ICONIC REEFS



THE REEFS OF THE FLORIDA KEYS ARE THE BACKBONE OF THE

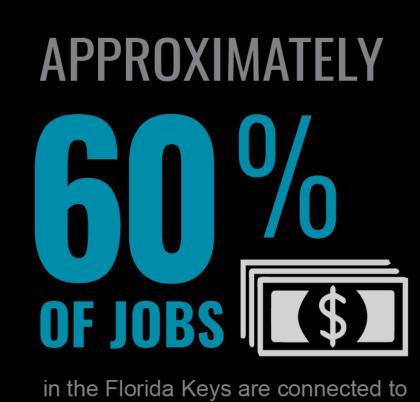
REGIONAL ECONOMY



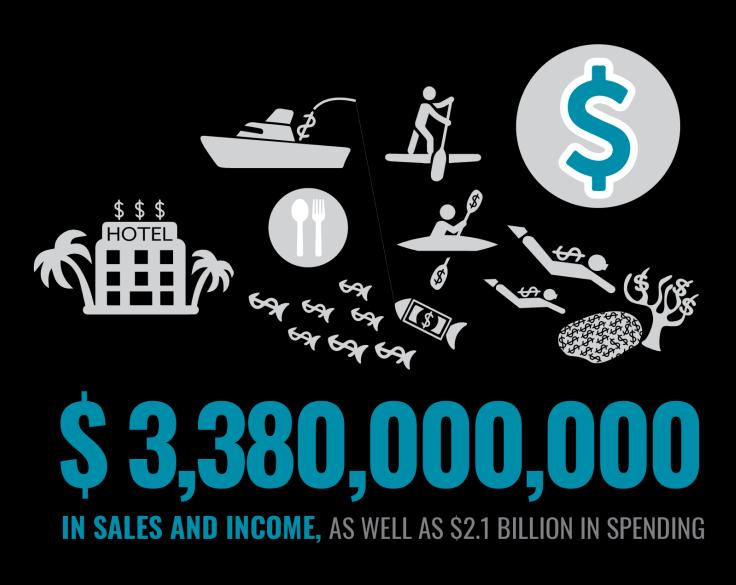
Yen-Yi Lee



Fishery Nation



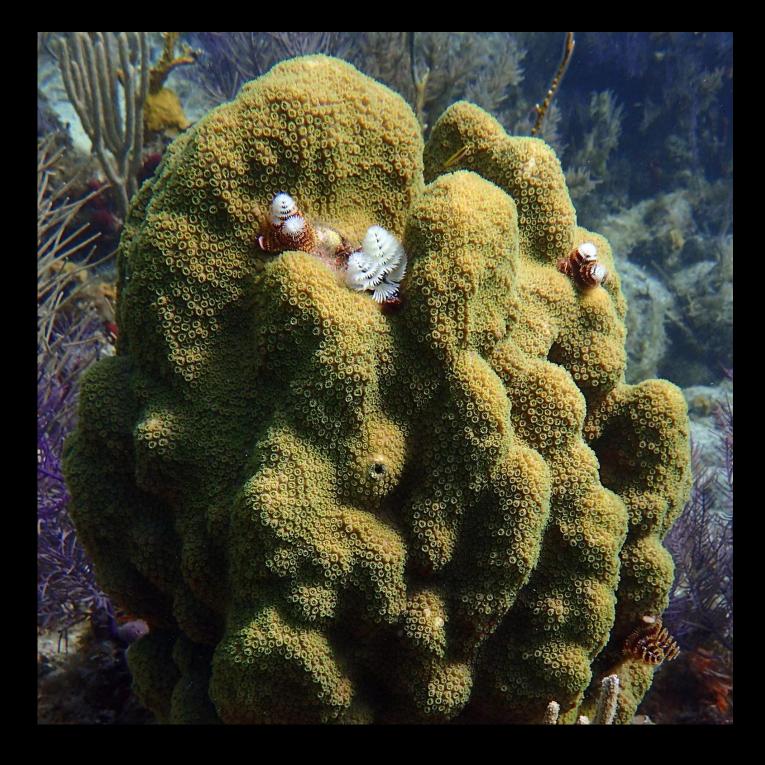
the marine ecosystem.







