Port Miami Deep Dredge Project: Challenges, Lessons Learned, and Sustainability

Presentation to the
World of Dredging Conference
(WODCON)

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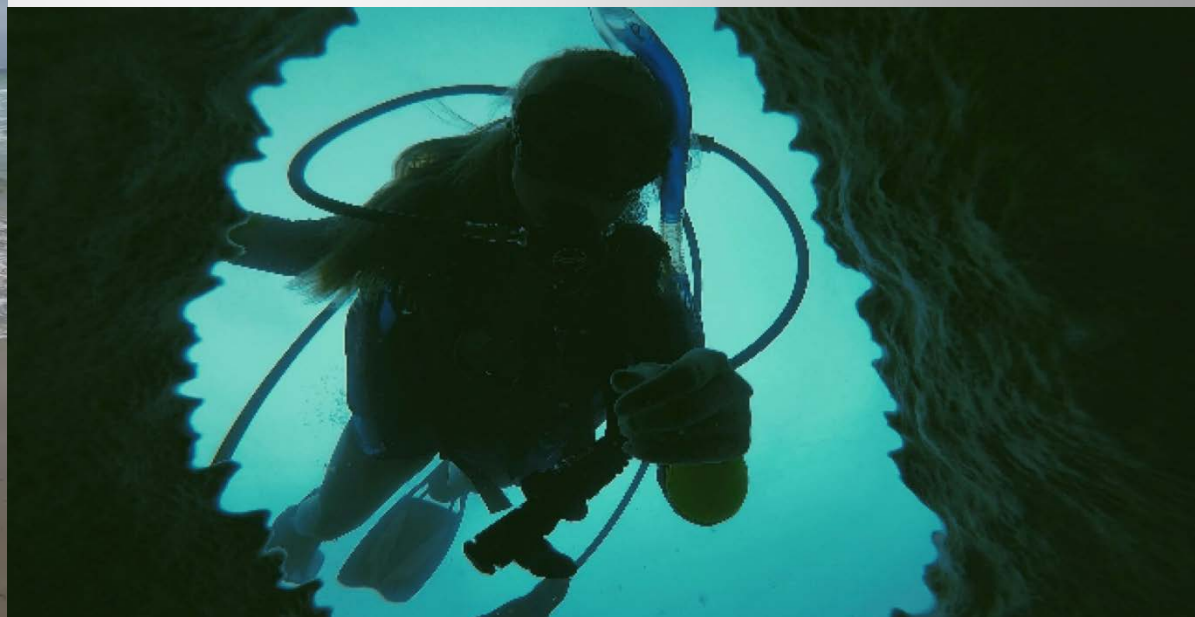
June 17, 2016

