



National Estuarine
Research Reserve System
Science Collaborative

Mangrove forest recovery in Rookery Bay National Estuarine Research Reserve following Hurricanes Irma & Ian

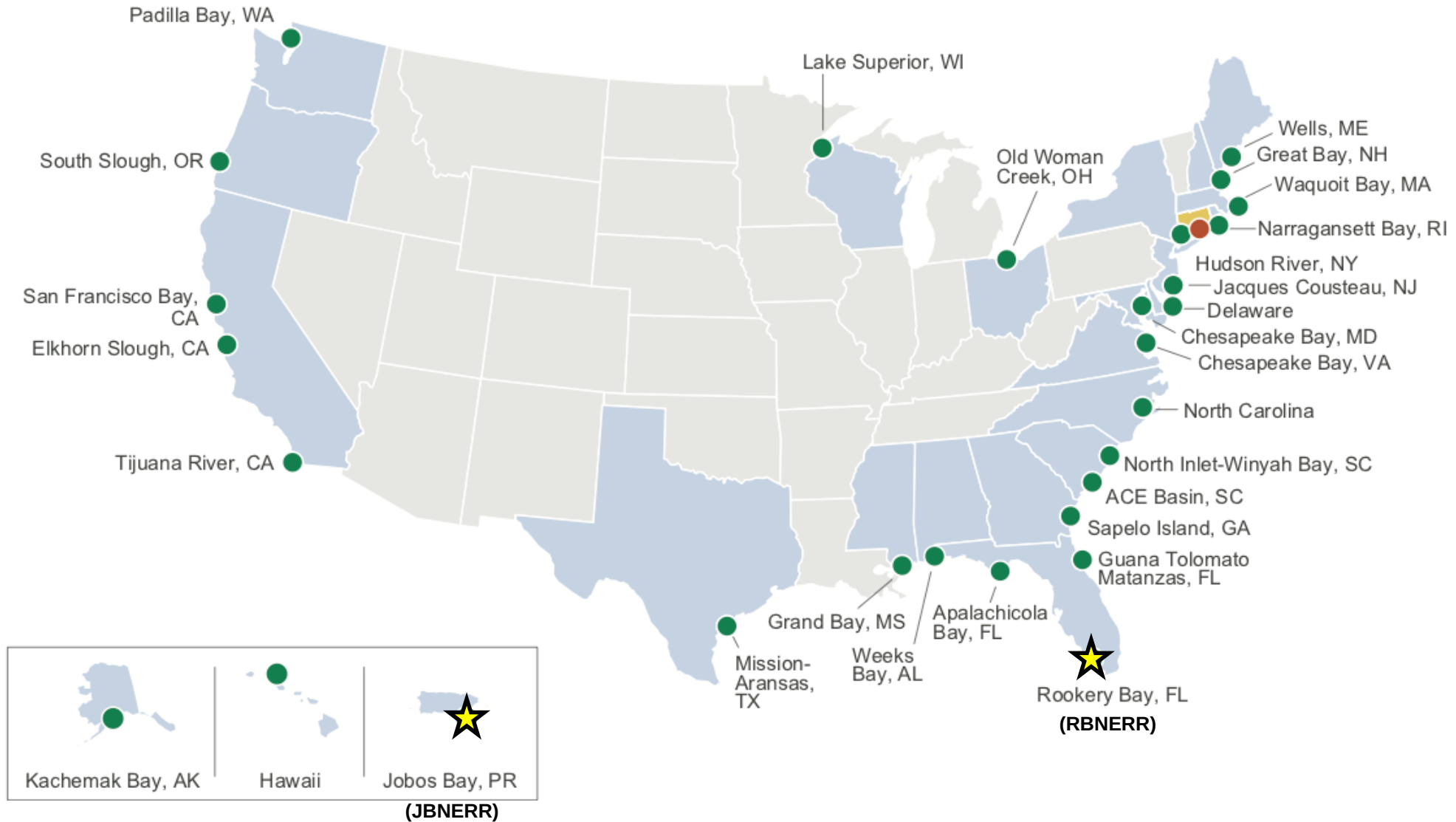
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U.S. National Estuarine Research Reserve (NERR) System





