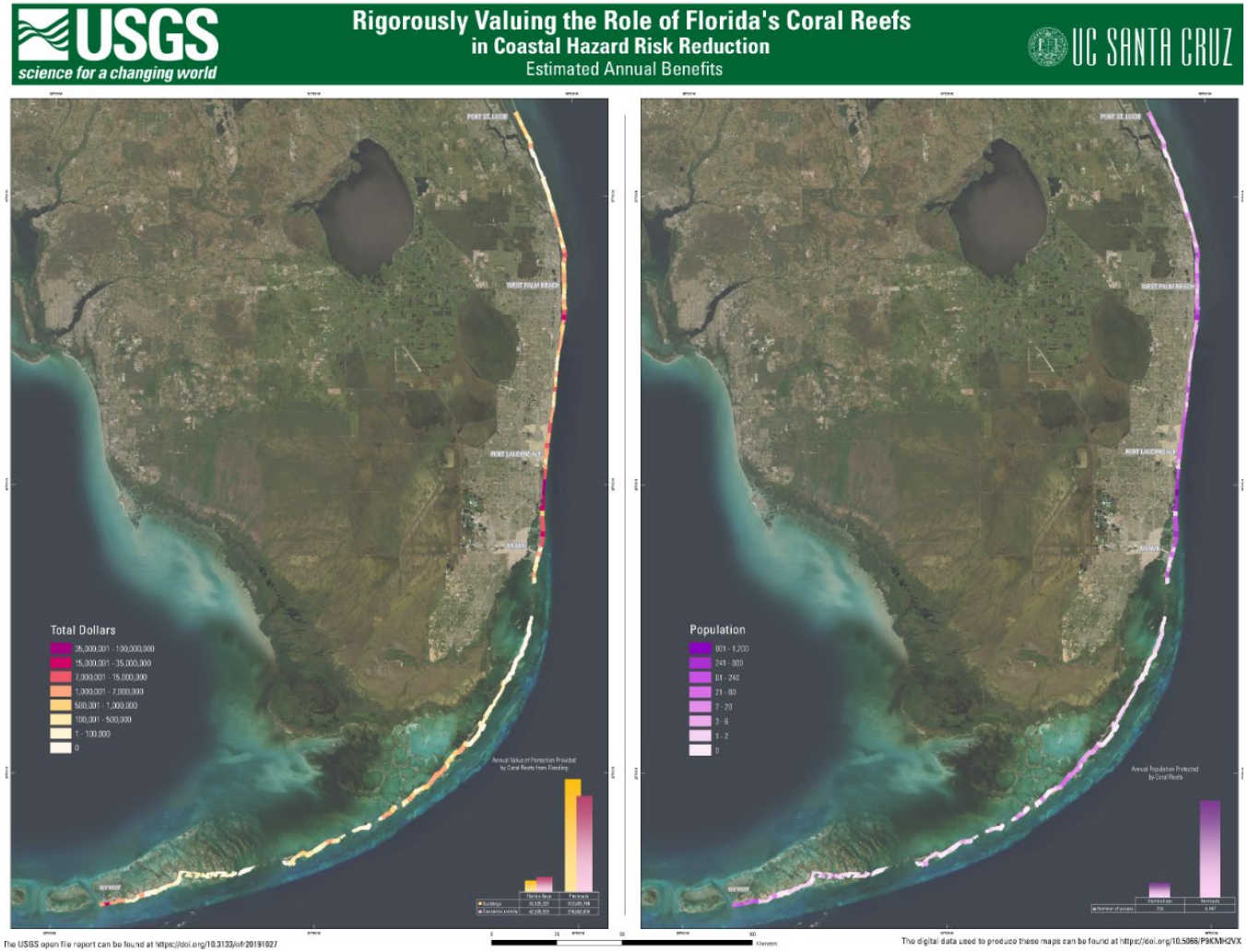
Coastal Protection, Fishing, Tourism



Images from: Mapping Ocean Wealth

Economically Essential

Rigorously Valuing the Role of Florida's Coral Reefs in Coastal Hazard Risk Reduction



Florida's Reefs annually provide $355 million in flood protection benefits to buildings and protect nearly $320 million in economic activity.

Over $1 billion in protection during extreme storm events


Thank you!
Joanna.Walczak@FloridaDEP.gov