STAR CORAL, ELKHORN CORAL, STAGHORN CORAL







OVER 80% OF THE ELKHORN CORALS DISAPPEARED FROM FLORIDA OVER TWO DECADES FROM

WHITE BAND DISEASE



1970s

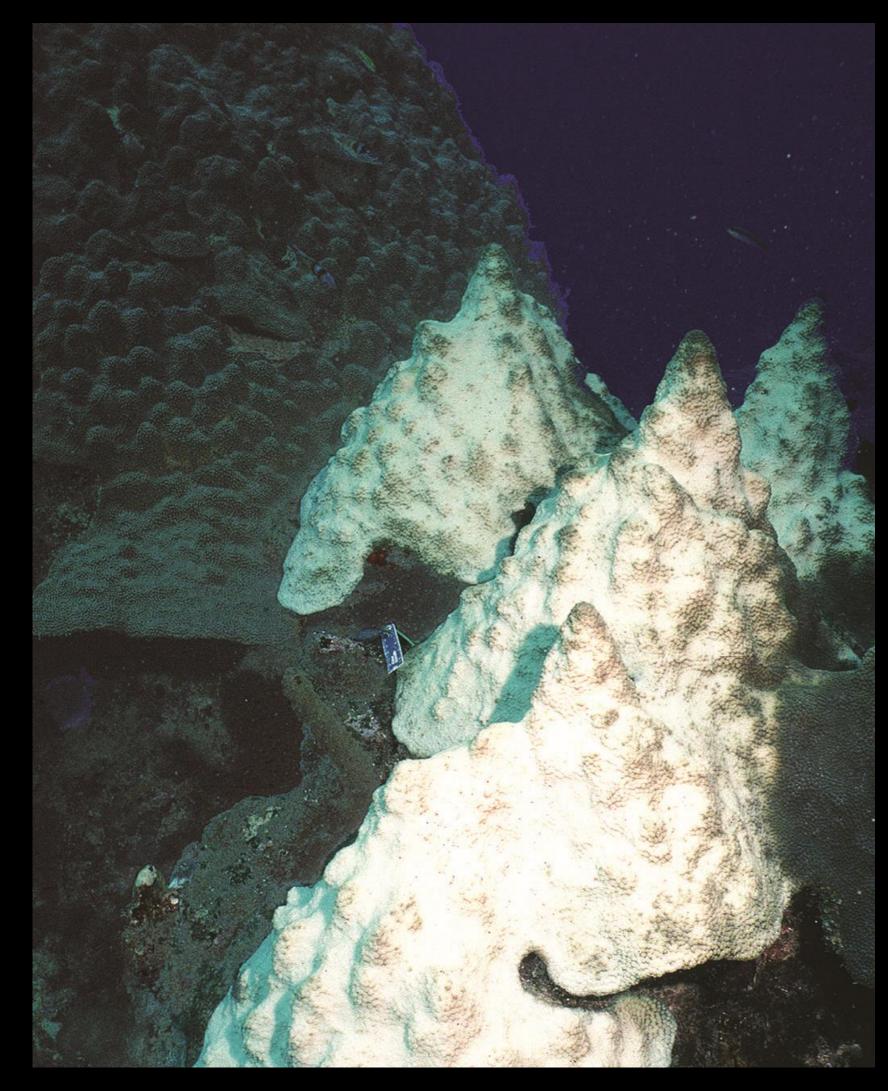


1980s-1990s



2000s

BLEACHING



September 1987





Summer 2023

THE COMPROMISED CORAL REEFS OF THE FLORIDA KEYS WERE FURTHER DAMAGED BY

HURRICANE IRMA

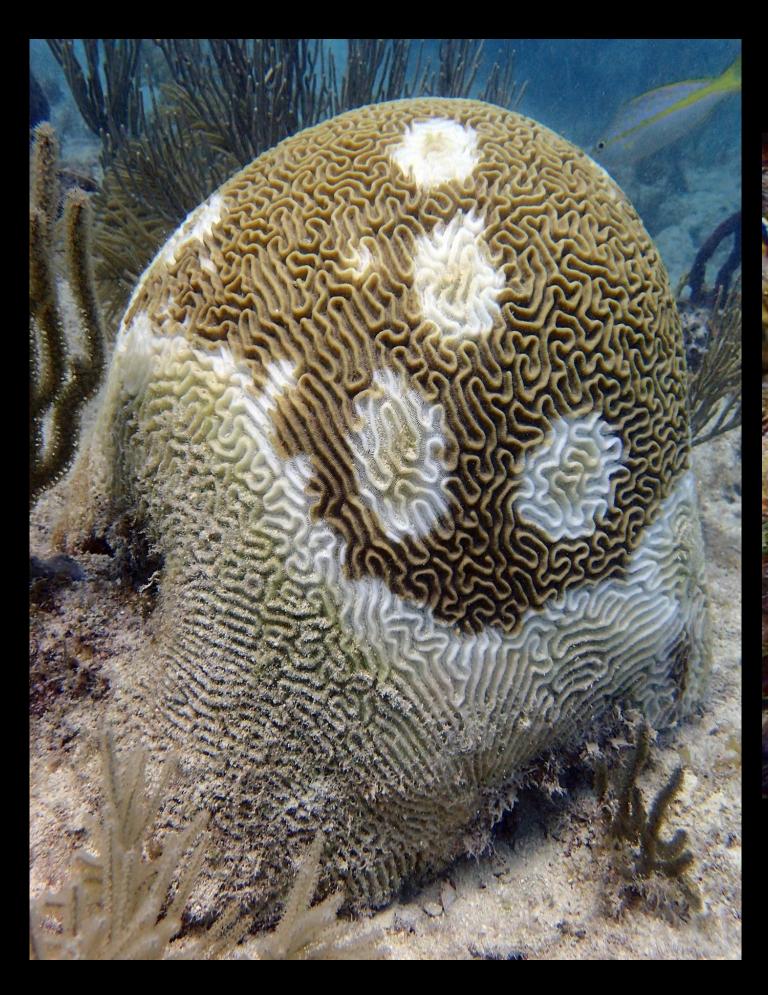




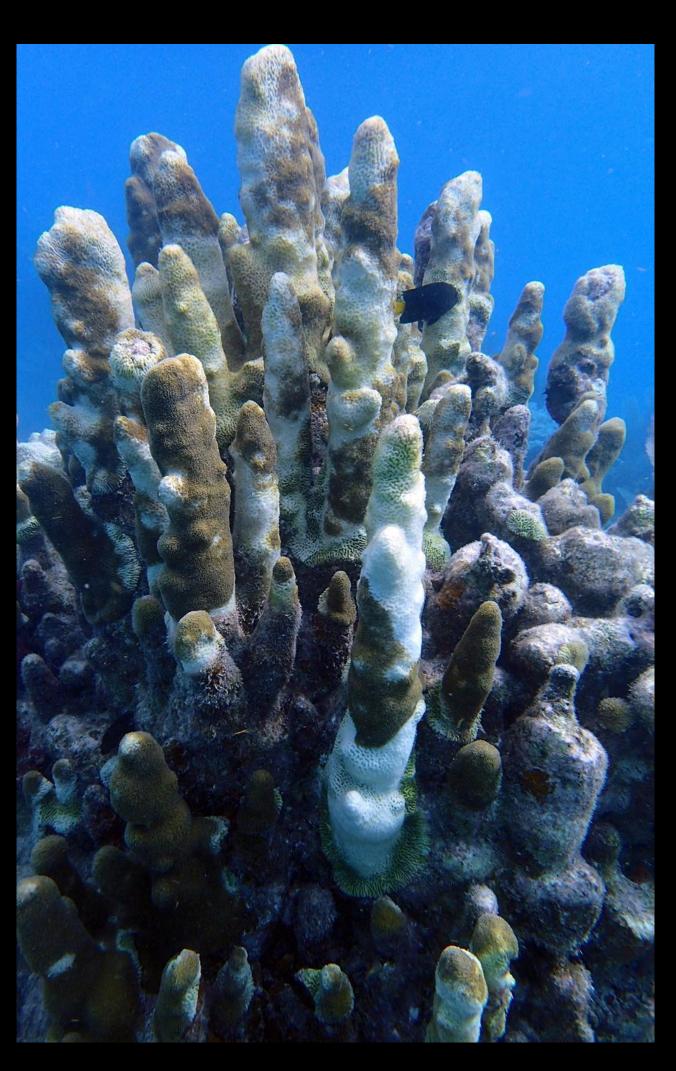




UNPRECEDENTED DISEASE







BOLD ACTION







