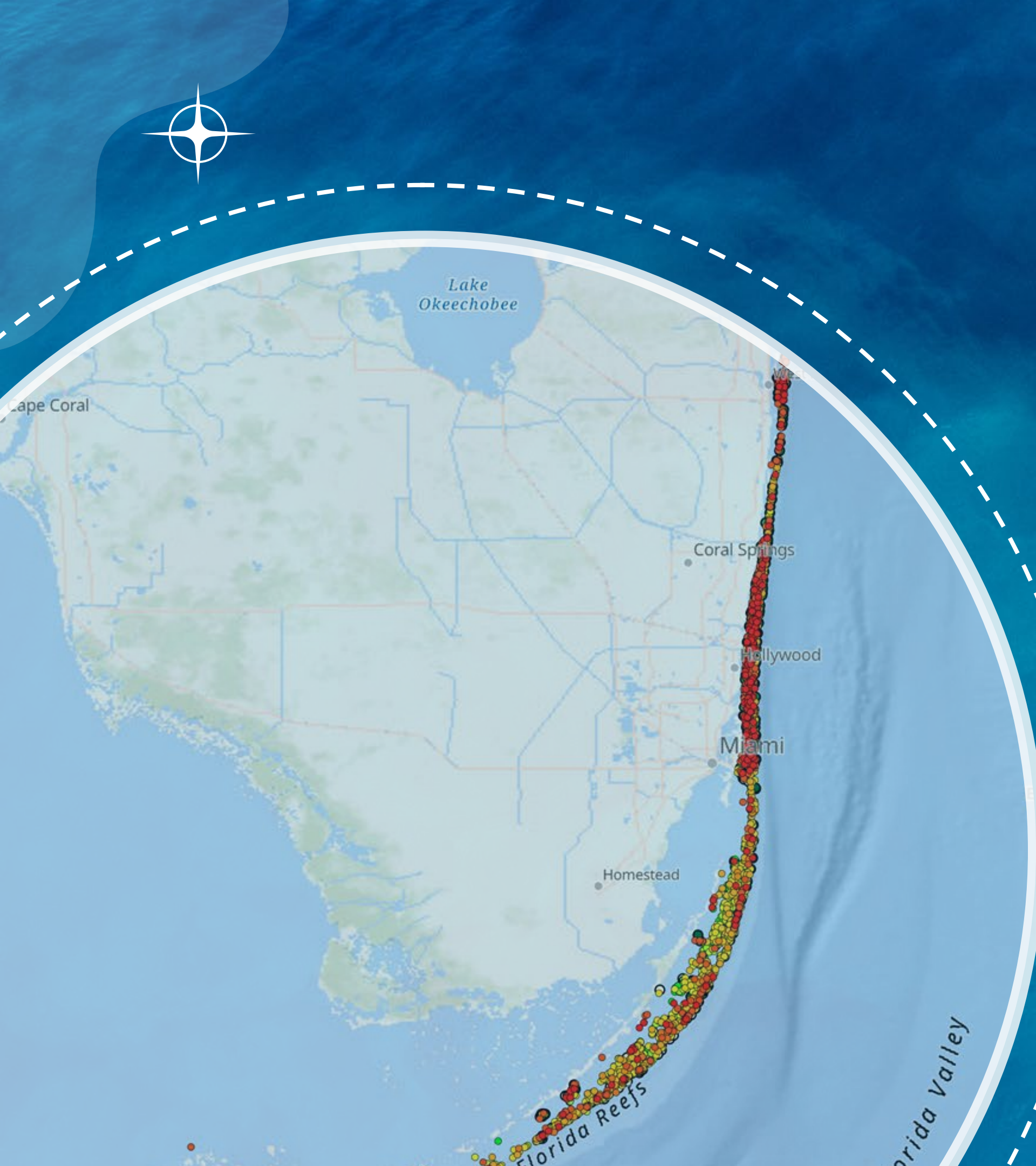


Spatiotemporal Analysis on Florida's Coral Reef

Maya Becker*
Benjamin Jessup
Nick Jones
Brian K. Walker



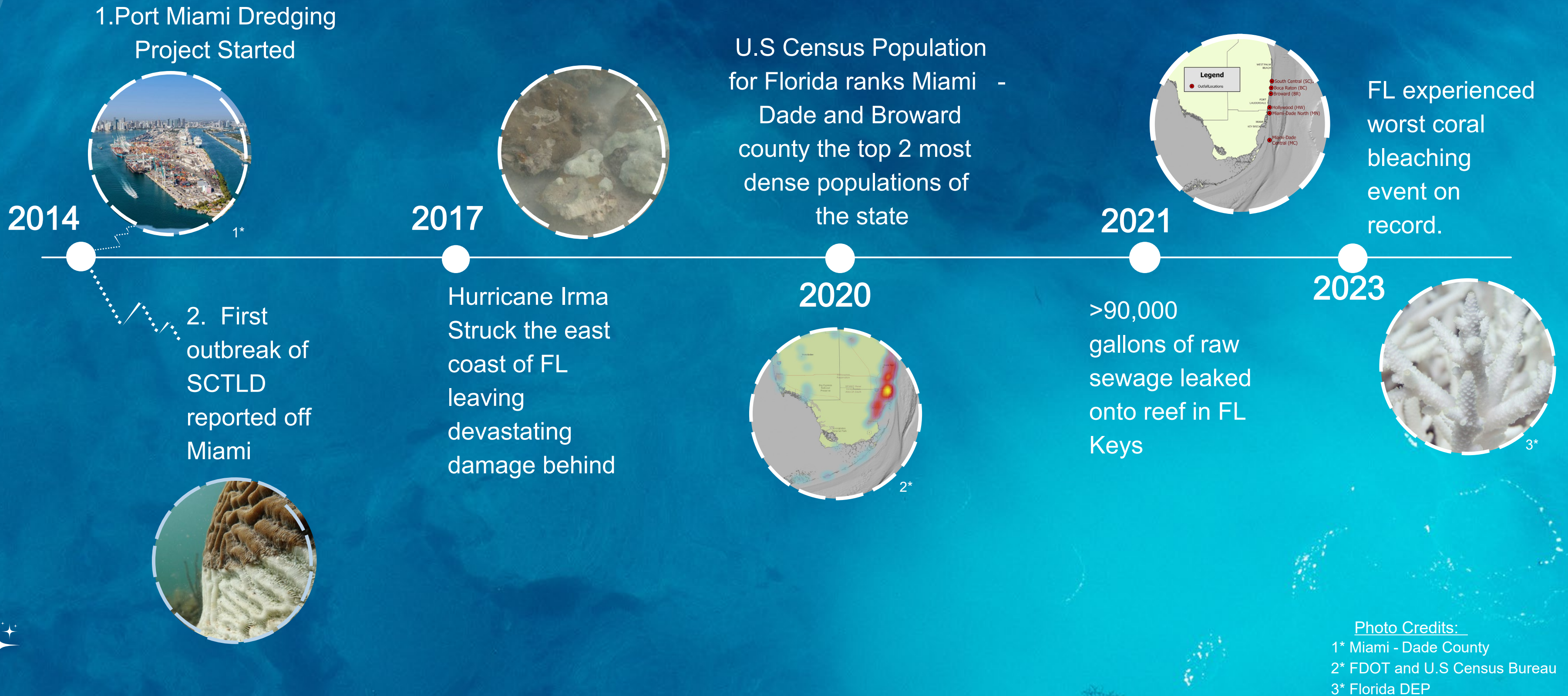
FLORIDA KEYS

MARINE SCIENCE CONFERENCE & WORKSHOP

Halmos College
of Arts and Sciences
NOVA SOUTHEASTERN UNIVERSITY

NSU
Florida

Threats Facing Florida's Coral Reefs



Monitoring Programs and their Challenges

Sample Design Differences

BCG Level	Narrative Rules	Quantitative Rules	
		CREMP_KEYS	NOT_CREMP_KEYS
3	Live coral surface area of non tolerant coral taxa is high (cm2/m2)	>3000	
3	Live coral surface area of large reef building corals is high (cm2/m2)	>2500	
3	Live coral surface area is high (cm2/m2)	>2000	
3	# of Acropora or Orbicella colonies per square meter is high (# colonies/m2)	>0.1	>0.075
3	Sensitive taxa are represented (# taxa)	>2.5	
3	Small and weedy colonies are not hyper-dominant (%)	<70	NA
4	Live coral surface area of large reef building corals is moderate (cm2/m2)	>2000	>250
4	Live coral surface area is moderate (cm2/m2)	>2000	>500
4	Sensitive taxa (attribute I, II, III) are represented (# taxa)	>2	
4	Non tolerant taxa (attribute I, II, III, and IV) are moderately diverse	>5	