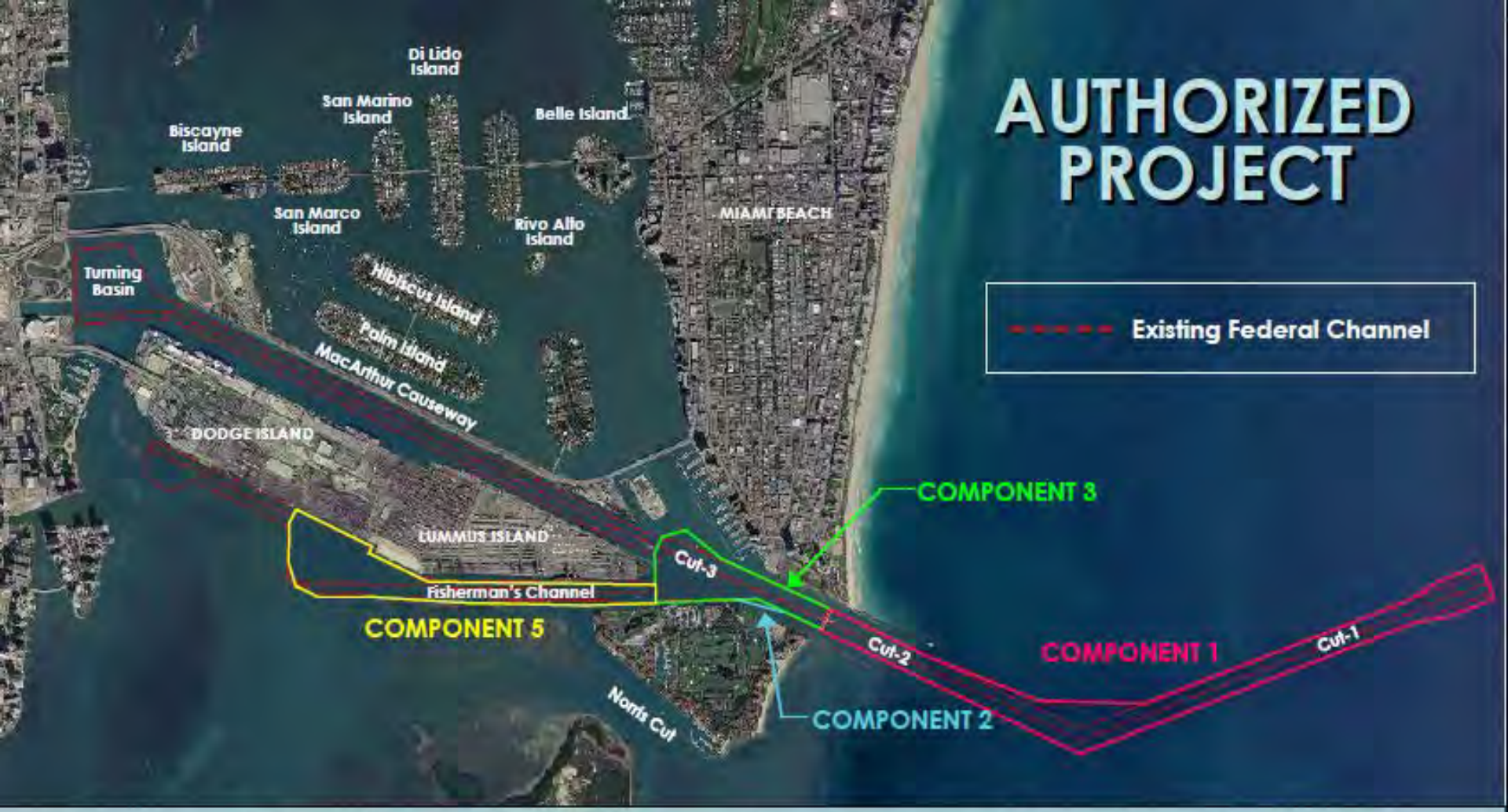
Sustainability Challenge

Move through challenges and apply lessons to achieve greater sustainability



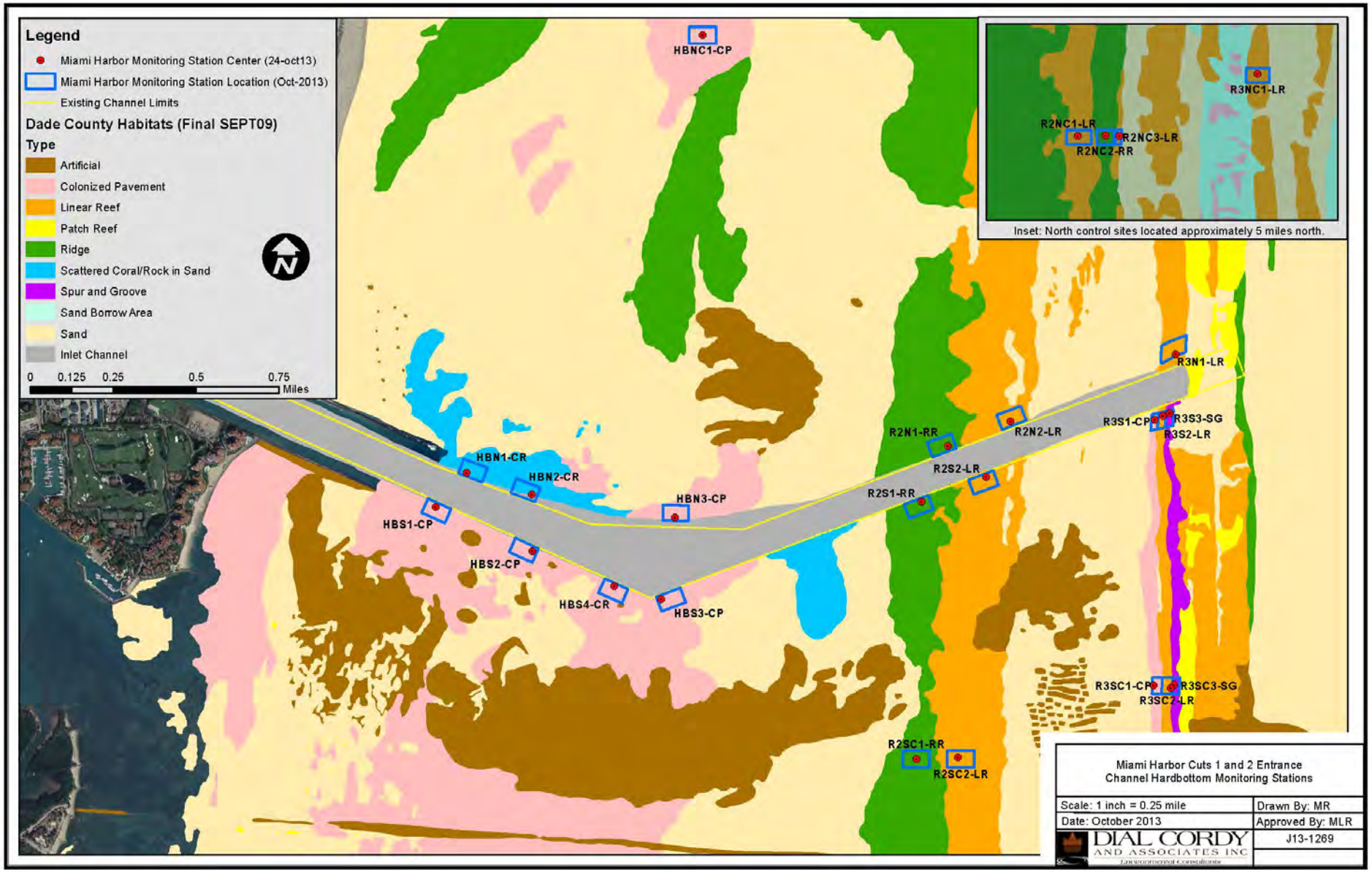
Background

1916 - Aerial view of Government Cut.



Component 1:	Component 2:	Component 3:	Component 5:
Widen seaward portion of Cut-1 from 500 to 800 feet; deepen Cut-1 and Cut-2 from 44 to 52 feet	Add turn widener at the southern intersection of Cut-3 with Fisherman's Channel and deepen to 50 feet	Increase Fisher Island turning basin from 1200 to 1500 feet; truncate NE section of the turning basin to minimize seagrass impacts; deepen from 42 to 50 feet	Expand berthing area by 60 feet and widen southern edge of Fisherman's Channel 40 ft; reduce Lummus Island turning basin to a 1500 ft dia.; deepen from 42 to 50 ft

Permit required Reef Monitoring



Challenges

- Complex ecosystem – multiple stressors
- Difficult working environment: high currents, low visibility, active channel, working dredge equipment, scows and support vessels
- Federal law suits
- Media attention