CORAL REEF RESTORATION STARTED 20 YEARS AGO IN THE

FLORIDA KEYS





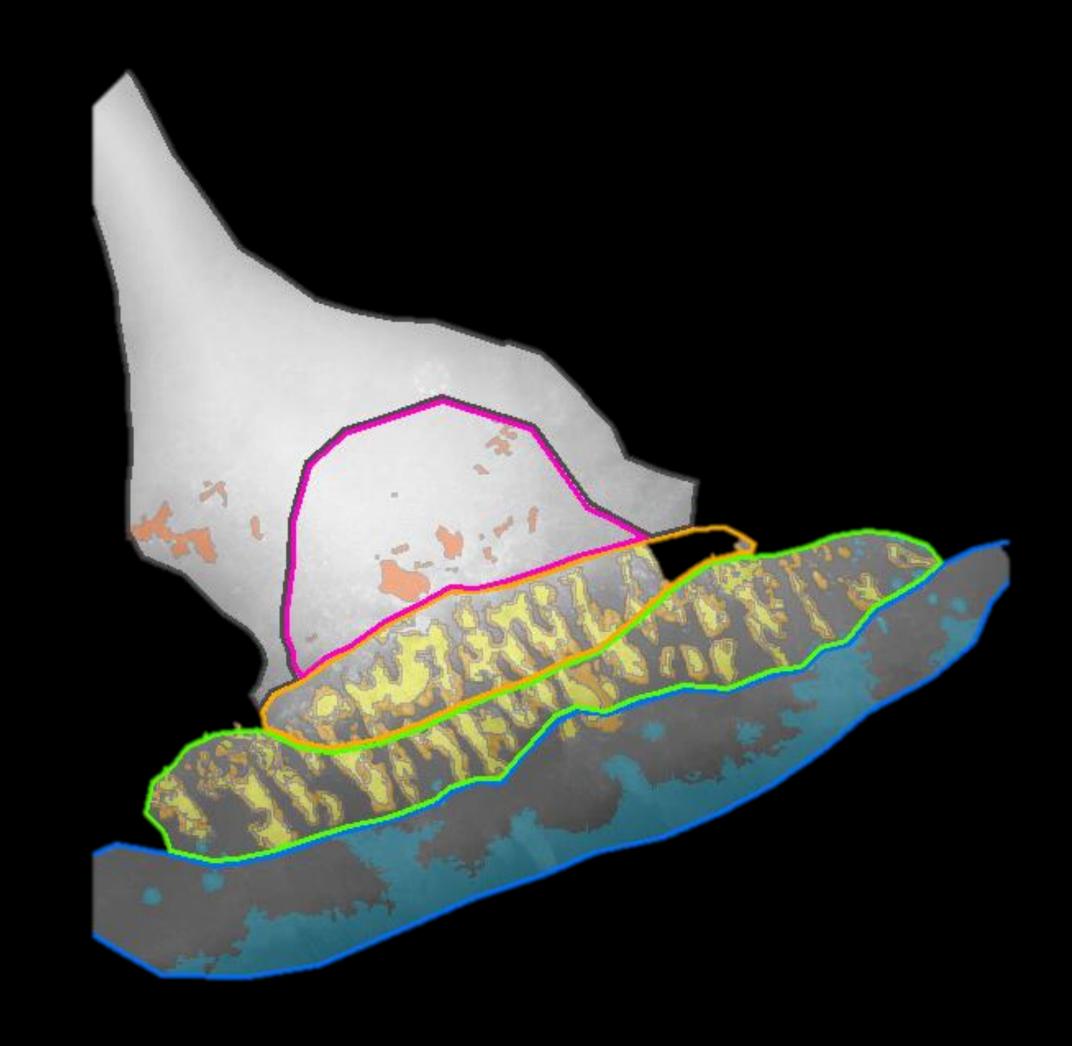


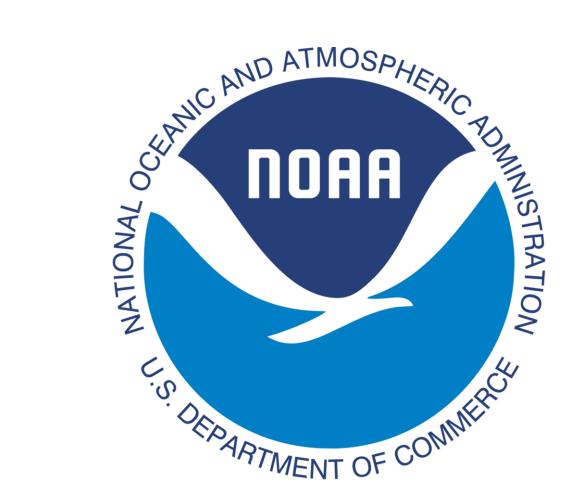
NOT KEEPING UP WITH THE DECLINE



STRATEGY TO REVERSE COURSE



















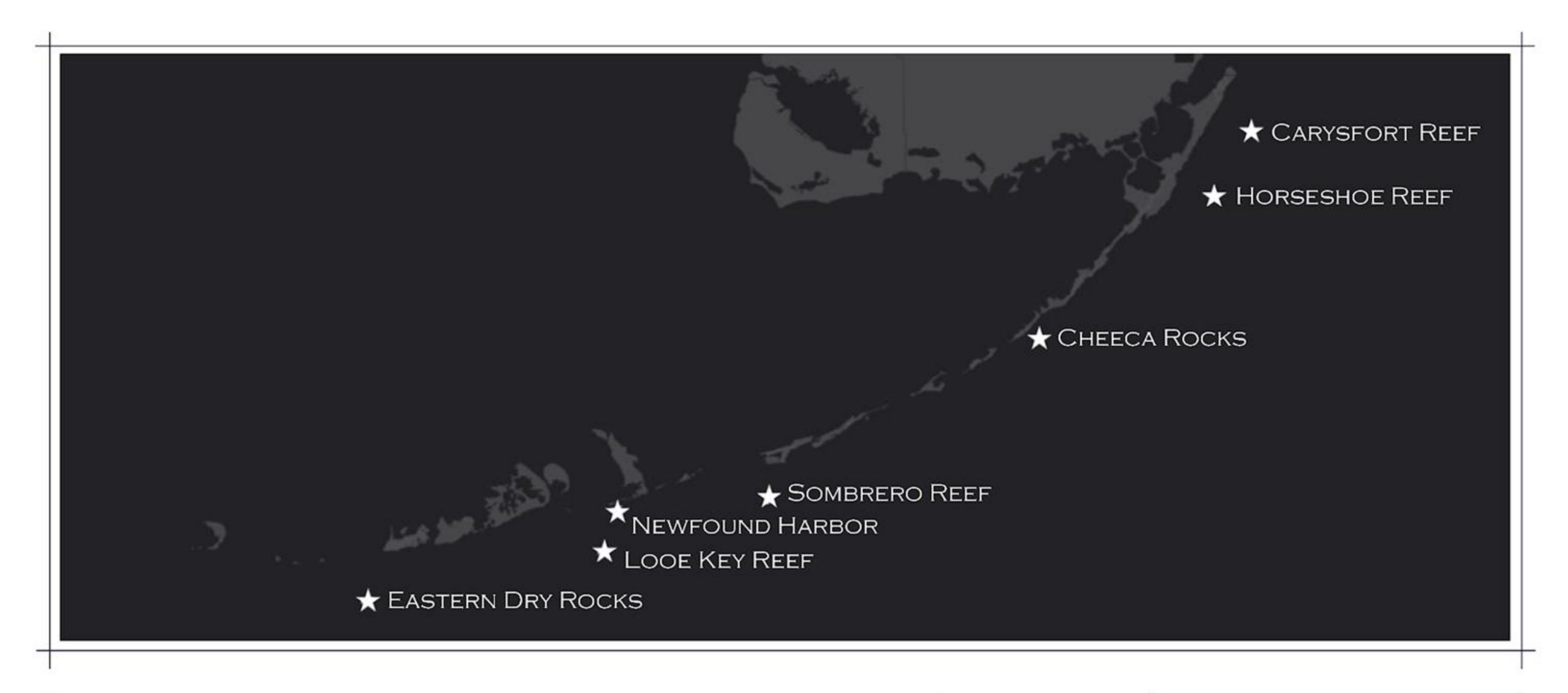










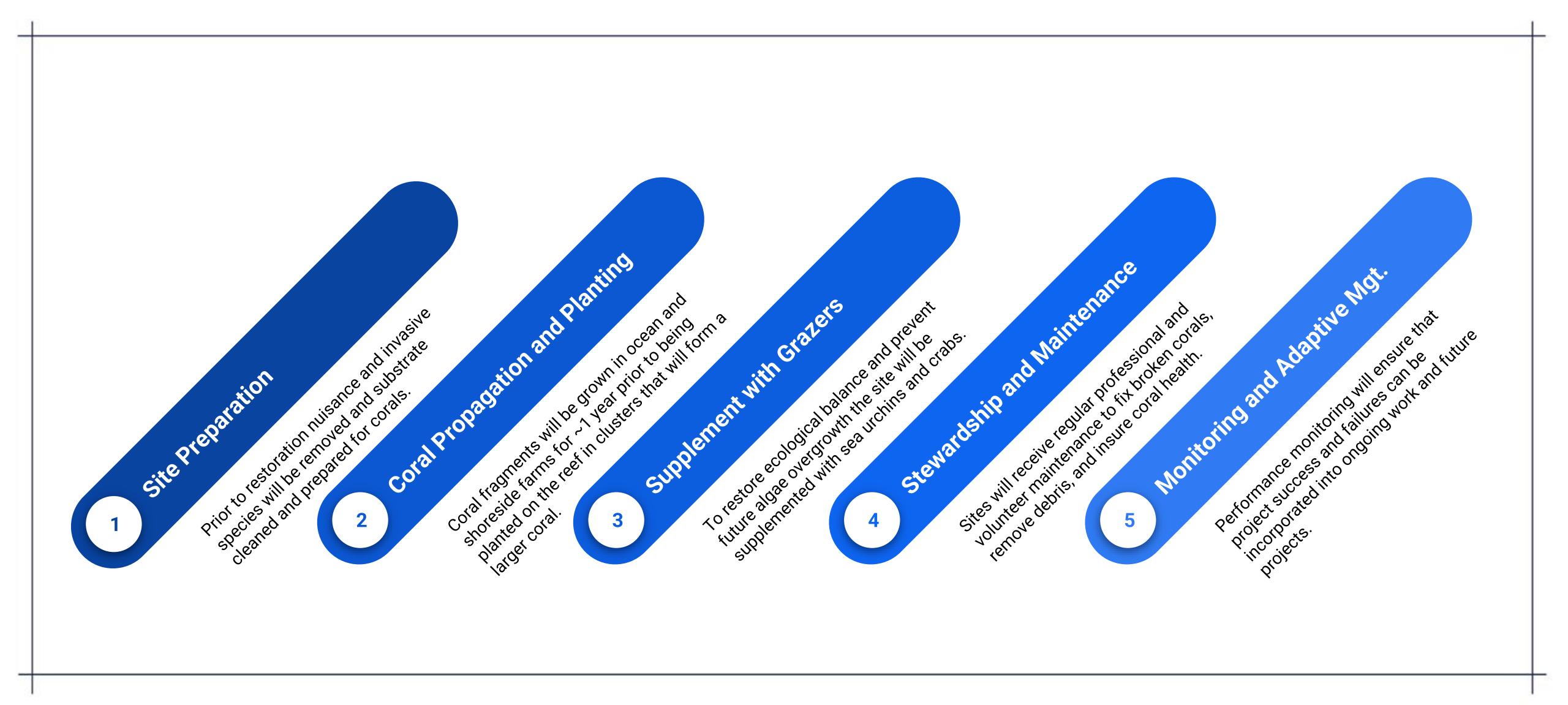


A PLAN TO RESTORE 7 ICONIC REEFS OF THE FLORIDA KEYS

AUGUST 2019



SUMMARY				
CARYSFORT REEF	NEWFOUND HARBOR			
HORSESHOE REEF	LOOE KEY REEF			
CHEECA ROCKS	EASTERN DRY ROCKS			
SOMBRERO REEF				