Institute of
Environment



UNIVERSITY OF
SOUTH FLORIDA
College of MARINE SCIENCE



Duke

NICHOLAS INSTITUTE
for ENERGY, ENVIRONMENT
& SUSTAINABILITY

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Jay Black (RBNERR)
Sarah Falkowski (RBNERR)
Marissa Figueroa (RBNERR)
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Frank Muller-Karger (USF)
Digna Roa-Rueda (USF)
Tylar Murray (USF)
Sara Mason (Duke)
Danielle Ogurcak (FIU)
Brita Jessen (SC Sea Grant)



2017 Hurricane Season – 17 Named Storms



September 8, 2017
NASA/NOAA

Hurricane Irma

September 10, 2017 – Cat 3 (115 mph) at landfall in RBNERR

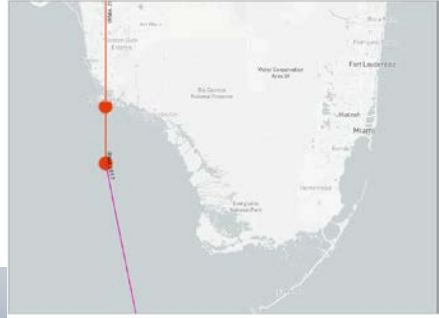
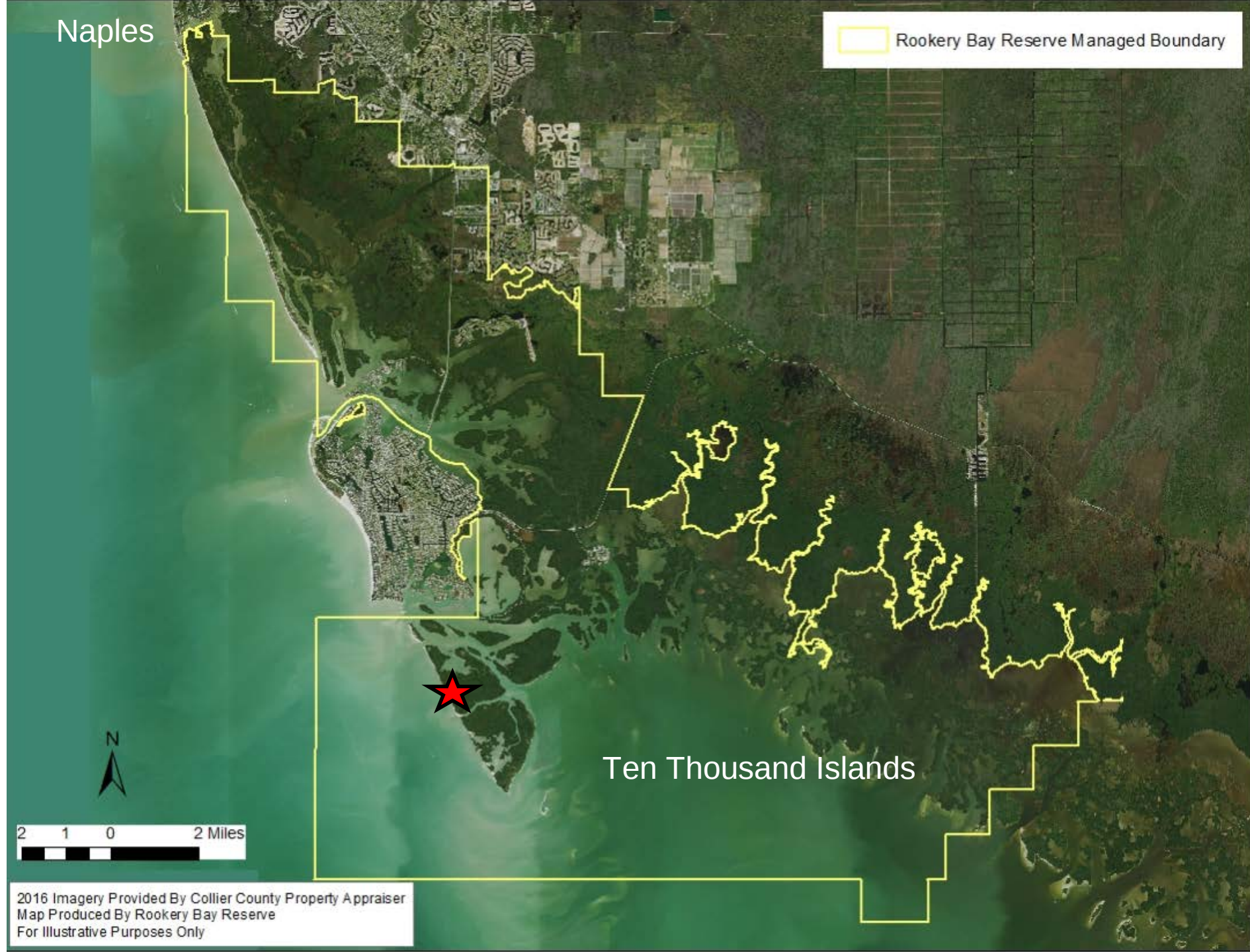