Challenges

Challenges

Challenges

Challenges

Activists sue to stop Government Cut dredge and protect coral

BY JENNY STALETOVICH - JSTALETOVICH@MIAMIHERALD.COM
10/01/2014 7:22 PM | Updated: 10/01/2014 7:22 PM

The New York Times

U.S.

Despite Protections, Miami Port Project Smothers Coral Reef in Silt

By LIZETTE ALVAREZ MARCH 7, 2015

Bay activists warn Corps to clean up dredge

BY JENNY STALETOVICH
07/17/2014 7:52 PM | Updated: 07/17/2014 8:20 PM

Miami-Dade County
Miami Herald

Biscayne Bay coral at risk from sloppy dredge work

BY JENNY STALETOVICH - JSTALETOVICH@MIAMIHERALD.COM
02/05/2015 4:50 PM | Updated: 02/05/2015 6:24 PM

New Times

ENVIRONMENTALISTS AGAIN WARN OF WIDESPREAD CORAL DAMAGE IN PORT EVERGLADES EXPANSION PROJECT

BY CHRIS JOSEPH

CBS NEWS

Bay dredging project threatens vital Miami reefs

Environmentalists ready to sue over Miami port's deep dredge

REUTERS By Zachary Fagenson

Miami's Choice: Bigger Ships or Coral Reefs?

Dredging in Biscayne Bay inflicts heavy damage on North America's only coral reef tract.