A PLAN TO RESTORE 7 ICONIC REEFS OF THE FLORIDA KEYS

AUGUST 2019

VERSION 1.1

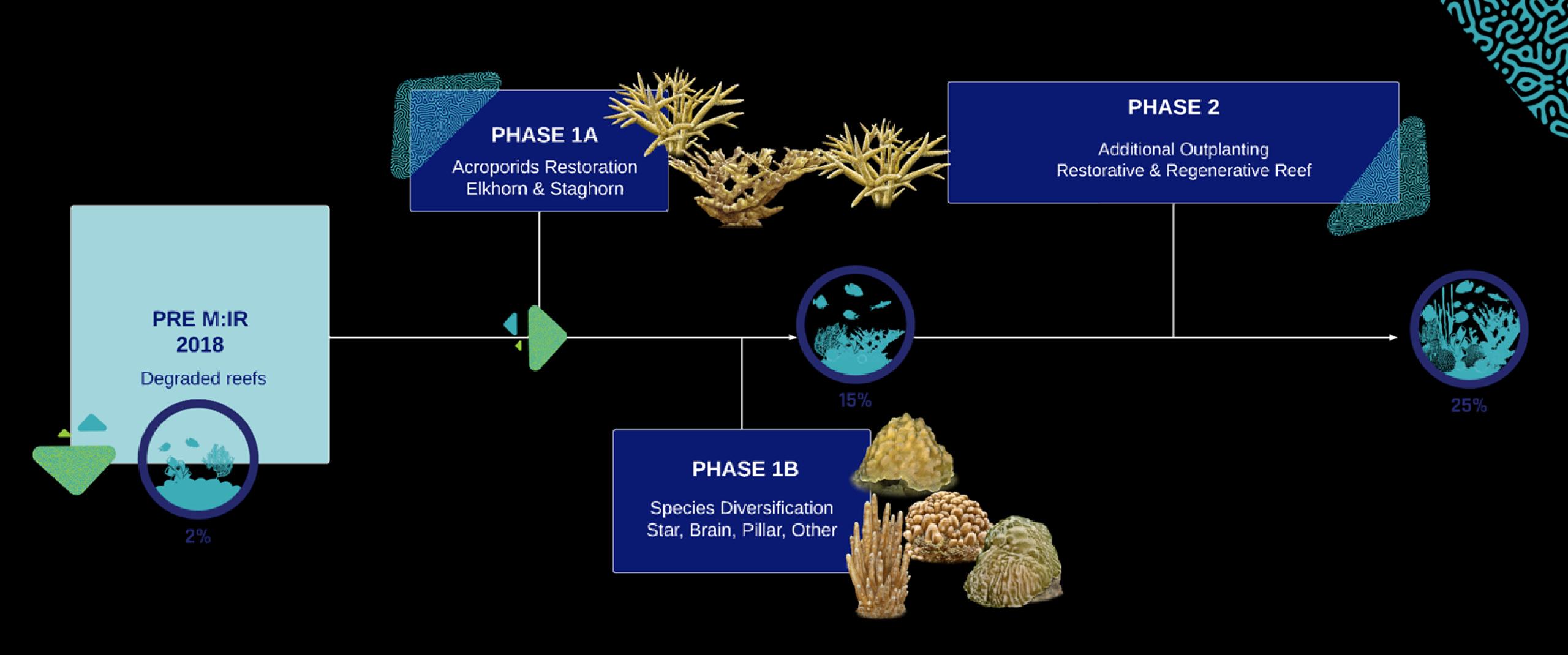


GRAND TOTALS

AREA RESTORED: 440,000 SQ M

CORALS PLANTED: ~750,000

To Restore Them Will Take Decades



2019 2020 2025 2021 2028 2025 2035

Status Quo

2%

Coral Cover

No action leaves the reef precipitous close to functional collapse and at significant risk major economic implications.

- Trending Down
- Ecological Catastrophe
- Widespread EconomicImplications
- Very Little Time

Phase 1a

10%

Coral Cover*

Elkhorn Restoration - focuses on quickly restoring reef structure with rapidly growing framework building corals that are not affected by the current disease event.

- Immediate Start
- No R&D Required
- No Special Permitting
- Rapid Results

Phase 1b

15%

Coral Cover

Balances the reef with a more diverse group of corals and the addition of other noncoral species such as grazers.

- Infrastructure Buildout
- Some R&D Needs
- 1-2 Year Ramp Up
- 7 Year ConstructionPeriod

Phase 2

25%

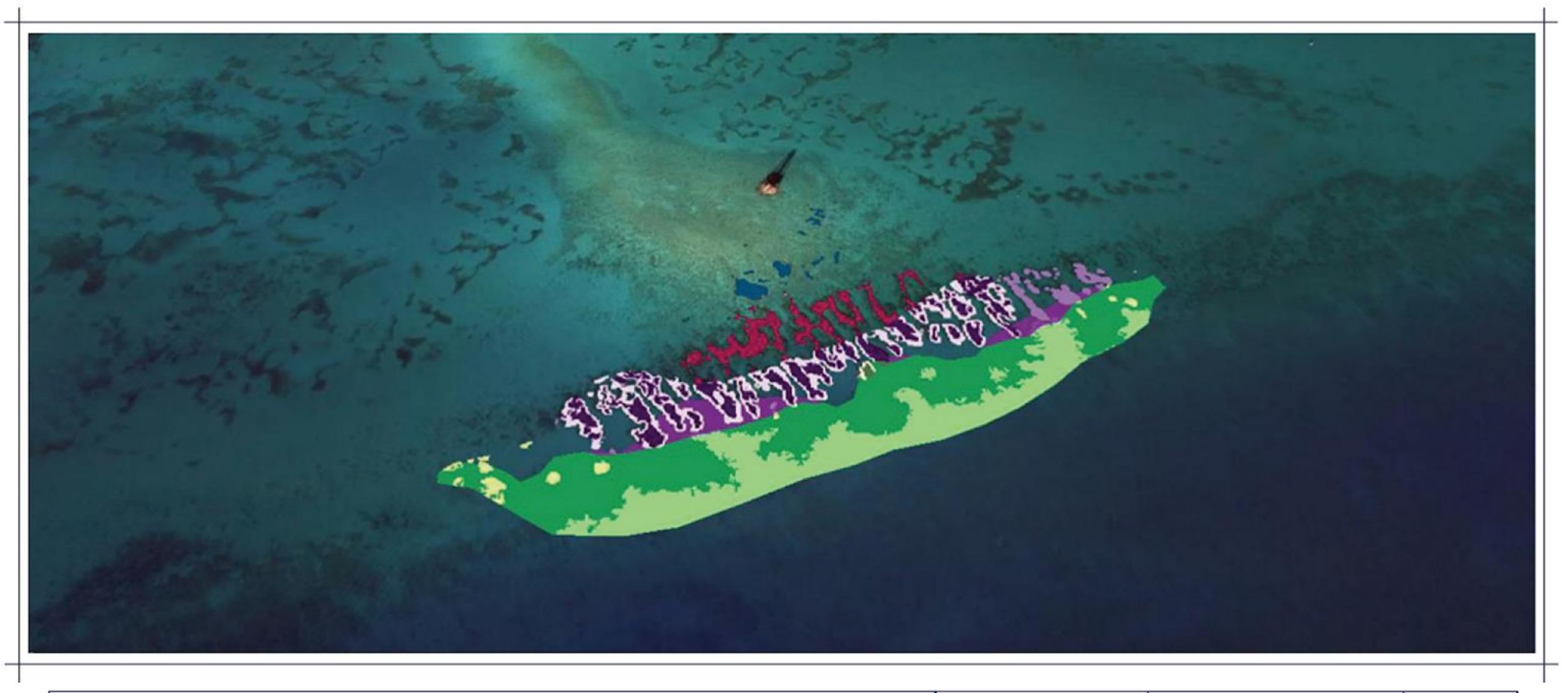
Coral Cover

Focuses on slower growing corals that give the reef its full diversity and cover.
Completion of Phase 2 should result in a resilient and regenerative reef.



- Utilizes Phase 1
 Infrastructure + New
- Achievable R&D
- 10 Year Construction Period

^{*} Within the appropriate reef sites and zones for species targeted in Phase 1A (Elkhorn Coral). All percent cover values are generalized estimates across the sites and zones. Exact values are available on a per reef and zone basis.