Photo: Naples, FL
aftermath of
Hurricane Irma
(credit: Brian
Emfinger, LSM)

Rookery Bay NERR

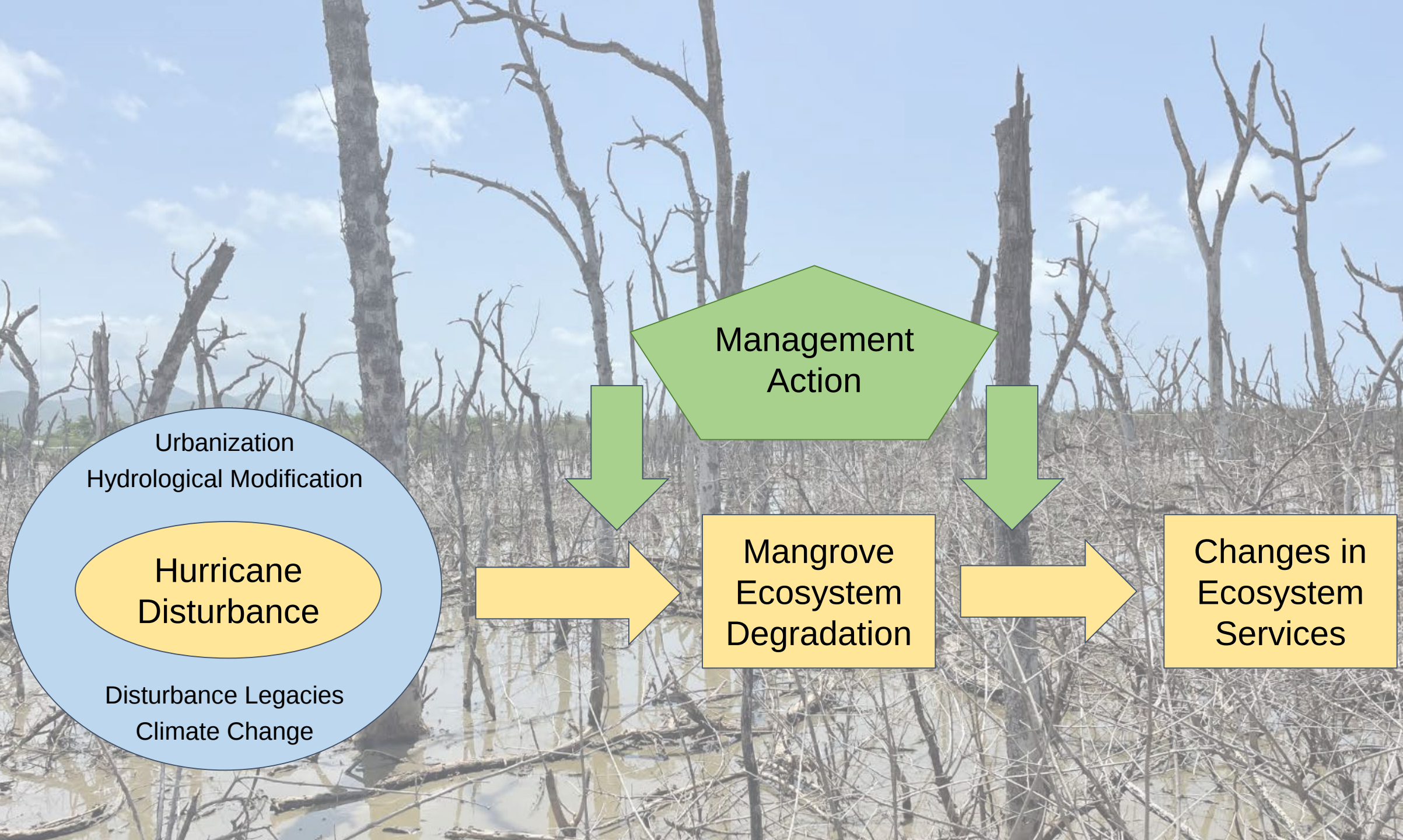
Total Acres:
110,000

Mangrove Forest
Acres: ~30,000



Avicennia germinans

[illegible]

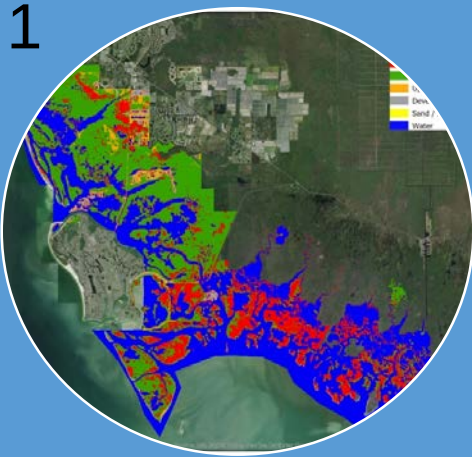


Management Decision: Should this site be restored?



Co-production of Actionable Science (Beier et al. 2016 *Conservation Letters*)

Mangrove Coast Collaborative Research Outputs



Storm Damage and
Recovery Maps
(2010 – 2020)

USF: Frank Muller-Karger,
Digna Roa-Rueda, Tylar Murray



Field Assessment
and Ecological
Driver Modeling

FIU: Danielle Ogurcak



Ecosystem Services
Evidence Library
and Gap Map

Duke University: Lydia Olander
& Sara Mason



Assessment of
Decision-Making
Frameworks

South Carolina Sea Grant:
Brita Jessen

Approach to Co-production used in the MCC

Jobos Bay
Local Project
Advisory
Committee

Rookery Bay
Local Project
Advisory
Committee

Technical
Project
Advisory
Committee

36 members representing 25 institutions



May 2021 PAC Meetings

We asked the PACs for input on *Understanding how drivers of degradation have led to declines in mangrove ecosystem resilience in both reserves*

- 1) Where should we focus field sampling efforts?
- 2) What metrics should we sample to assess mangrove degradation or recovery?



11800 ha of mangrove forest pre-Hurricane Irma

Forest by
Dominant
Species

Area
(ha)

Avicennia

1638

Rhizophora

3583

Mixed

6600

Hurricane Irma
path

Mangrove
Forest (2010 RBNERR Habitat Map)



0 2.5 5 10
Kilometers

- Selected 72 stratified random sampling locations of which 64 were accessible
- Selected an additional 5 targeted locations with input of advisory committee