By Scott Wylaad
for National Geographic

INTERNATIONAL BUSINESS TIMES

Twitter Rumor: 1D Fans Supposedl

Massive PortMiami Dredge Project 'Wiping Out' Vast Coral Field

Local

NOAA Says Port Miami Dredge Disaster For Reef

August 18, 2015 4:40 PM

Miami port dredging damaging sea life, state inspectors say

BY JENNY STALETOVICH
08/19/2014 6:36 PM | Updated: 08/19/2014 8:54 PM

NOAA Warns of "Rapid Deterioration" of Endangered Corals Due to Deep Dredge Sludge

By Michael E. Miller Thu., Sep. 18 2014 at 7:00 AM 8 Comments

Environment AUGUST 17, 2015

PortMiami dredge damages more coral than feds expected

Florida – Deep Dredge Critics File Emergency Demand to Stop "Destruction of Endangered Species"

LETTERS TO THE EDITOR MARCH 17, 2016 8:31 PM

Dredging sediment killed our port coral

Challenges

The Washington Post

Energy and Environment

Bleaching and disease are devastating the biggest coral reef in the continental U.S.

By Chelsea Harvey October 26

The disease outbreaks have been especially severe in the area off the coast of Miami, where bleaching was particularly heavy, Morton said. While several different types of coral disease have been observed, a disease known as "white plague" has been the most prevalent.

Lessons Learned

- Don’t forget your past
- Repeated measures design documented dredging and natural effects
- Improve communication of results based on data – real time would be optimal
- Adaptive management

Lessons Learned

Don’t forget your past!

Proceedings of the Fourth International Coral Reef Symposium, Manila, 1981, Vol. 1

IMPACT OF DREDGING ON A SUBTROPICAL REEF COMMUNITY, SOUTHEAST FLORIDA, U.S.A.

Donald S. Marszalek
Rosenstiel School of Marine and Atmospheric Science, University of Miami,
4600 Rickenbacker Causeway, Miami, Florida 33149 U.S.A.

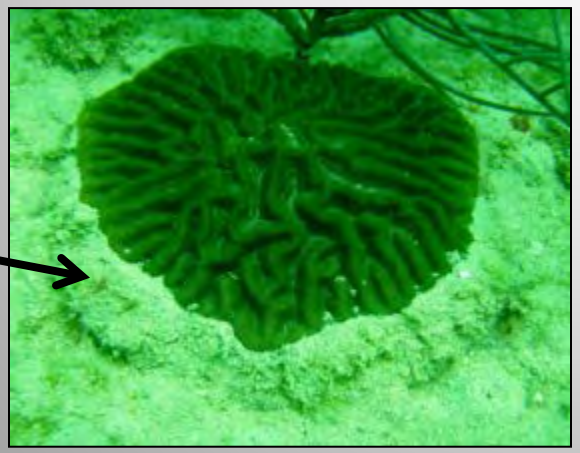
Many of the small colonies of *D. stokesii, M. cavernosa* and other hemispherical forms showed a band of dead tissue adjacent to the substrate, buried beneath the layer of silt which covered the reef surface.

Scleractinian corals appeared to be the most impacted of the reef macrofauna. Although mass mortality of corals has not occurred, the number of corals exhibiting stress symptoms has increased during the course of the dredging project. All species present in the study area showed a similar tolerance to dredging. In 1978, after two dredging seasons, about 5% of the corals near the dredge showed a partial loss of zooxanthellae (pale spots); after the 1980 dredging season, as many as 32.3% of scleractinian corals along a transect adjacent to the dredge exhibited pale spots or loss of tissue near the base of

