The Florida Department of Environmental Protection (DEP) is fully committed to supporting the coral disease response efforts – including co-leading the coordination of a multi-faceted collaborative response effort with numerous partners from federal, state, and local agencies, non-governmental organizations, universities, and members of the community to investigate and solve this problem.

**OUR EFFORTS INCLUDE:**

- monitoring and modelling the disease spread;
- documenting the prevalence and severity of the outbreak;
- researching causative agents and environmental factors;
- developing novel coral disease treatments;
- creating a region-wide Reef Ambassador and local reporting programs to facilitate stakeholder engagement through citizen science.
STONY CORAL TISSUE LOSS DISEASE
Highly infectious, waterborne disease
Long residence time of pathogen(s) – 5+ years
Affects 22+ species of stony coral – more than 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’S CORAL DISEASE OUTBREAK
CARIBBEAN CORAL DISEASE OUTBREAK
Ballast Water: Long-recognized as a global vector for aquatic invasive species and pathogens

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

- Requires active management of ballast water and associated sediment to certain standards
- Includes open-ocean exchange >200 nm offshore and in water >200m deep & eventual installation and use of an approved on-board ballast water treatment system

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

Source: GloBallast
Source: IMO
Coral Disease Technical Workshop

• Intervention action framework
• Coral rescue & propagation
• Restoration trials
• Regulatory permitting & project considerations
RESTORING RESILIENCE

SHORT TERM
Enhance Disease Response Capacity

LONG TERM
Reduce Local Stressors & Restore Environmental Conditions to Improve Resiliency Among Reefs
FY15-18: mapping, research, lesion intervention, coral rescue

FY 18-23: colony intervention, survivor rescue and propagation (including building land-based infrastructure), research and restoration trials

FY 23+: site intervention, survivor propagation (maintaining infrastructure), research and ecosystem restoration
TREAT PRIORITY CORALS TO MAINTAIN WILD SPECIES

- Track extent of disease, locate survivors
- Apply new probiotic treatments to priority corals
- Develop and trial new treatments
**CORAL RESCUE**

**RESCUE HEALTHY CORALS TO PRESERVE GENETIC STOCK**

Save high priority corals in advance of 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
- 5 facilities in Florida, 10 facilities in other states

Genetic Rescue in the ‘endemic’ region
- Determine best management practices to capture genetic information from survivors in disease impacted areas
CORAL PROPAGATION

GROW CORALS FOR LARGE-SCALE REEF RESTORATION

• Expand existing and develop new land-based infrastructure throughout Florida
• Build expertise
• Incorporate genetic considerations
• Grow hearty corals
RESTORATION TRIALS & OUTPLANTING

DETERMINE WHAT, WHERE, AND WHEN TO RESTORE

- Conduct Outplanting Trials
- Identify Restoration Sites
- Conduct Meaningful Ecosystem Restoration
RESEARCH & EPIDEMIOLOGY

IDENTIFY PATHOGEN(S) AND CHARACTERIZE THE DISEASE

Bacterial and Viral Profiling
• Determine differences in bacterial and viral communities in healthy vs. diseased corals

Histopathology & ‘-omics’
• Look at changes in tissue caused by disease
• Study the genes, proteins and certain molecules related to disease progression

Environmental Factors
• Identify any environmental factors (nutrients, temperature, salinity, etc.) that may drive disease
SHARING INFORMATION INTERNALLY AND EXTERNALLY

Information Availability
- DEP & FKNMS web portals for Florida-focused information
- NGO partner 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
1. Continue Coral Reef Water Quality Monitoring & Coral Propagation Infrastructure Support


4. Southeast Florida Coral Reef Initiative’s Technical Advisory Committee – Oct. 30 & 31
NSU Oceanographic Center, 8000 N. Ocean Drive, Dania Beach, FL 33004
5. US Coral Reef Task Force – Jurisdictional assistance to determine appropriate coral reef-specific numeric nutrient criteria

6. Support for Restoring Resilient Reefs Act

7. DEP Coral Reef Conservation Program’s SE FL Coral Reef Ecosystem Conservation Area Management Planning Process

8. Florida Keys National Marine Sanctuary’s “Restoration Blueprint”
ECONOMICALLY ESSENTIAL
Coastal Protection, Fishing, Tourism

Images from: Mapping Ocean Wealth
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
Coral and Artificial Reef Socioeconomic Study (Partial) Update
- Funding provided by DEP, NOAA, Martin County, and FWC

Phase 1: Economic Impact = Goods and Services associated with dive, snorkel, and fishing trips in SE FL (Results Coming Soon!)

Phase 2: Economic Valuation = Willingness to Pay

What would you like to know?
THANK YOU!

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