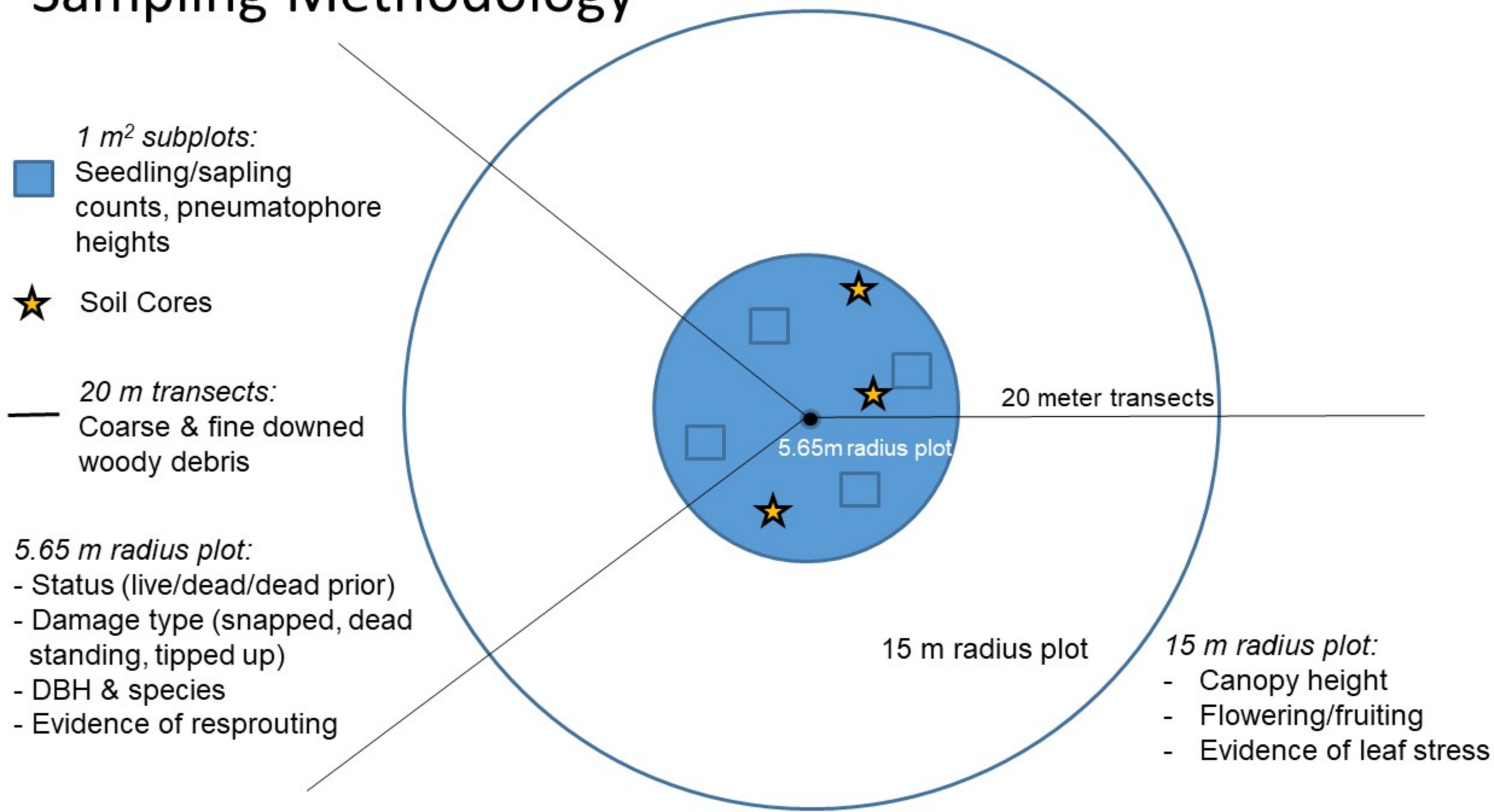
Sampling Locations
Species

- Black (22 plots)
- Mixed (23 plots)
- Red (24 plots)