Lessons Learned
Project Related Sediment Impacts

Survey Zone	Area	Site	Partial Mortality Related to Sediment Stress							
			All Corals				Without Dead Corals			
			#PM	N	Prop.	SD	#PM	N	Prop.	SD
Middle Reef	North	R2N1-RR	28	30	0.93	0.25	17	18	0.94	0.24
		R2N2-LR	15	24	0.63	0.49	12	20	0.60	0.50
		R2NC1-LR	2	28	0.07	0.25	2	24	0.08	0.27
		R2NC2-RR	2	30	0.07	0.25	2	28	0.07	0.26
	South	R2S1-RR	17	27	0.63	0.49	14	20	0.70	0.47
		R2S2-LR	15	24	0.63	0.49	6	12	0.50	0.52
		R2SC1-RR	9	30	0.30	0.47	8	21	0.38	0.50
		R2SC2-LR	2	25	0.08	0.28	1	11	0.10	0.32
Outer Reef	North	R3N1-LR	15	21	0.71	0.46	14	18	0.78	0.43
		R3NC1-LR	7	24	0.29	0.46	5	18	0.28	0.46
		R3S1-CP	8	19	0.42	0.51	7	13	0.54	0.52
	South	R3S2-LR	1	25	0.04	0.20	0	20	0.00	0.00
		R3S3-SG	9	25	0.36	0.49	7	19	0.37	0.50
		R3SC1-CP	4	24	0.17	0.38	3	20	0.15	0.37
		R3SC2-LR	0	20	0.00	0.00	0	12	0.00	0.00
		R3SC3-SG	3	24	0.13	0.34	2	15	0.13	0.35
Total			137	400			100	289		

54%



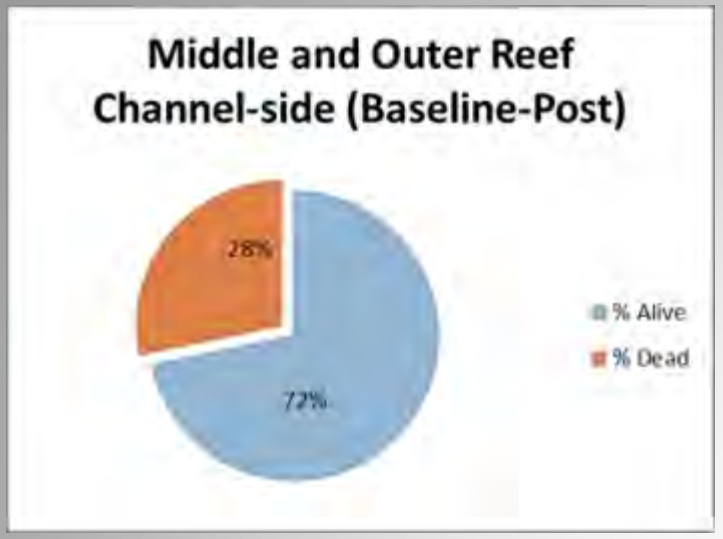
Partial Coral Mortality In CNAT

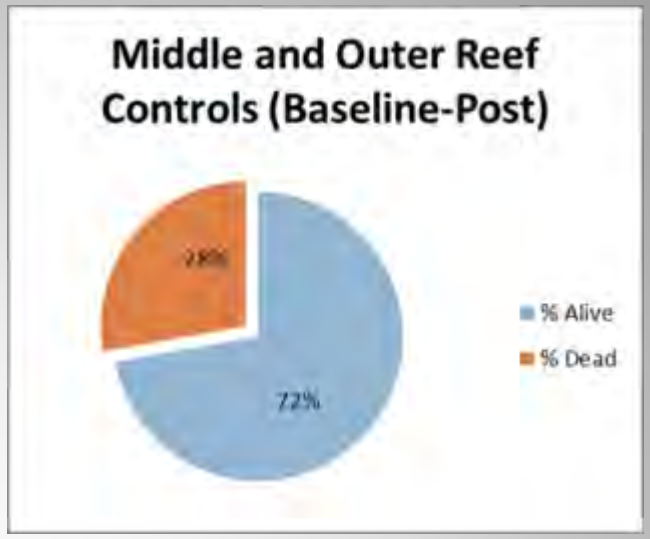
Table Total Scleractinan mortality from baseline through the Middle and Outer reef impact assessment as measured at each compliance monitoring site. Mortality has been broken into categories based on cause of coral mortality and include: sediment, disease and bleaching (white plague not included), and white plague disease. The white plague disease category includes colonies photographed with definitive signs of white plague disease and those consistent with white plague due to the resulting mortality patterns, timing, location, and species involved. Corals showing active white plague have also been included.