5	Non tolerant taxa (attribute I, II, III, and IV) are minimally diverse	>2.5	
5	All coral taxa are minimally diverse	>4	
5	FLAG: Algae and bare substrate are not hyper-dominant	<85-95	

communities

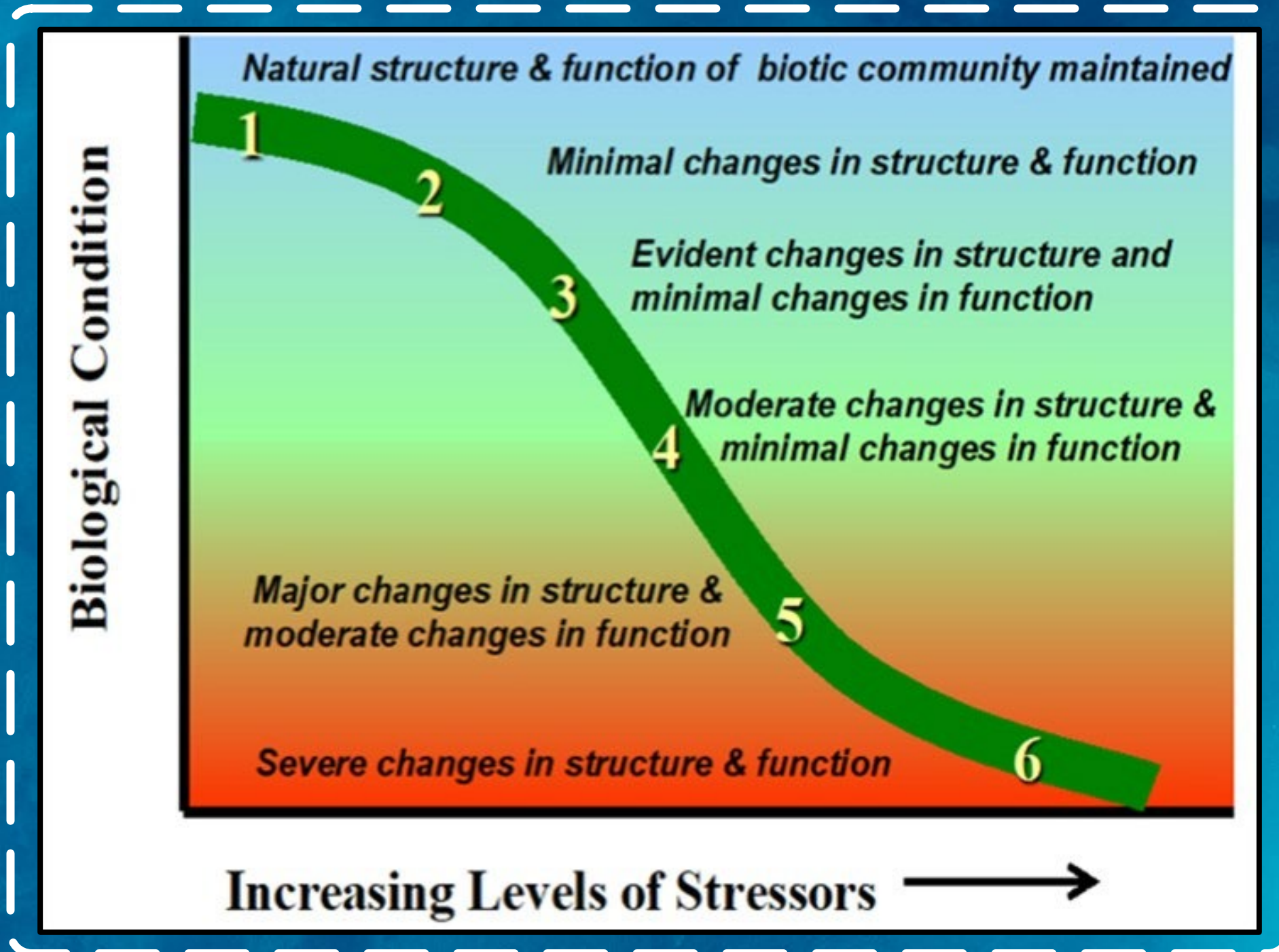
The Use of Expert Elicitation on the Biological Condition Gradient Model (BCG)



- BCG stands for the biological condition gradient, utilizing expert elicitation to rank sites against increasing levels of anthropogenic stress
- Experts cover a wide range of knowledge related to:
 - coral biology
 - disease outbreaks
 - water quality
 - anthropogenic disturbances
 - and more



BCG Scoring Scale



Noticeable changes at BCG levels 5 and 6 compared to 3 and 4 include:

Overall coral richness declines

Large reef-building coral richness decreases

More prevalence of nuisance species

Expert Elicitation Scoring Process

“This sample matches the definition of a BCG I because I know what should occur in this and this sample has everything I would expect

Table 4. Florida Reef BCG Conceptual Narrative Rules. Weedy colonies are defined by “weedy” designation of taxa (see Appendix J). *Siderastrea siderea* and *Stephanocoenia intersepta* are weedy when diameter <30cm and height <10cm.