0 2.5 5 10
Kilometers

Sampling Methodology



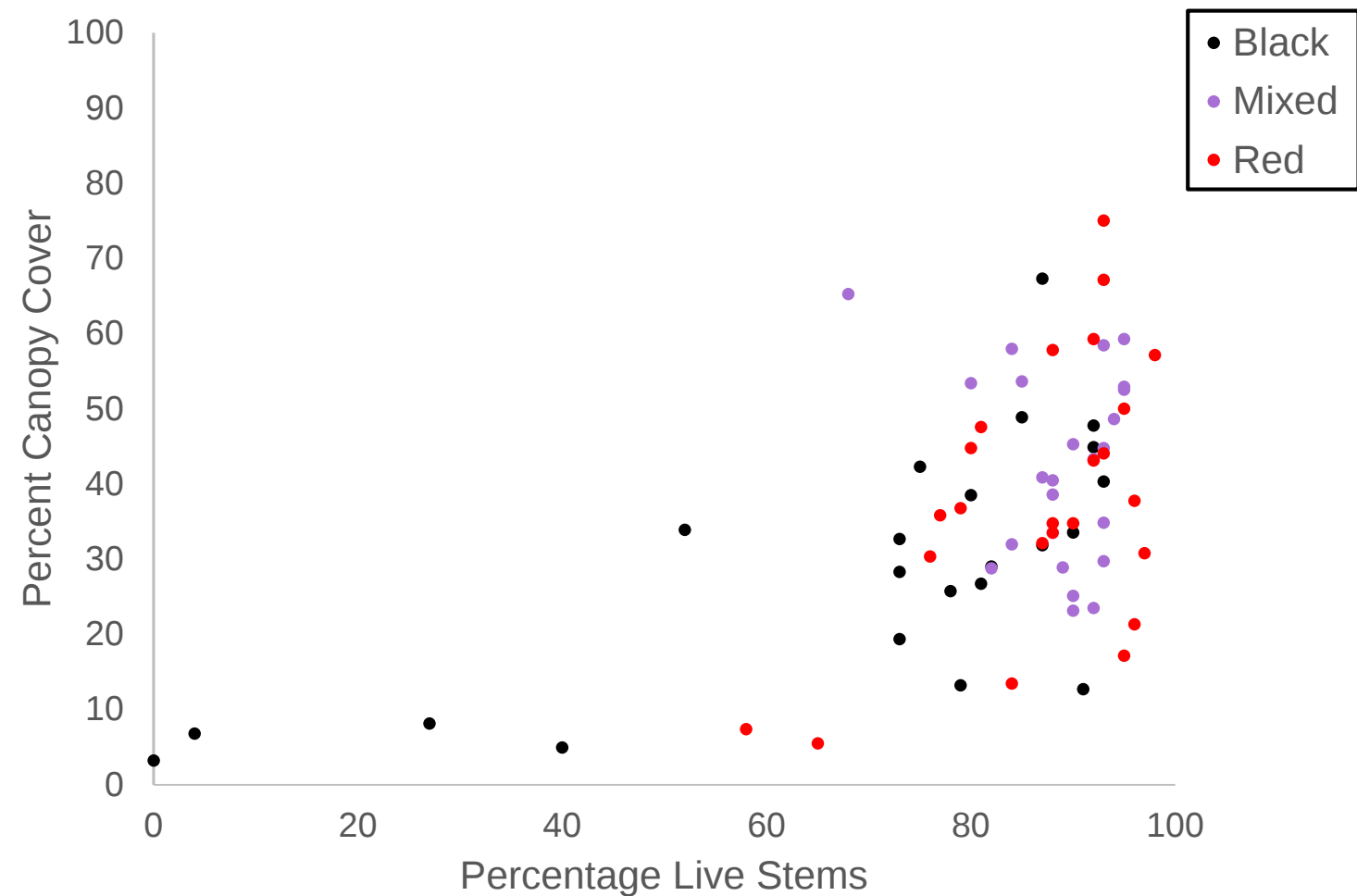


Field Campaign

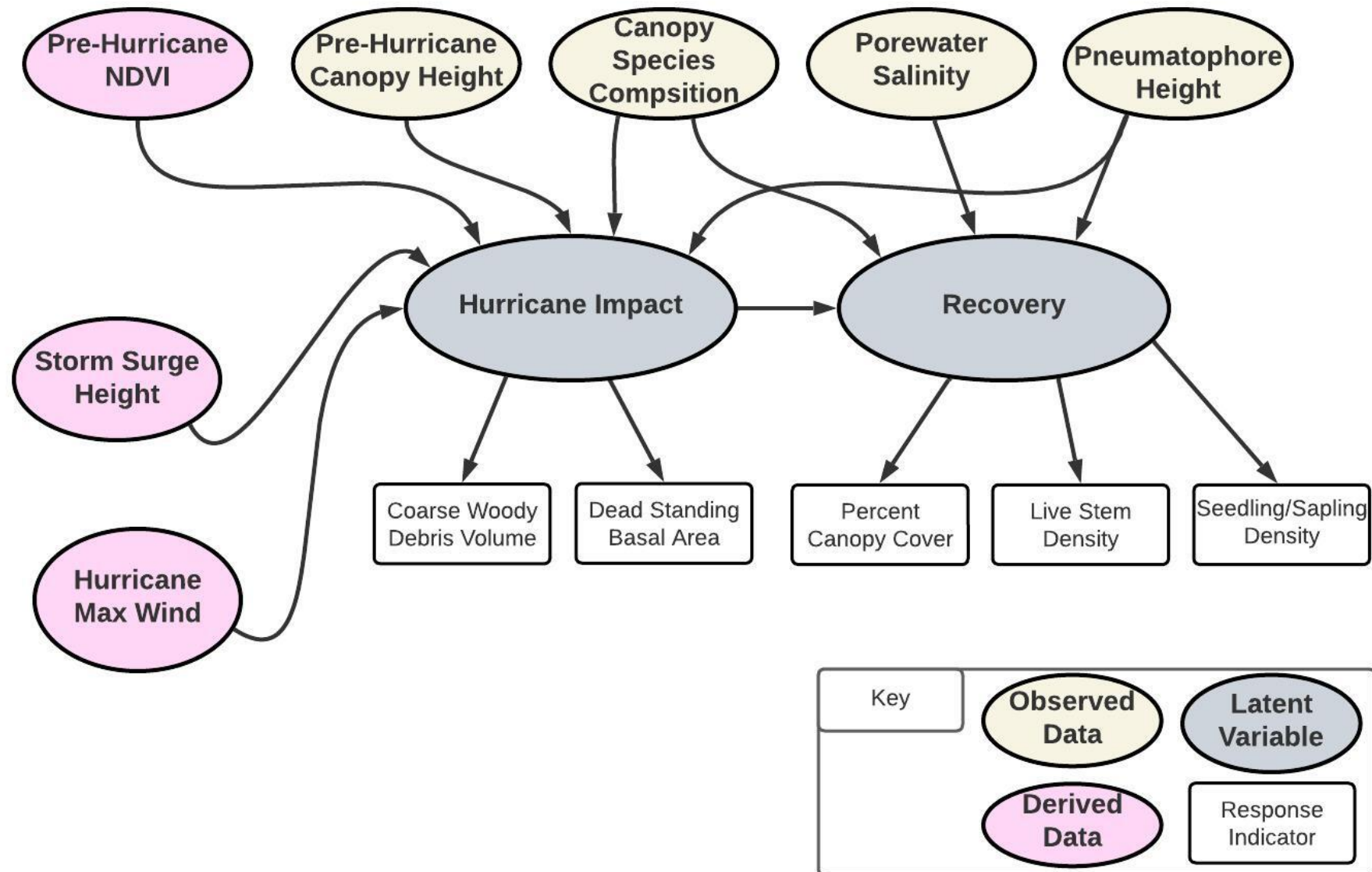
March 2022 – March 2023

Reserve	# Plots	# Days	# Stems
JBNERR	64	81	10,001
RBNERR	69	77	8,459

Comparison of Live Stems to Canopy Cover of each plot



Hypothesis of Impact & Recovery of Mangrove Forest 5 years post-Hurricane Irma



NSC Catalyst Grant (Oct 2023 – Sept 2024)