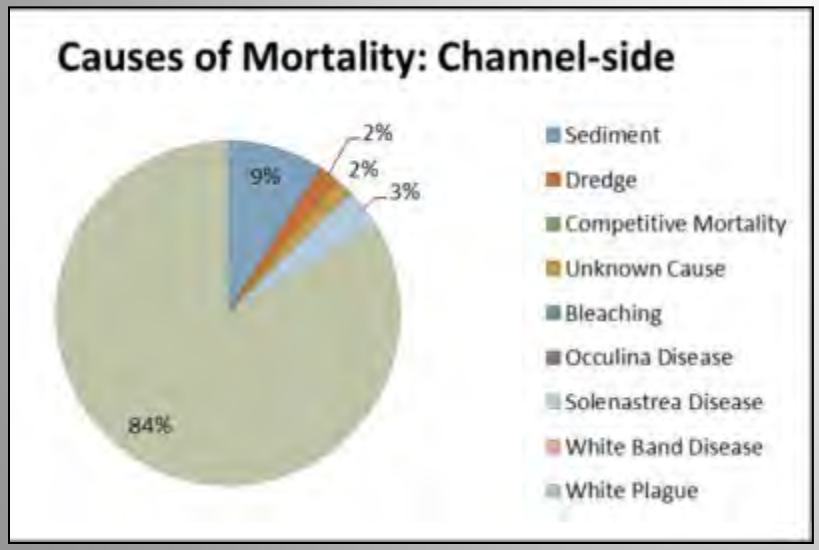
Survey Zone	Area	Site	Scleractinian Mortality (Baseline through Middle and Outer Reef Impact Assessment)								
			N	Sediment	Bleaching / Disease	WP Mortality	WP Active	% Sediment Mortality	% WP Mortality	Total Mortality	% of Tagged Dead
Middle Reef	South	R2S1	27	0	0	7	0	0.00	25.93	7	25.93
		R2SC1	30	0	1	6	4	0.00	20.00	7	23.33
		R2S2	24	0	0	9	4	0.00	37.50	9	37.50
		R2SC2	25	0	2	11	0	0.00	44.00	13	52.00
	North	R2N1	30	0	0	12	0	0.00	40.00	12	40.00
		R2NC2	30	0	0	0	2	0.00	0.00	0	0.00
		R2N2	24	2	0	2	1	8.33	8.33	4	16.67
		R2NC1	28	0	0	0	1	0.00	0.00	0	0.00
Outer Reef	South	R3S1	19	1	0	0	0	5.26	0.00	1	5.26
		R3SC1	24	0	2	2	0	0.00	8.33	4	16.67
		R3S2	25	0	1	3	0	0.00	12.00	4	16.00
		R3SC2	20	0	0	7	2	0.00	35.00	7	35.00
		R3S3	25	0	0	4	4	0.00	16.00	4	16.00
		R3SC3	24	0	0	6	2	0.00	25.00	6	25.00
	North	R3N1	21	2	0	0	0	9.52	0.00	2	9.52
		R3NC1	24	0	0	4	1	0.00	16.67	4	16.67
Totals			400	5	6	73	21	1.25	18.25	84	21.00