BCG Metrics	BCG Level 3 Narrative Rules	BCG Level 4 Narrative Rules	BCG Level 5 Narrative Rules
3-D Live Coral Surface Area (LCSA)	3-D Live Coral Surface Area (LCSA) is high (cm ² /m ²)	3-D Live Coral Surface Area (LCSA) is moderate (cm ² /m ²)	
Number of <i>Acropora</i> or <i>Orbicella</i> colonies per square meter	The number of <i>Acropora</i> or <i>Orbicella</i> colonies per square meter is high (# colonies/m ²)		
3-D LCSA of large reef-building corals	3-D LCSA of large reef-building corals is high (cm ² /m ²)	3-D LCSA of large reef-building corals is moderate (cm ² /m ²)	
3-D LCSA of non-tolerant coral taxa	3-D LCSA of non-tolerant coral taxa is high (cm ² /m ²)		
Percent of colonies that are small and weedy	Small and weedy colonies are not hyper-dominant (%)	Small and weedy colonies are not dominant (%)	
Number of sensitive taxa (Attributes I, II, and III)	Sensitive taxa are represented (# taxa)	Sensitive taxa are represented (# taxa)	
Percent of coral colonies that are Acroporids	FLAG: Dominant Acroporid stands may indicate good conditions (%)		
Percent of corals that are tolerant taxa (Att V)		Tolerant taxa are relatively sparse (% taxa)	
Number of non-tolerant taxa (BCG Attributes 1,2,3, & 4)		Non-tolerant taxa are moderately diverse	Non-tolerant taxa are minimally diverse
Total number of Coral Taxa			All coral taxa are minimally diverse
Percent cover of Algae and Bare Substrate			FLAG: Algae and bare substrate are not hyper-dominant

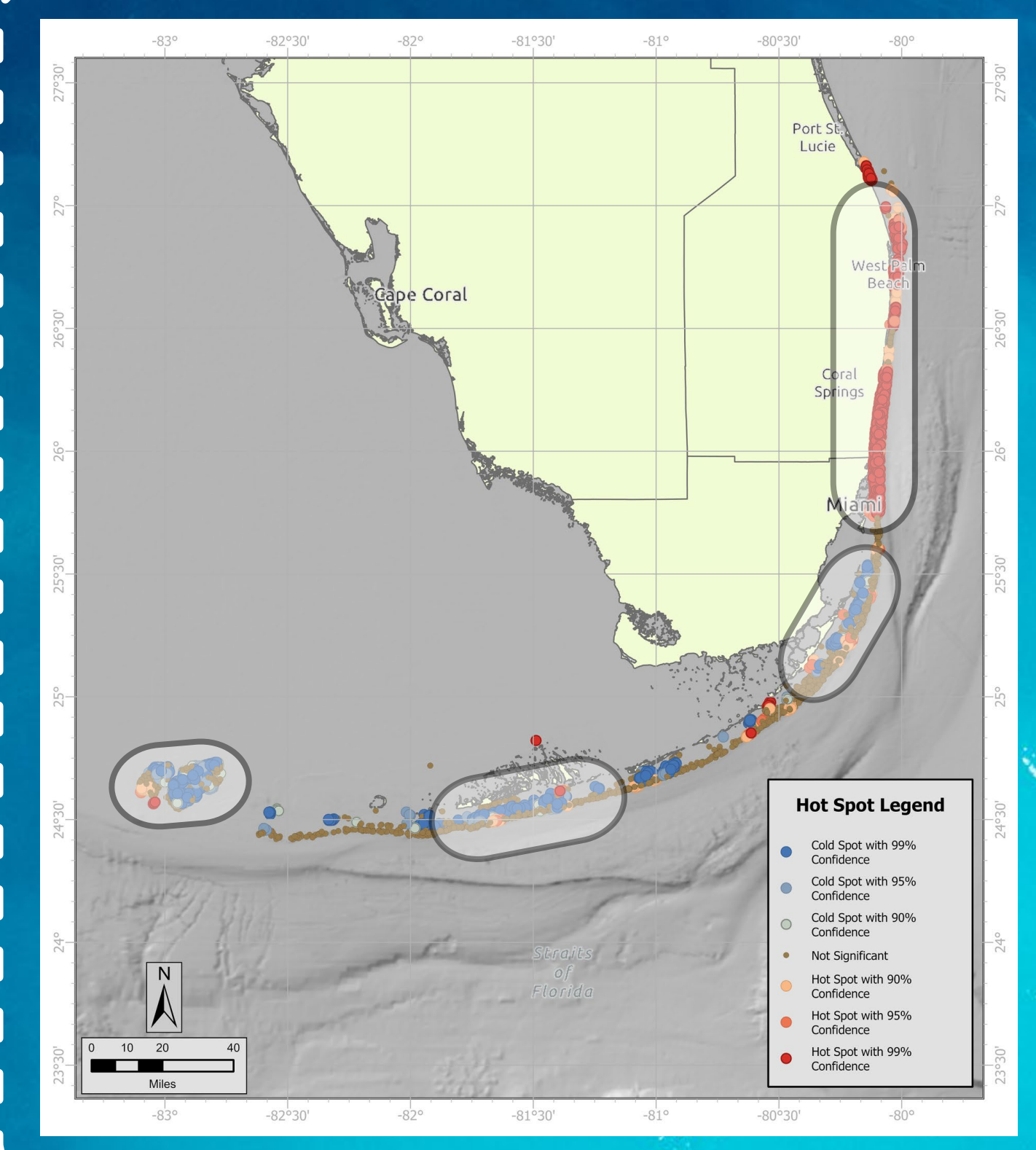
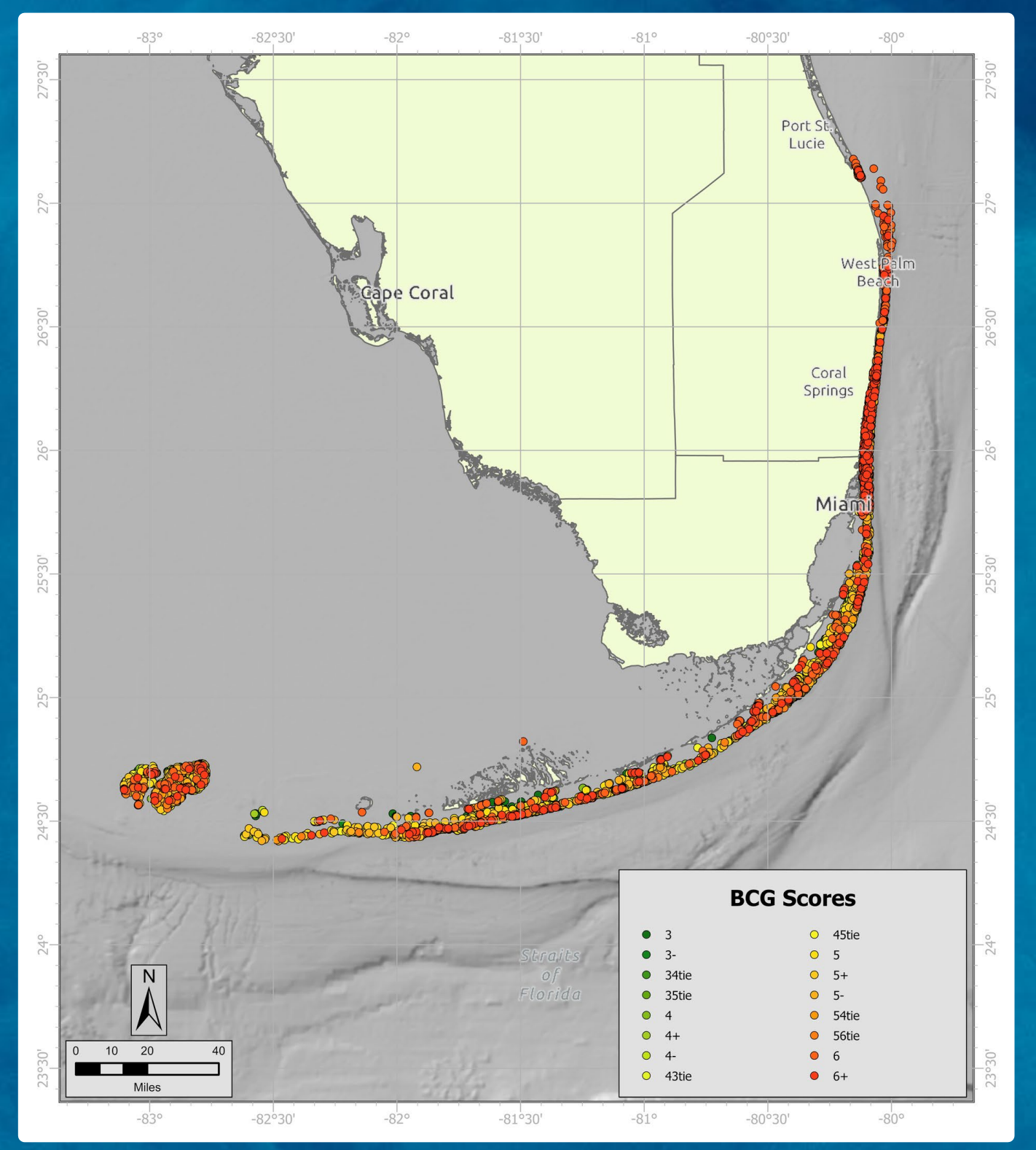
er >20 %