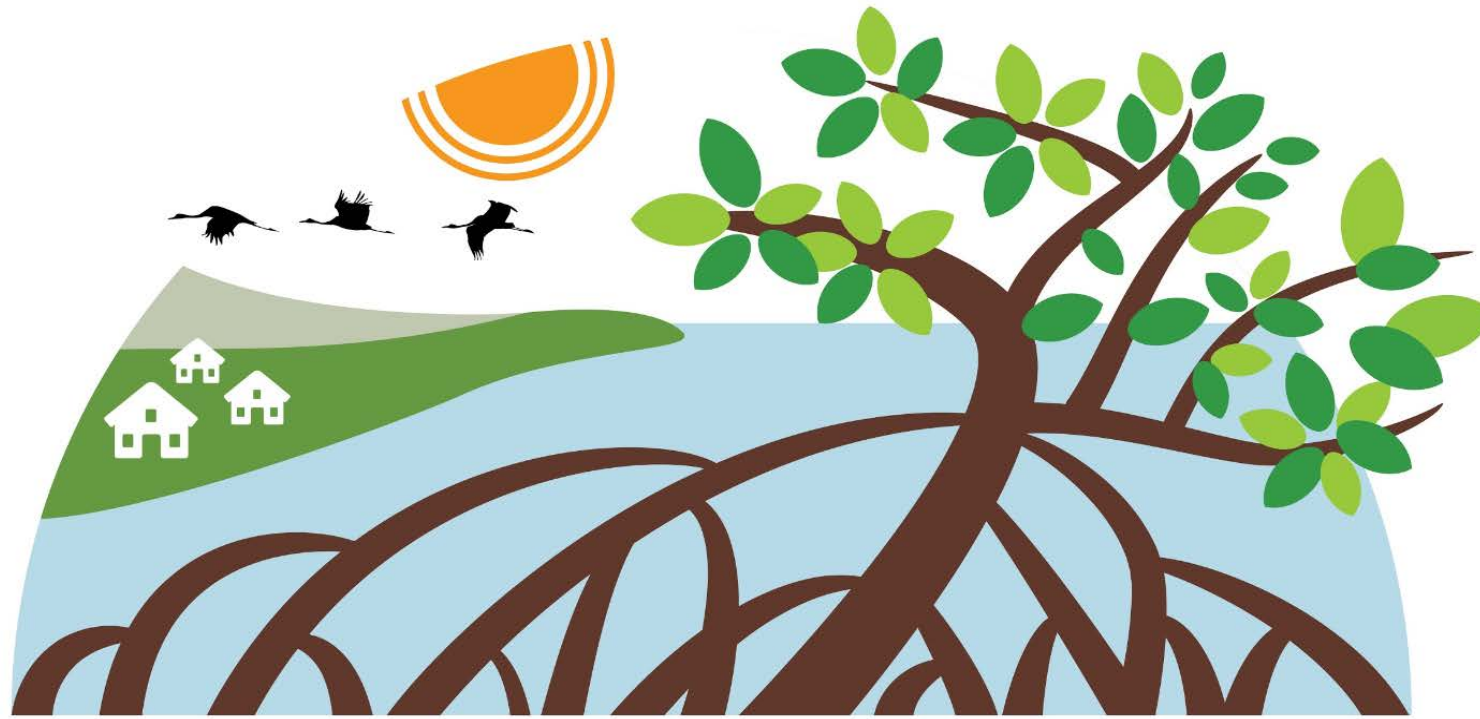
Thank You!

Project Advisory Committee Members

Mike Barry (Tatenda)
Brian Bovard (FGCU)
Ruperto Chaparro (PR Sea Grant)
Sean Charles (ECU)
Carlos Coronado (SFWMD)
Karen Cummins (Tall Timbers)
Mark Danaher (USFWS)
Daniel Davila (Para La Naturaleza)
Rene Esteves (PR Sea Grant)
Laura Flynn (Coastal Resources Group)
Yogani Govender (Interamerican Univ.)
Ken Krauss (USGS)

David Lagomasino (ECU)
Felix Lopez (USFWS)
Ariel Lugo (USFS IITF)
Chris Mason (Collier County)
Manuel Matos (USDA NRCS)
Matthew McCarthy (ORNL)
Julio Morell (CARICOOS)
Ryan Moyer (TerraCarbon)
Ernesto Olivares (Para La Naturaleza)
Randall Parkinson (FIU)
Deborah Parrilla (UPR)
Maulik Patel (Florida State Parks)

Kara Radabaugh (FWC FWRI)
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Andre Rovai (ACOE)
Abdiel Santana (USDA NRCS)
Rolando Santos Corujo (FIU)
Michael Sipos (Florida Sea Grant)
Jessica Tipton (Clemson University)
Chad Washburn (Naples Botanical Garden)
Kathy Worley (Conservancy of SW Florida)



MANGROVE COAST COLLABORATIVE

COLABORACIÓN EN MANGLES COSTEROS

*For more information
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