		_	
Sombrero	Reet -	/one	Manning
	11001	20110	Mapping

RESTORING SEVEN ICONIC REEFS: A MISSION TO RECOVER THE CORAL REEFS OF THE FLORIDA KEYS

November 2019



SHALLOW REEF CREST	240 sq м
REEF CREST (PALMATA ZONE)	2,525 sq м
Spur and Groove Top	3,325 sq м
Spur and Groove Wall	2,650 sq м
Deep Forereef	3,360 sq м

SHALLOW REEF CREST TARGET COVER = 10% ELKHORN CORAL = 10%

DEEF FOREREEF

TARGET COVER = 15%

STAR CORAL = 1%

BRAIN CORAL = 0.5%

STAGHORN CORAL = 13%

SMALL STONY CORAL = 0.50%

REEF CREST

TARGET COVER = 35%

ELKHORN CORAL = 27.5%

BRAIN CORAL = 1%

STAGHORN CORAL = 5%

SMALL STONY CORAL = 0.5%

BLADE CORAL = 1%

SPUR AND GROOVE

TARGET COVER = 20%

ELKHORN CORAL = 9%

STAR CORAL = 2%

BRAIN CORAL = 1%

PILLAR CORAL = 0.25%

STAGHORN CORAL = 6%

SMALL STONY CORAL = 1.50%

Reef Cross-Section by Zone and Target

RESTORING SEVEN ICONIC REEFS: A MISSION TO RECOVER THE CORAL REEFS OF THE FLORIDA KEYS

November 2019



SHALLOW REEF CREST	240 sq м
REEF CREST (PALMATA ZONE)	2,525 sq м
Spur and Groove Top	3,325 sq м
Spur and Groove Wall	2,650 sq м
Deep Forereef	3,360 sq м



Zone	2 - Reef Crest												
Postovahla Avaa (av m)	10.460	10,469 Coral Restoration Component Other Components											
Restorable Area (sq m)	10,469			Corai Restorati	on Component			Site Preparation			Sea Urchins		
	Completion Target		Phase 1 (10 Years	s)		Phase 2 (20 Years	s)	Site Condition Score	3	Moderate	% of Restorable Area to Target	50	0%
Target % Cover Increase	33.50%	25.00%	Area of Restored Coral (sq m)	Restoration Requirement (clusters/heads)	8.50%	Area of Restored Coral (sq m)	Restoration Requirement (clusters/heads)	Restoration Area (sq m)	1	0,469	Area (sq m)	5,2	234
Elkhorn Coral	27.50%	20.00%	2,094	10,133	7.50%	785	3,081	Site Prep (sq m/day)	300		# per sq m	3	3.0
Star Coral	0.00%	0.00%	0		0.00%	0			30	300	Phase 1 / 2 Allocation	50%	509
Barin Garat	0.000/	0.000/			0.000			Preperation Days Req.		35	# Sea Urchins	7,852	7,85
Brain Coral	0.00%	0.00%	0	0	0.00%	0	o o	Monitoring			Caribbean Kir	ng Crab	
Pillar Coral	0.00%	0.00%	0		0.00%	0		% of Zone	3	20%	% of Restorable Area to	0)%
Staghorn Coral	5.00%	5.00%	523	2,533	0.00%	0	0	Area (sq m)	2	,094	Area (sq m)	(0
04 5 11 55 51	1 000/	0.000/			1 000/	105	4 420	Plots per Zone		20.9	# per sq m	1	1.0
Other Small Stony Coral	1.00%	0.00%	0	0	1.00%	105	4,429	Plots/day Events/10 years	6	20	Phase 1 / 2 Allocation	50%	509
Other	0.00%	0.00%	0		0.00%	0		Monitoring Days Req.		70	# Crabs	0	0

Zone	3 - Spur and Gro	oove - Top																			
Bostovahla Avaa (sa m)	10.670	19,679 Coral Restoration Component Other Components																			
Restorable Area (sq m)	19,679			Coral Restorati	on Component			Site Preparation	Ž		Sea Urchins										
	Completion Target		Phase 1 (10 Year	s)	2	Phase 2 (20 Years	s)	Site Condition Score	3	Moderate	% of Restorable Area to Target	50	0%								
Target % Cover Increase	19.75%	16.83%	Area of Restored Coral (sq m)	Restoration Requirement (clusters/heads)	2.92%	Area of Restored Coral (sq m)	Restoration Requirement (clusters/heads)	Restoration Area (sq m)	19	9,679	Area (sq m)	9,8	839								
Elkhorn Coral	10.00%	10.00%	1,968	9,524	0.00%	0	0	Site Prep	Site Prep		200		# per sq m		3.0						
Star Coral	2.00%	0.50%	98	3,456	1.50%	295	7,992	(sq m/day)		300	Phase 1 / 2 Allocation	50%	50%								
Brain Coral	1.00%	0.350	49	1,728	0.75%	0.75%	148	2 006	Preperation Days Req.		66	# Sea Urchins	14,759	14,75							
Brain Corai	1.00%	0.25%		1,720			0.75%	0.75%	140 3,5	0.7570 140	8 3,996	Monitoring			Caribbean Kir	ng Crab					
Pillar Coral	0.25%	0.08%	16	485	0.17%	33	686	% of Zone		20%	% of Restorable Area to Target	0)%								
Staghorn Coral	6.00%	6.00%	1,181	5,714	0.00%	0	0	Area (sq m)	3	,936	Area (sq m)		0								
Oahan Small Stame Carel	0.50%		0		0.500/	00	4.163	Plots per Zone	3	39.4	# per sq m	1	1.0								
Other Small Stony Coral	0.50%	0.00%	0	U	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	98	4,163	Plots/day Events/10 years	6	20	Phase 1 / 2 Allocation	50%	50%
Other	0.00%	0.00%	0		0.00%	0		Monitoring Days Req.	3	131	# Crabs	0	0								

Core Project Components

RESTORING SEVEN ICONIC REEFS: A MISSION TO RECOVER THE CORAL REEFS OF THE FLORIDA KEYS

November 2019



SUMMARY				
CARYSFORT REEF	NEWFOUND HARBOR			
HORSESHOE REEF	LOOE KEY REEF			
CHEECA ROCKS	EASTERN DRY ROCKS			
Sombrero Reef				

Phase 1

ACTION: Add rapid-growing corals DURATION: 5-7 Years of Work 10-YR GOAL: ~15% cover

Region	Reef	Site Preparation	Coral Restoration	Grazer Addtions	Monitoring	Maintenance	Adaptive Mgt.	Total
Upper	Carysfort Reef	\$1,462,483	\$29,101,940	\$3,506,550	\$4,004,427	\$3,779,707	\$4,185,511	\$46,040,618
Keys	Horseshoe Reef	\$119,533	\$4,065,269	\$205,057	\$379,075	\$366,983	\$513,592	\$5,649,507
Middle	Cheeca Rocks	\$109,459	\$3,165,963	\$558,623	\$384,995	\$372,713	\$459,175	\$5,050,929
Keys	Sombrero Reef	\$280,068	\$3,293,394	\$363,454	\$417,479	\$404,161	\$475,856	\$5,234,413
	Looe Key Reef	\$710,247	\$12,393,494	\$1,550,820	\$1,781,336	\$1,615,838	\$1,805,173	\$19,856,908
Lower Keys	Newfound Harbor	\$123,738	\$1,192,572	\$398,366	\$261,967	\$253,611	\$223,025	\$2,453,280
INCYS	Eastern Dry Rocks	\$1,063,795	\$7,952,343	\$778,794	\$1,126,933	\$1,090,984	\$1,201,285	\$13,214,134
	Subtotal	\$3,869,323	\$61,164,977	\$7,361,664	\$8,356,213	\$7,883,996	\$8,863,617	\$97,499,790

Phase 1	Example	Cost Structure
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RESTORING SEVEN ICONIC REEFS: A MISSION TO RECOVER THE CORAL REEFS OF THE FLORIDA KEYS