>4 species

and turf with
t < 30 %

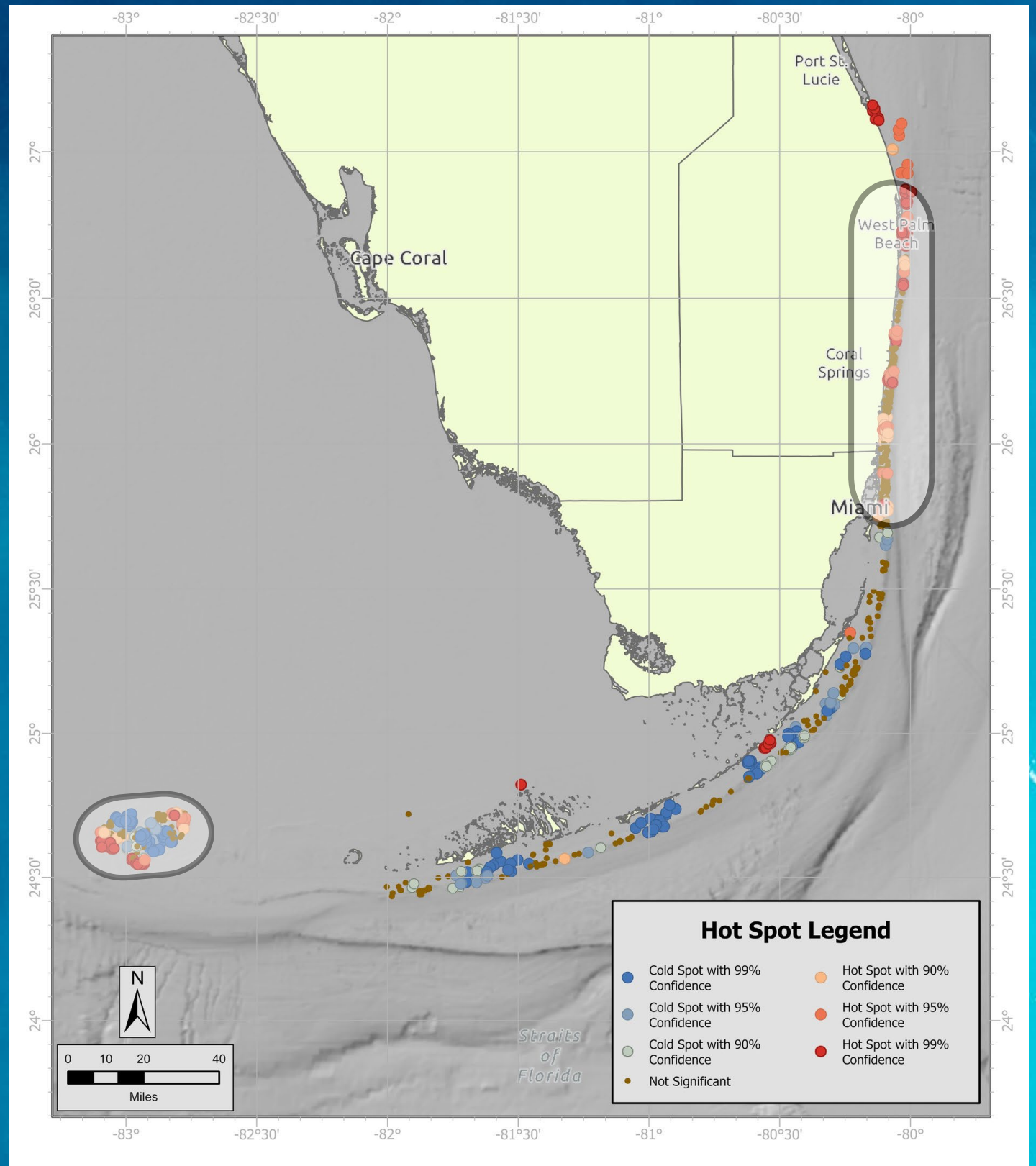
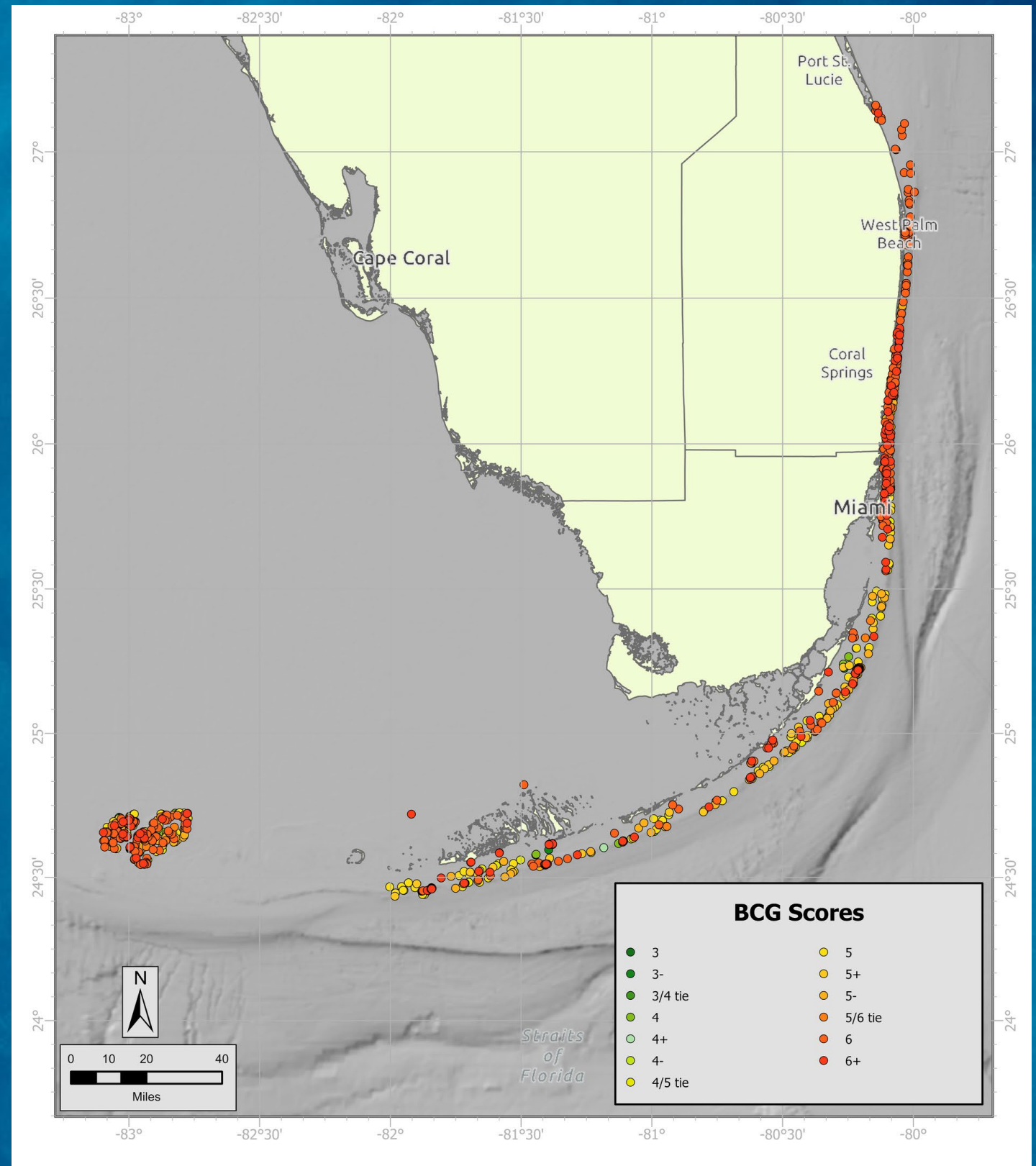