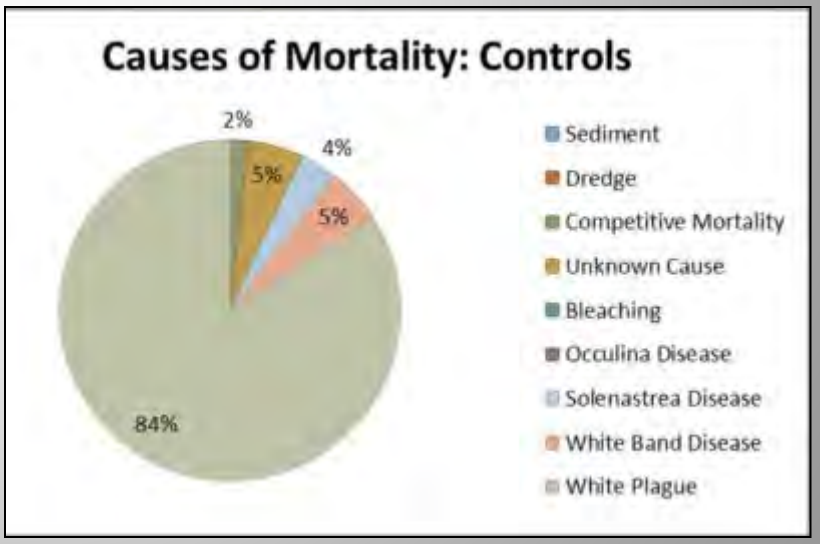
<2%

Lessons Learned



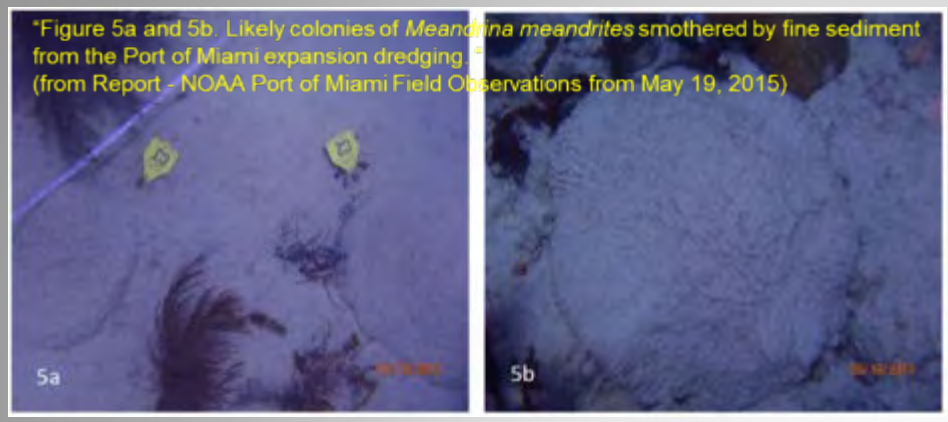




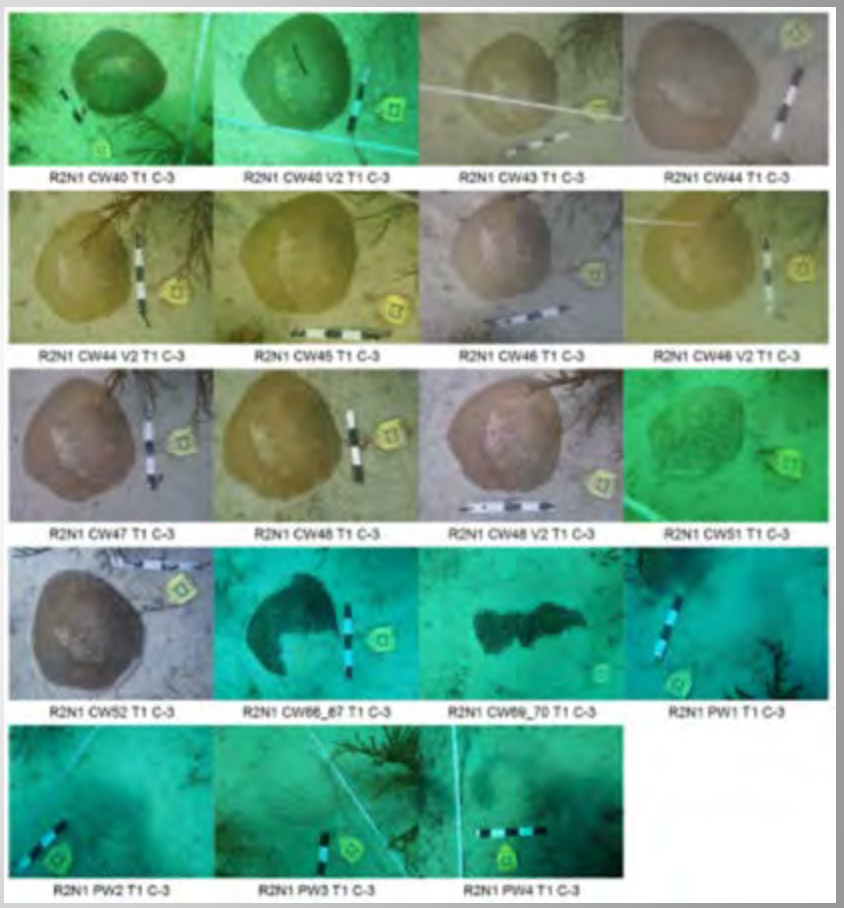


Use data to explain observed patterns.

Lessons Learned
The temporal data tells the story!