November 2019



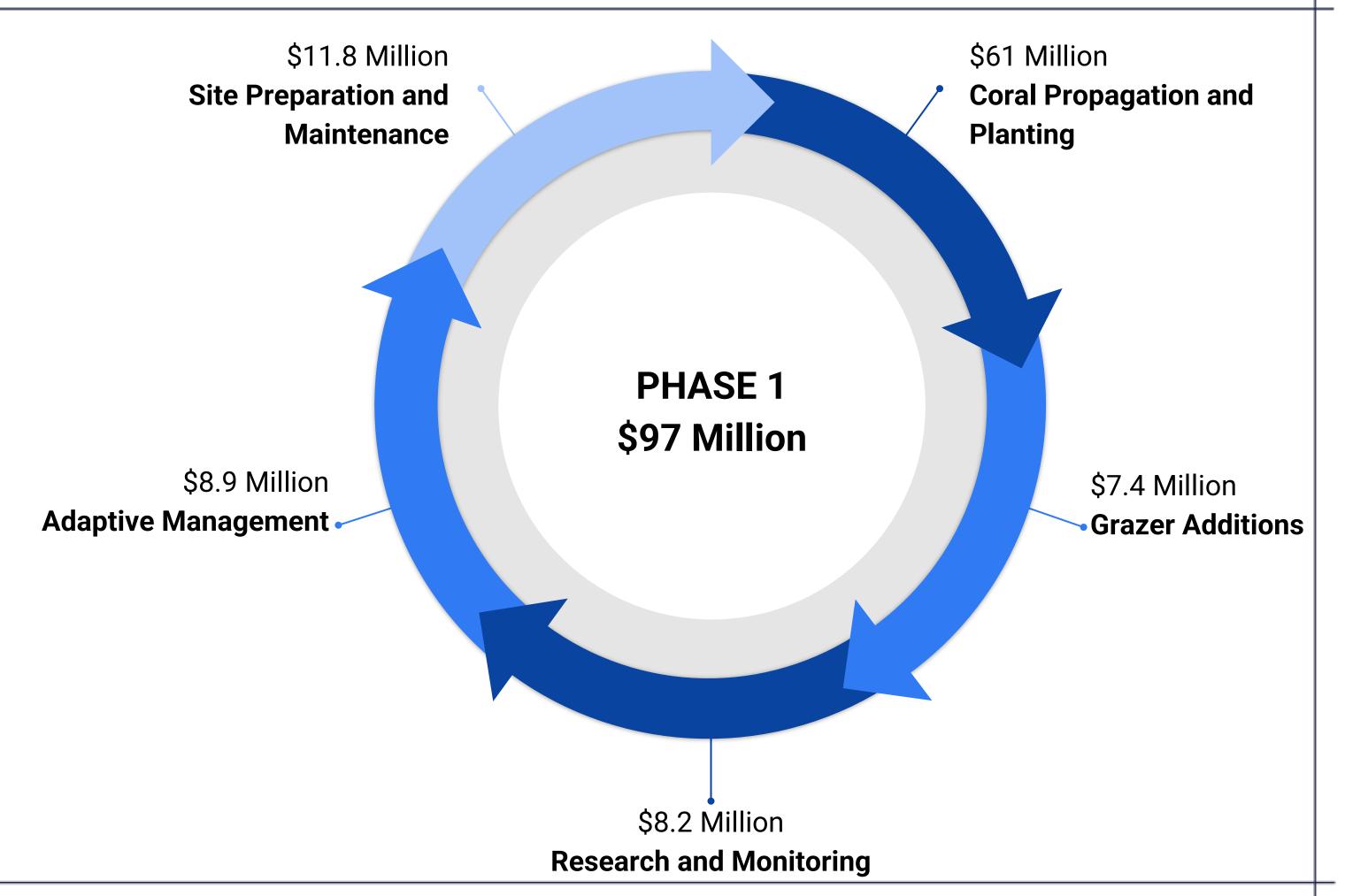
Sumi	MARY
CARYSFORT REEF	Newfound Harbor
HORSESHOE REEF	LOOE KEY REEF
CHEECA ROCKS	EASTERN DRY ROCKS
Sombrero Reef	

^{*} Provided as a sense of scale only of the funding necessary for local partners to execute Phase 1.

Phase 1

ACTION: Add rapid-growing corals DURATION: 5-7 Years of Work 10-YR GOAL: ~15% cover

Region	Reef	Total
I Innar Kaya	Carysfort Reef	\$45,803,168
Upper Keys	Horseshoe Reef	\$5,781,215
Middle Keys	Cheeca Rocks	\$5,050,929
	Sombrero Reef	\$4,989,497
Lower Keys	Looe Key Reef	\$19,976,449
	Newfound Harbor	\$2,453,280
	Eastern Dry Rocks	\$13,214,134
	Subtotal	\$97,268,672