Preliminary BCG Historical Data: 2005 - 2021

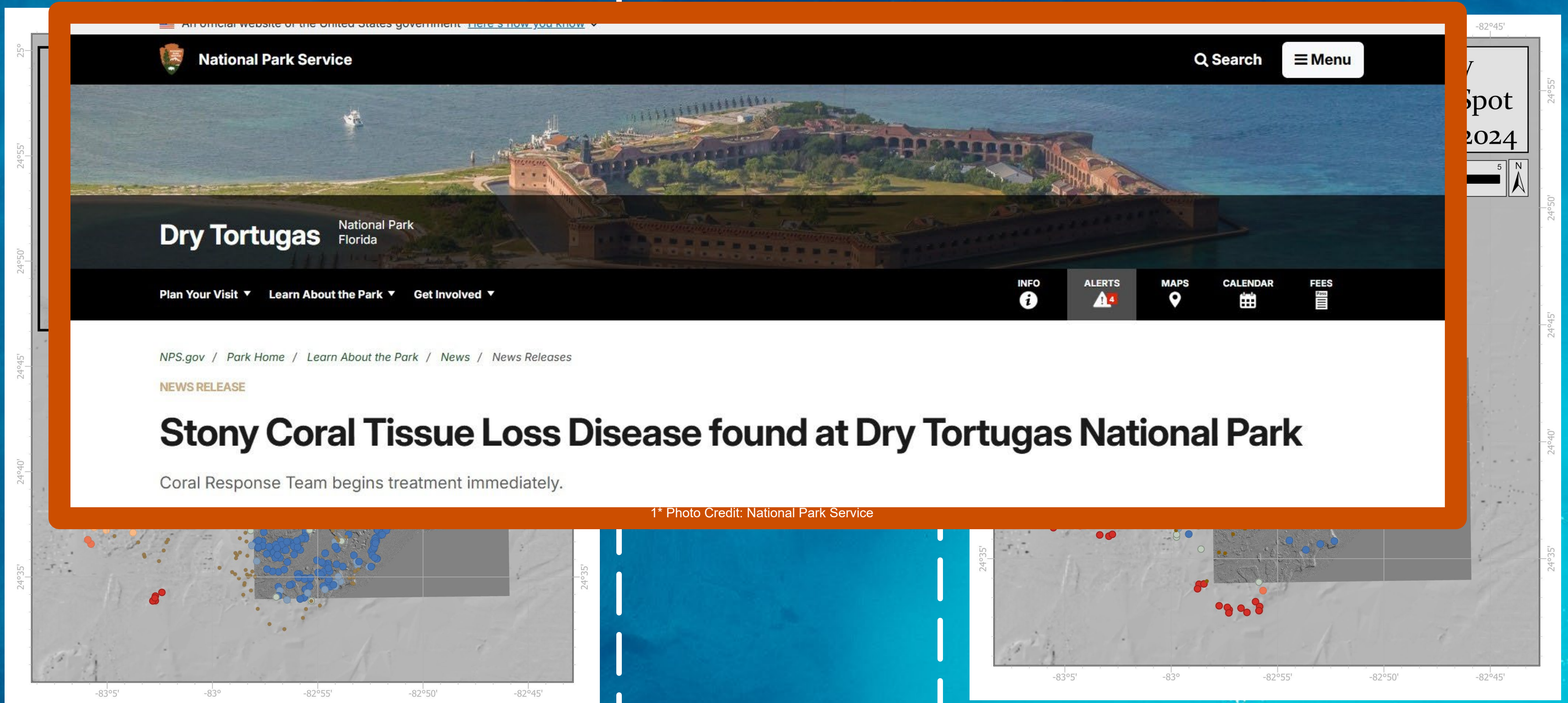




Preliminary BCG Current Data: 2022 - 2024



Areas of Interest: Dry Tortugas



Future Hope: Disease Intervention Activities