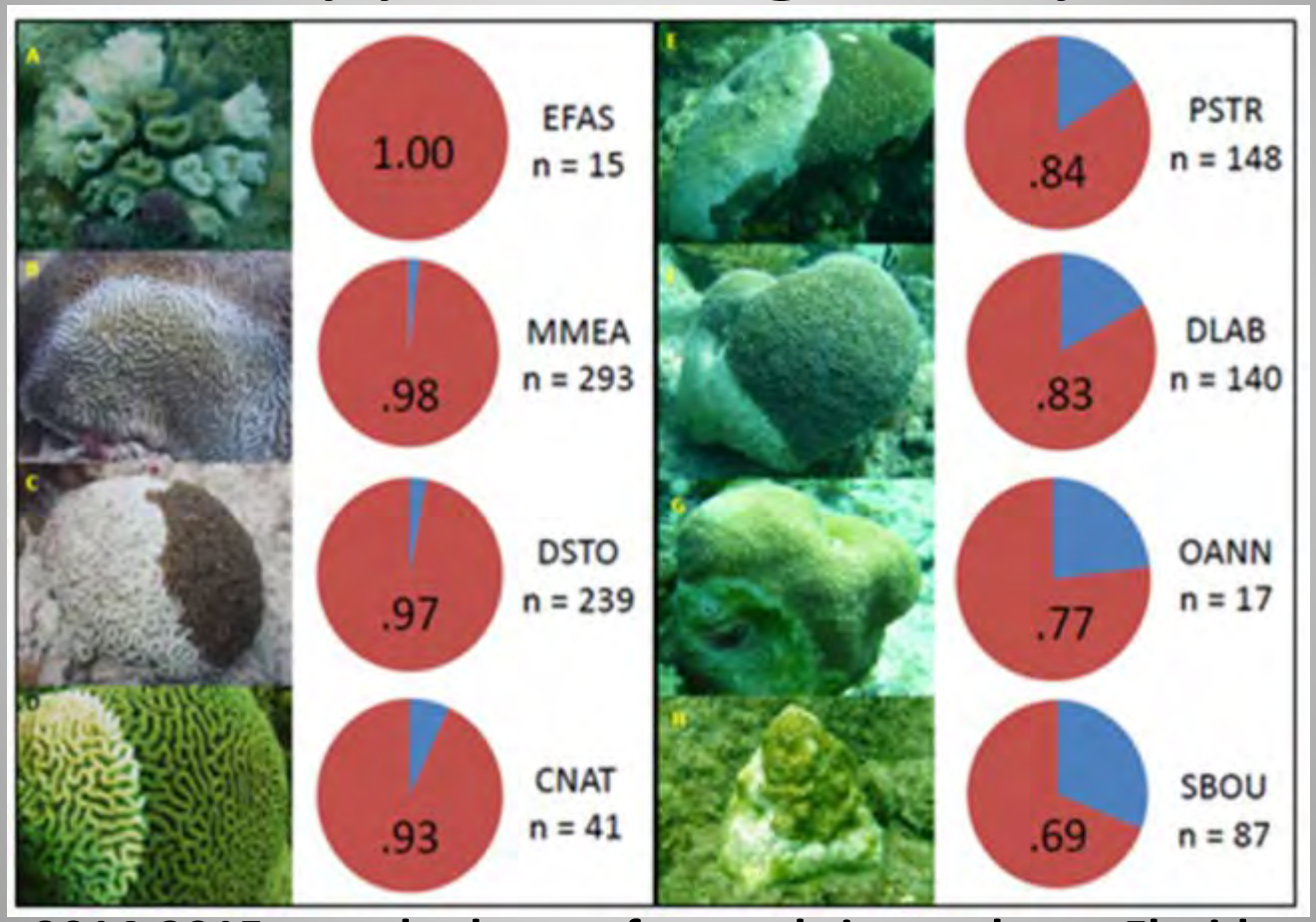
One-Off Surveys



vs. Repeated Measures

Look familiar?

Lessons Learned
It's important to understand what happened regionally.



2014-2015 were bad years for corals in southeast Florida due to thermal stress (bleaching) and disease.

Lessons Learned

Lessons Learned

The repeated measures monitoring of tagged corals at control and channel side sites provided the detailed information needed to assign the correct cause of mortality to corals in the project area as opposed to the undocumented assertions of project opponents who conducted one-off surveys. The actual monitoring results from the project emphasize the need to implement scientifically-based, not ideologically-based management of natural systems to best understand, sustain and protect our fragile coral resources for future generations.

Sustainability Challenge

Move through challenges and apply lessons learned to achieve greater sustainability