Phase	1	Cost	Estimate
1 1105	上	C031	

RESTORING SEVEN ICONIC REEFS: A MISSION TO RECOVER THE CORAL REEFS OF THE FLORIDA KEYS



SUMMARY	
CARYSFORT REEF	NEWFOUND HARBOR
HORSESHOE REEF	LOOE KEY REEF
CHEECA ROCKS	EASTERN DRY ROCKS
Sombrero Reef	

We are not just outplanting more corals

We Are Monitoring Progress





Duke University



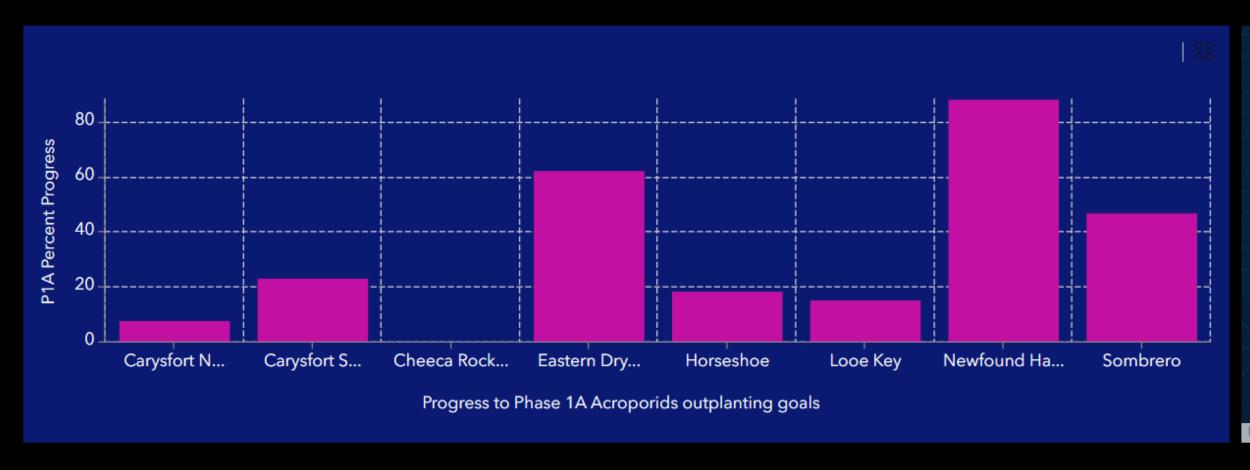
ACCOMPLISHMENTS DASHBOARD

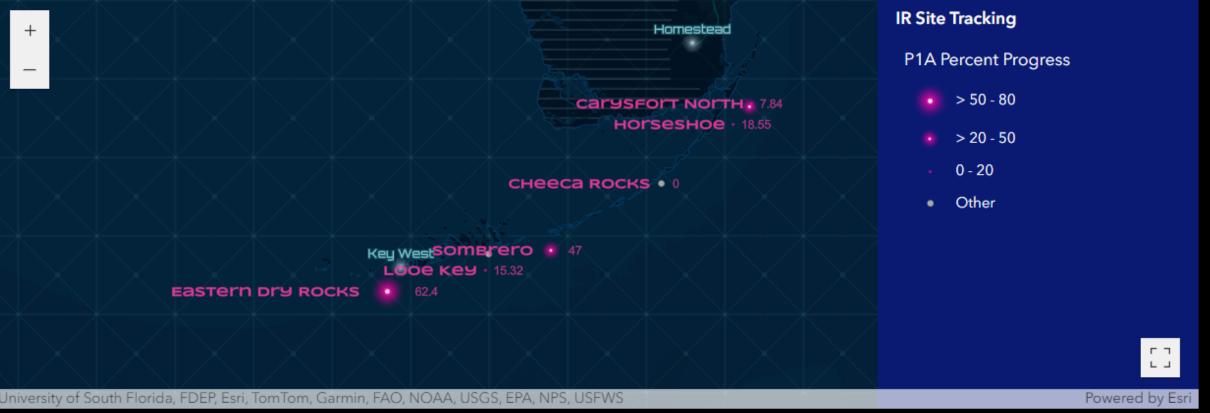


PHASE 1A PROGRESS

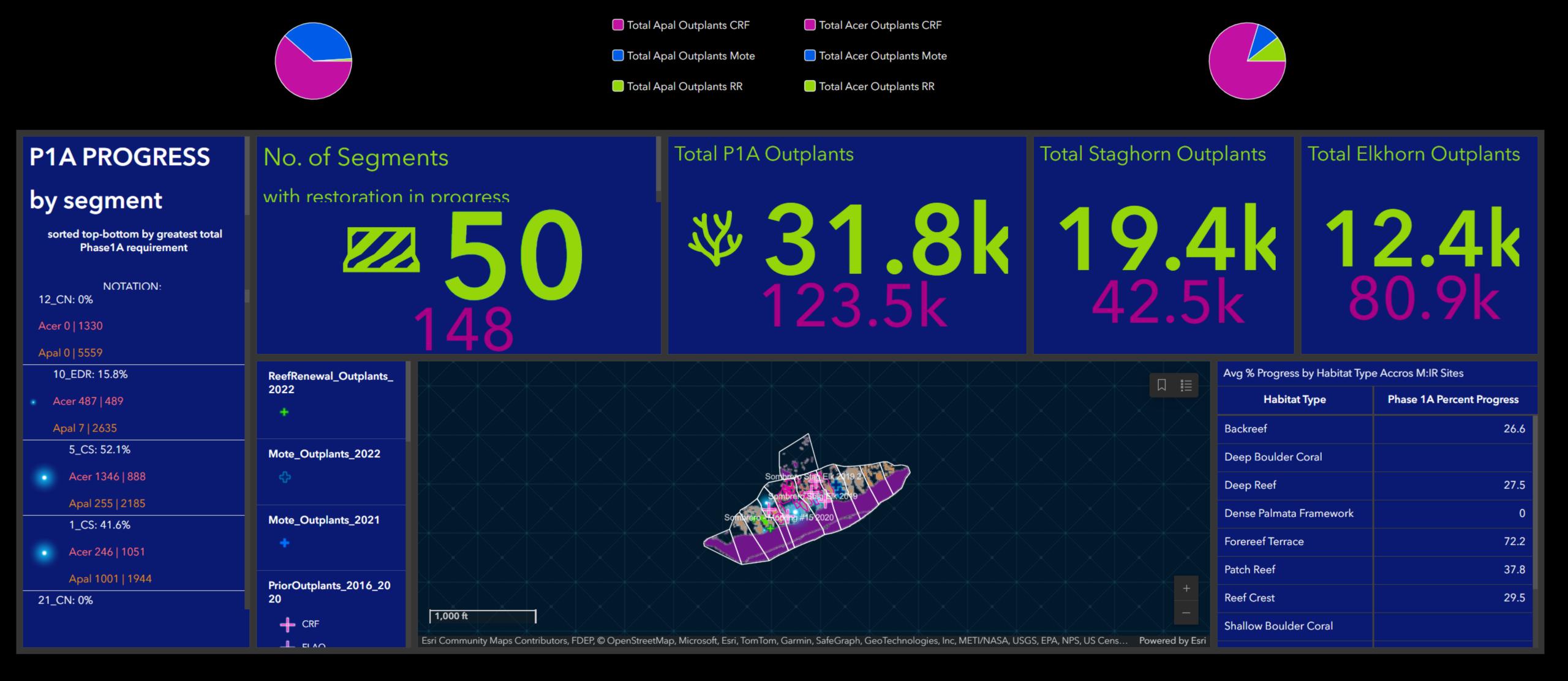
25.74%

PROGRESS TO PHASE 1A RESTORATION TARGETS

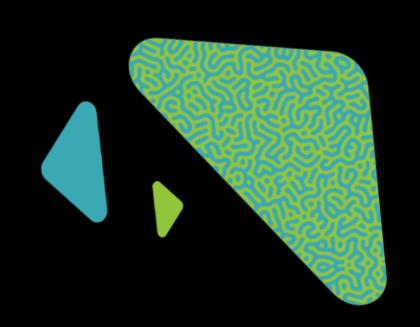




ACCOMPLISHMENTS DASHBOARD







26% overall progress to Phase 1A restoration outplanting goals

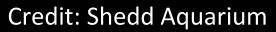
46% to Staghorn goal

15% to Elkhorn goal



Coral Condition Surveys



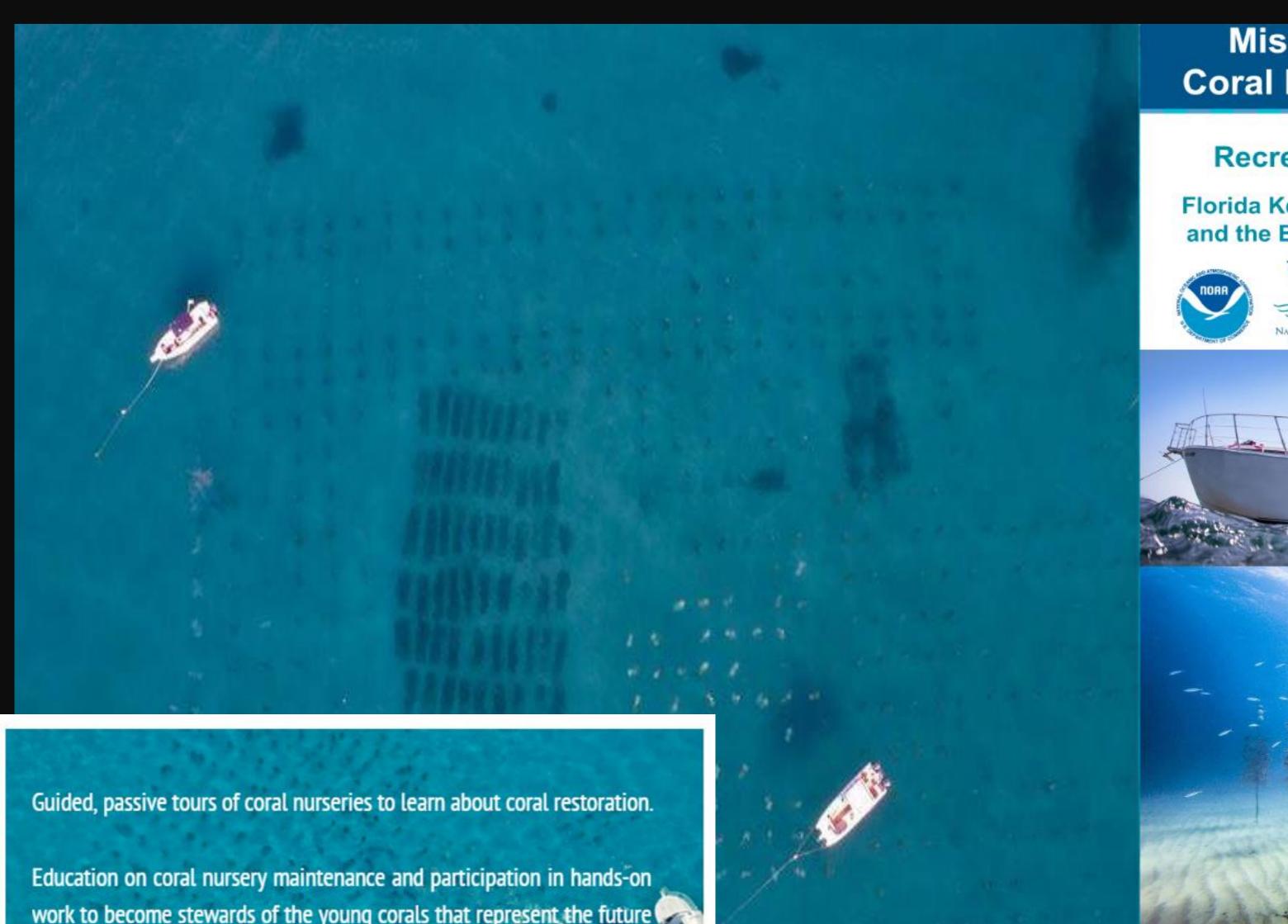




Credit: NOAA



Credit: Ben Edmonds



Mission: Iconic Reefs **Coral Restoration Program**

Recreational Diver Training

Florida Keys National Marine Sanctuary and the Blue Star Restoration Program







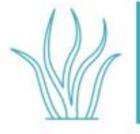




TIER 1



TIER 2





work to become stewards of the young corals that represent the future of our reefs.

"Adopt" a Mission: Iconic Reefs site through regular care and gardening of newly outplanted corals to ensure they grow into resilient reefs.