 Coral Disease Intervention Dashboard updated 5/29/2025

Filter Results

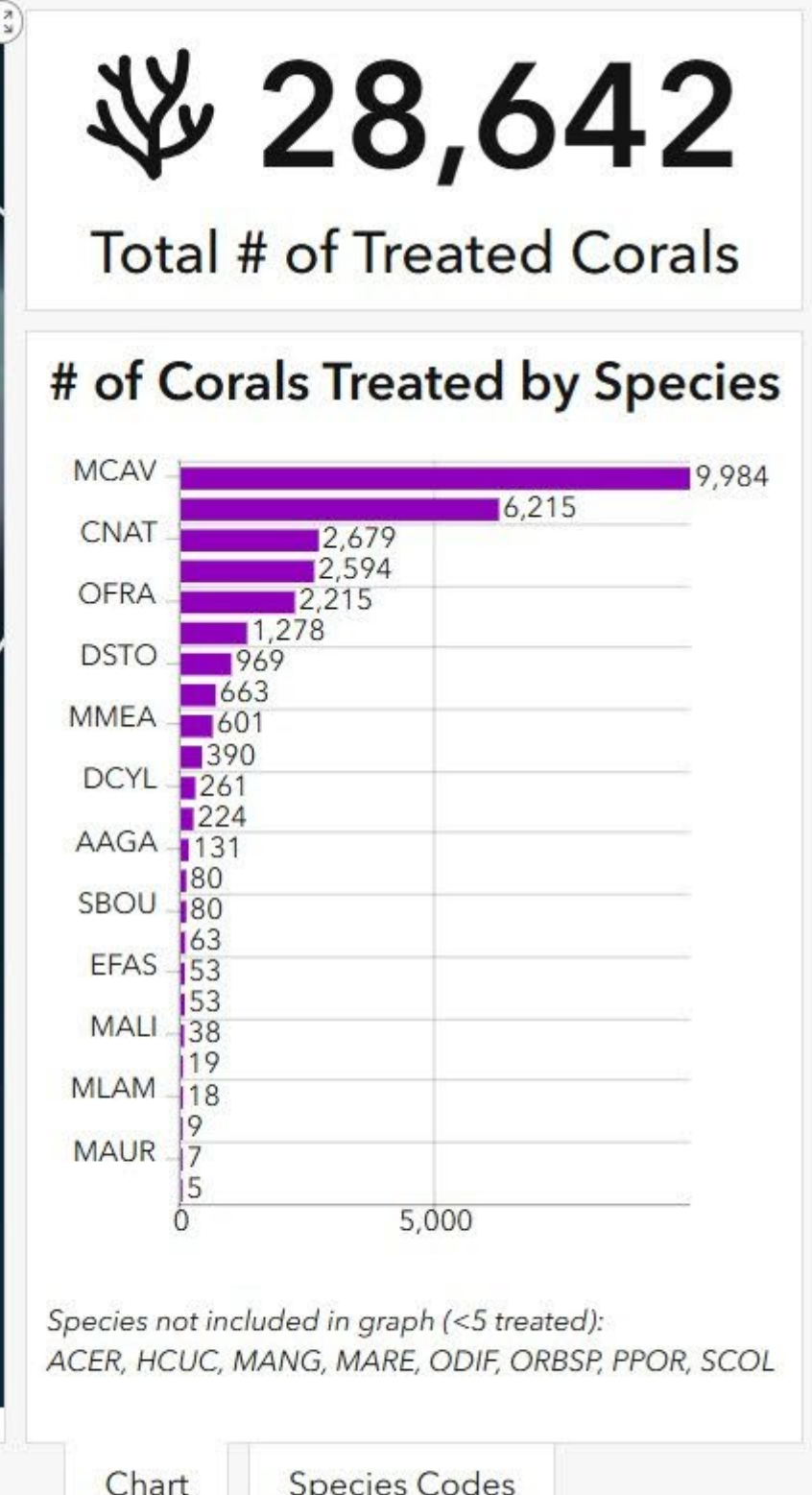
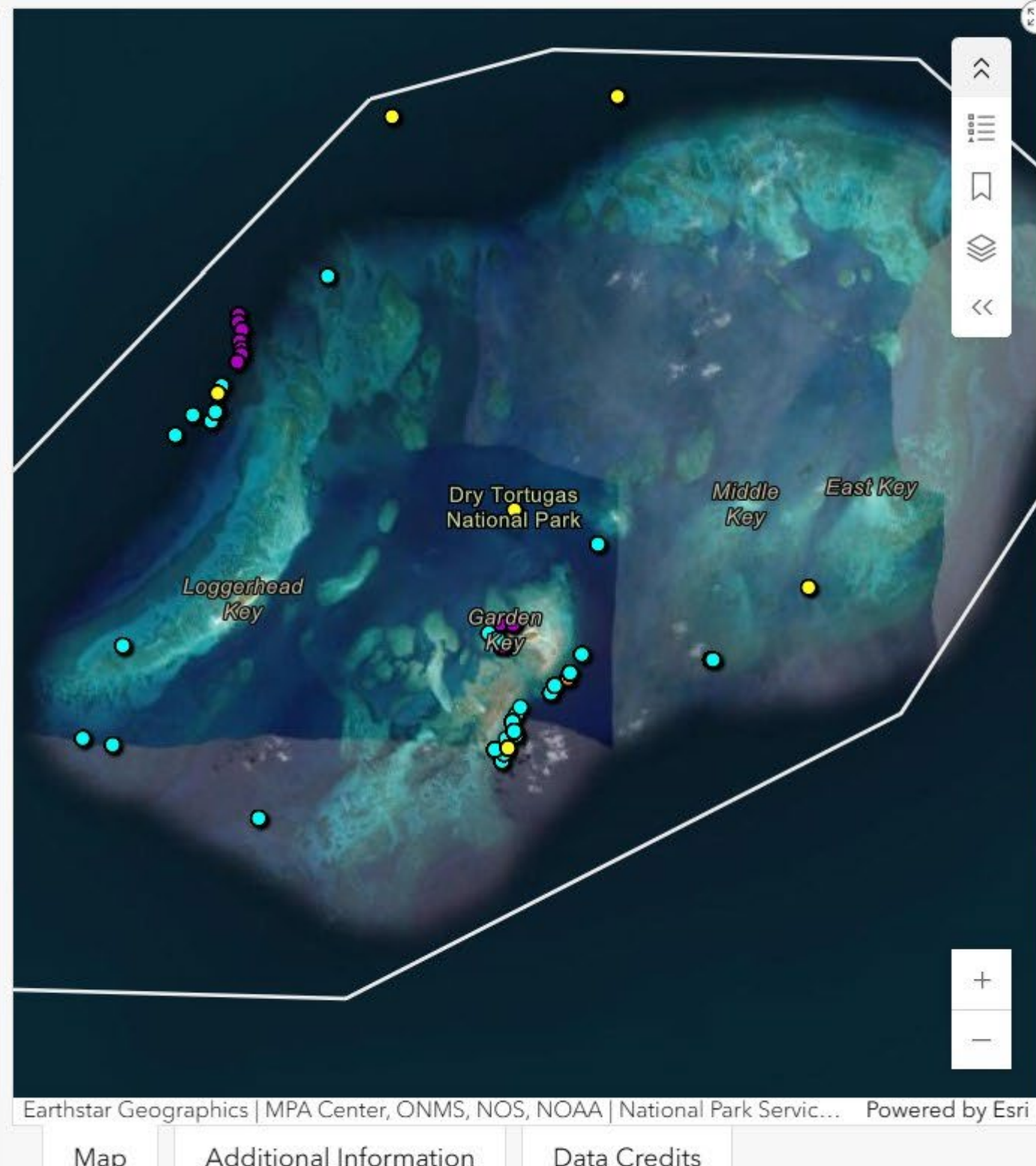
Filter by data provider*

Emergency Mission #1, NSU & FAU... [5]

Legend*

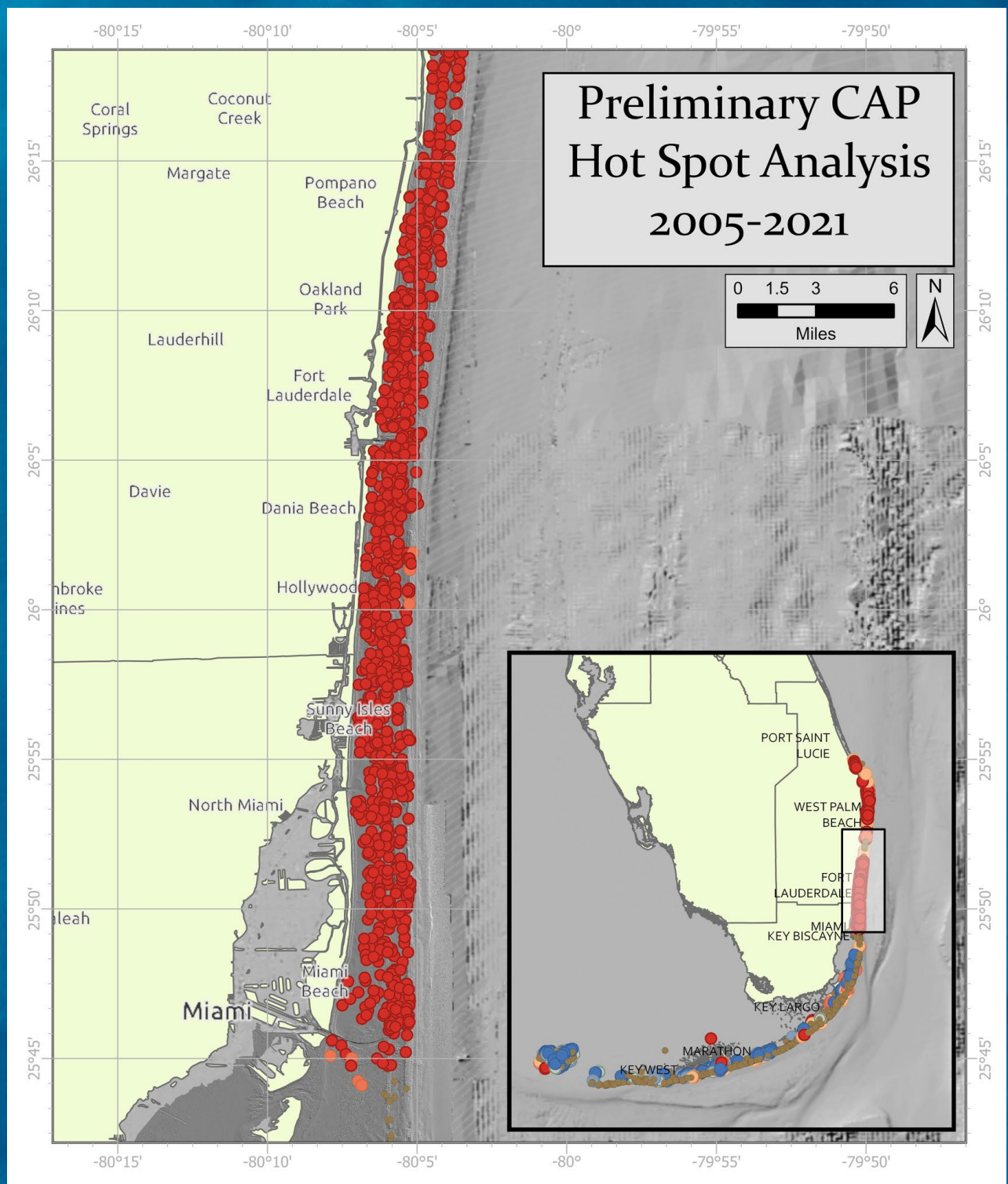
- Biscayne National Park (NPS)
- Dry Tortugas Emergency Coral Mission #1, Nova Southeastern University, Karen Neely & Florida Atlantic University, Joshua Voss (NFWF & NOAA-CRCP)
- Dry Tortugas Emergency Coral Mission #2, Nova Southeastern University, FAU - Harbor Branch, University of the Virgin Islands (NFWF & NOAA-CRCP)
- Dry Tortugas Emergency Coral Mission #3, Nova Southeastern University, Karen Neely & Florida Atlantic University, Joshua Voss (NPS)
- Dry Tortugas National Park (NPS & DEP)
- Fish & Wildlife Research Institute & Mote (DEP & SWG)
- Florida Atlantic University, Joshua Voss (DEP & HBOI)
- Nova Southeastern University, Brian Walker & Miami-Dade RER, Rebecca Ross (DEP & NOAA)
- Nova Southeastern University, Karen Neely (DEP & NFWF)
- Smithsonian Marine Station, Valerie Paul (DEP)