National Marine Sanctuary Foundation

















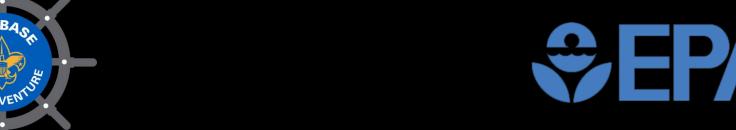














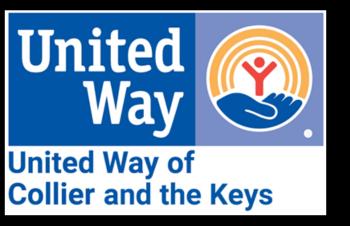














ICONIC REEFS



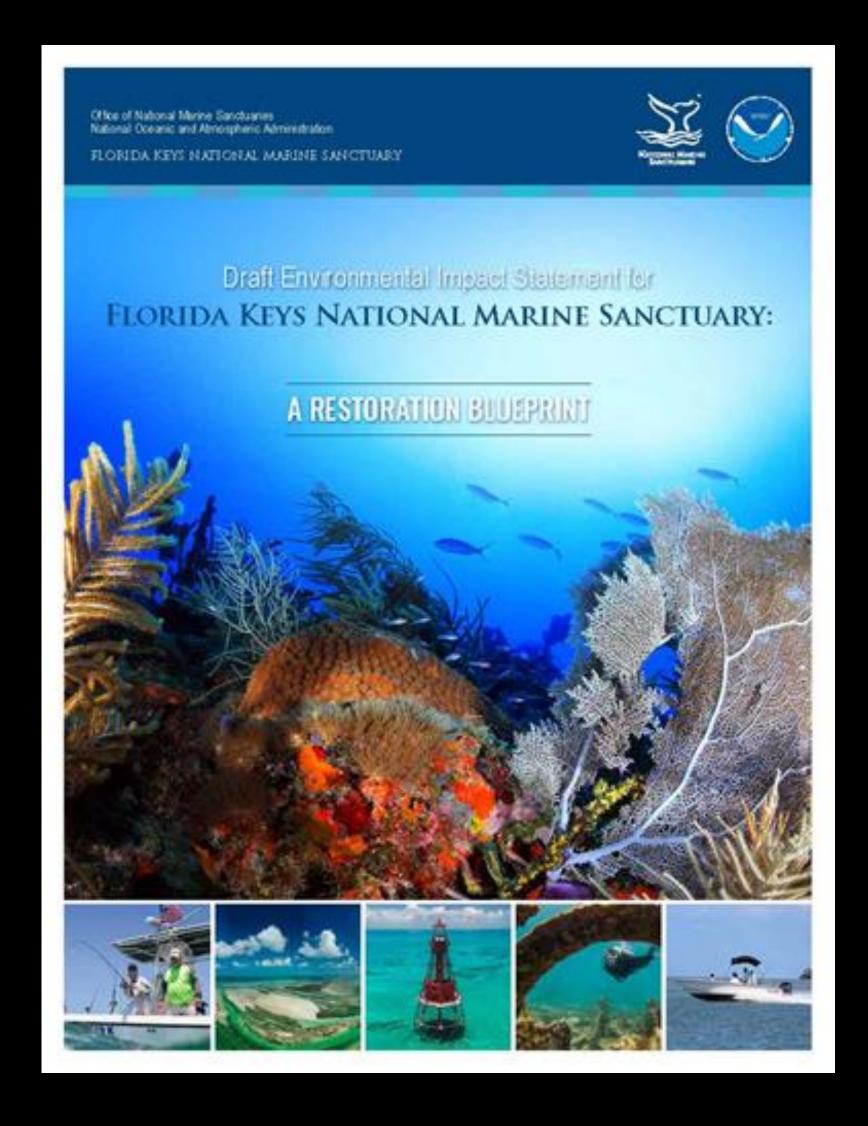
Coral Restoration Foundation

COMPREHENSIVE MANAGEMENT REVIEW







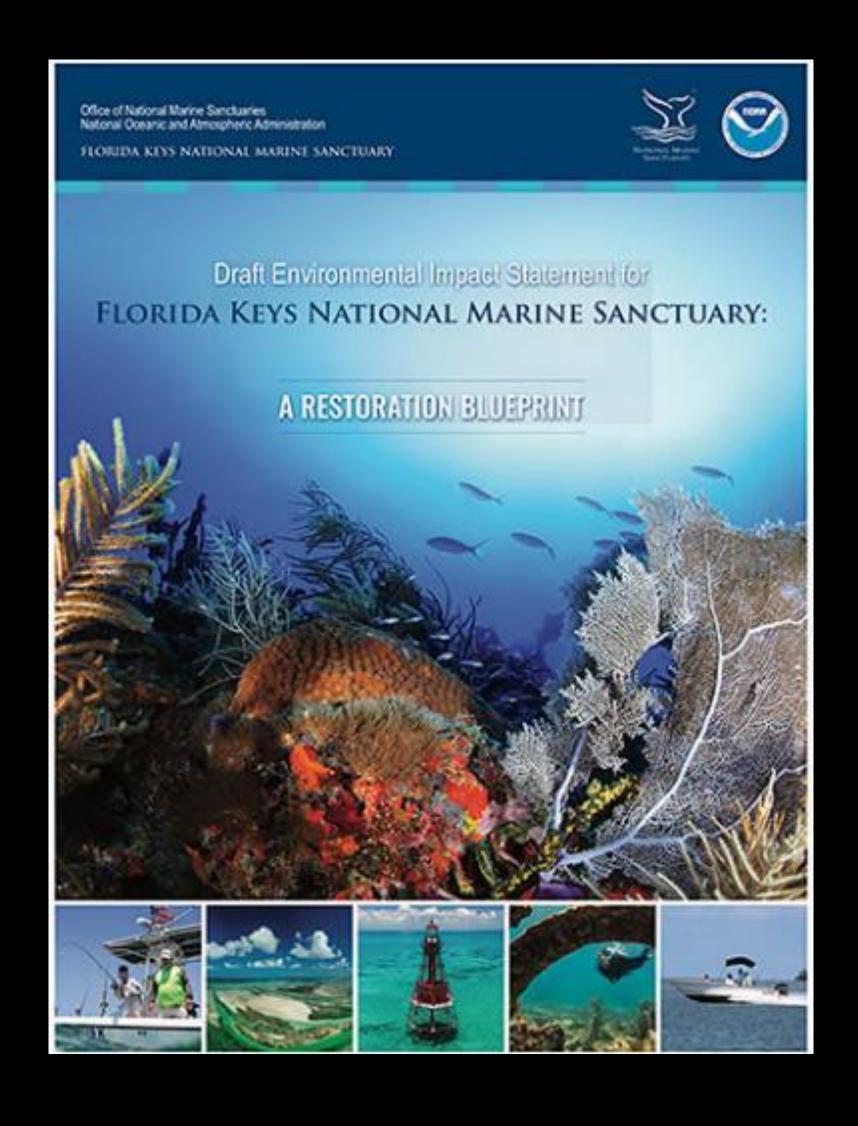




Community Led Effort

Since the process began:

- 85 Advisory Council or
 Working Group Meetings
- 70 Public Meetings
- ~50 Community Presentations
- 16 Public scoping/comment sessions
- Agency Collaboration (46 state & federal briefings)
- Over 80,000 public comments



Proposed regulations for:

- Sanctuary boundary
- Sanctuary-wide regulations
- Marine zones & zone-specific regulations

Proposed Rule is informed by:

- Public and agency comment
- Updated socio-economic and environmental data

*Management Plan is a separate document





RESTORATION AREAS

Protect Nurseries & Facilitate Restoration

Proposed new zone type

Create a restoration permit category



4 Habitat Restoration Areas

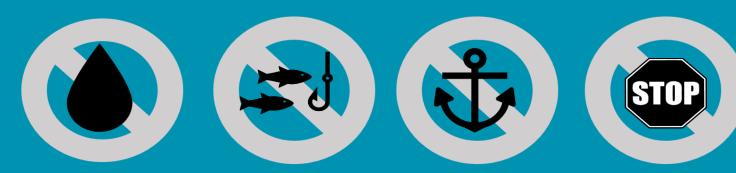
Same as SPAs - no discharge, no take, no anchor

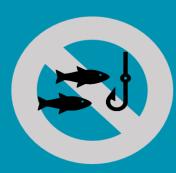






9 Nursery Restoration Areas Same as SPAs + transit only











RESTORATION AREAS

Tavernier Nursery Restoration Area: proposed new (0.19 sq miles) Pickles Reef Habitat Restoration Area: proposed new (0.11 sq miles)







Photo Credit: Coral Restoration Foundation

Two-year old elkhorn coral outplants before and after anchor damage (Sept. 2019).

Since Start of Restoration Blueprint...