*Funding partners for each data set are shown in parenthesis.



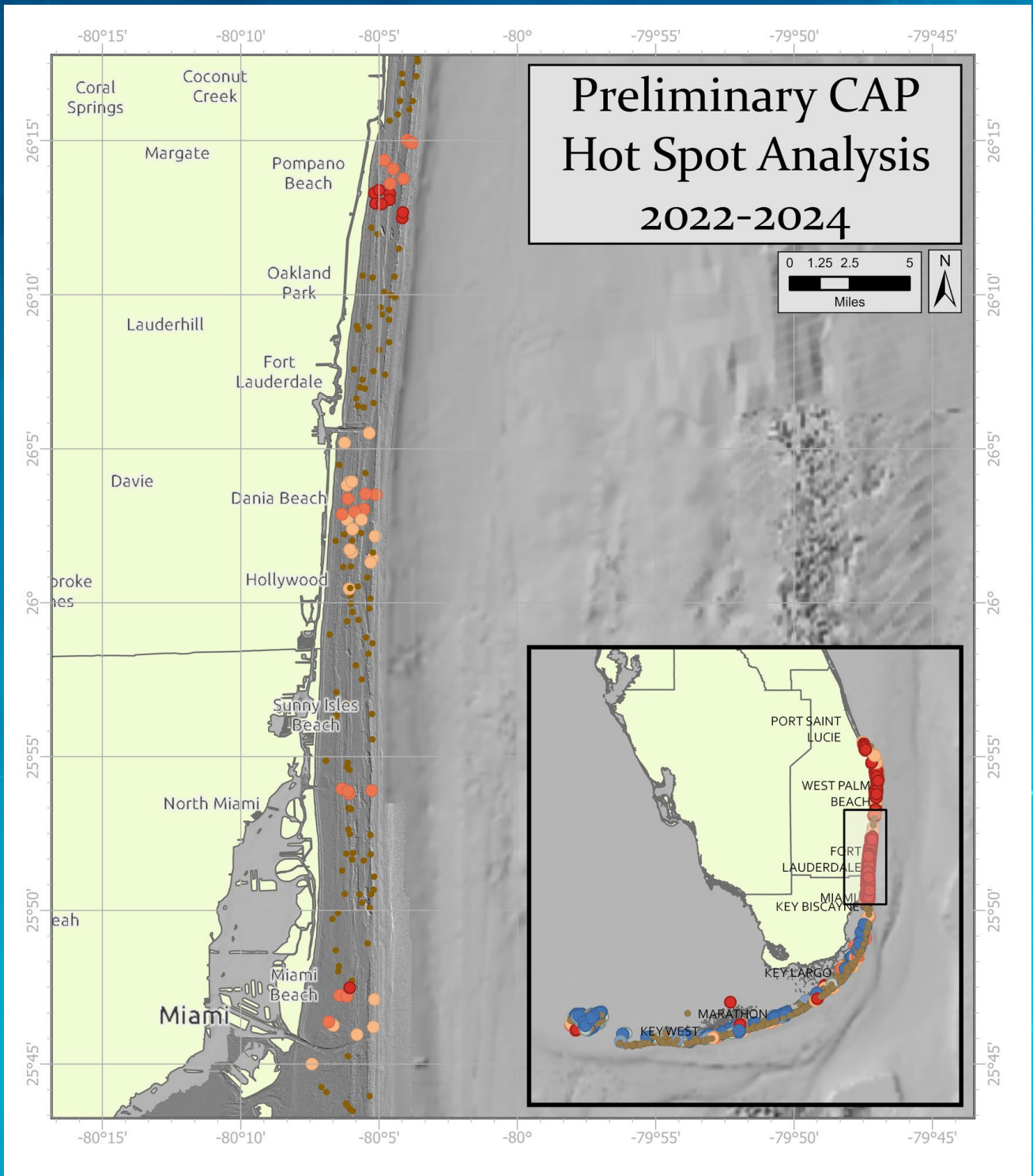


Areas of Interest: Kristin Jacobs Coral Aquatic Preserve (CAP)



Hot Spot Analysis Legend

- Cold Spot with 99% Confidence
- Cold Spot with 95% Confidence
- Cold Spot with 90% Confidence
- Not Significant
- Hot Spot with 90% Confidence
- Hot Spot with 95% Confidence
- Hot Spot with 99% Confidence



Future Objectives

1

Tease apart the BCG data into various time intervals to identify major anthropogenic disturbances such as the disease outbreak of SCTLD moving through the reef tract through time

2

Further separate the study region of the BCG into 3 distinct geographic spatial regions of Southeast Florida, The Florida Keys, and The Dry Tortugas for further analysis .

3

Determine the influence of external environmental co-factors through water quality data on the BCG scores as a mechanism to what may be driving these changes in reef health





TETRA TECH



Thank You!

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