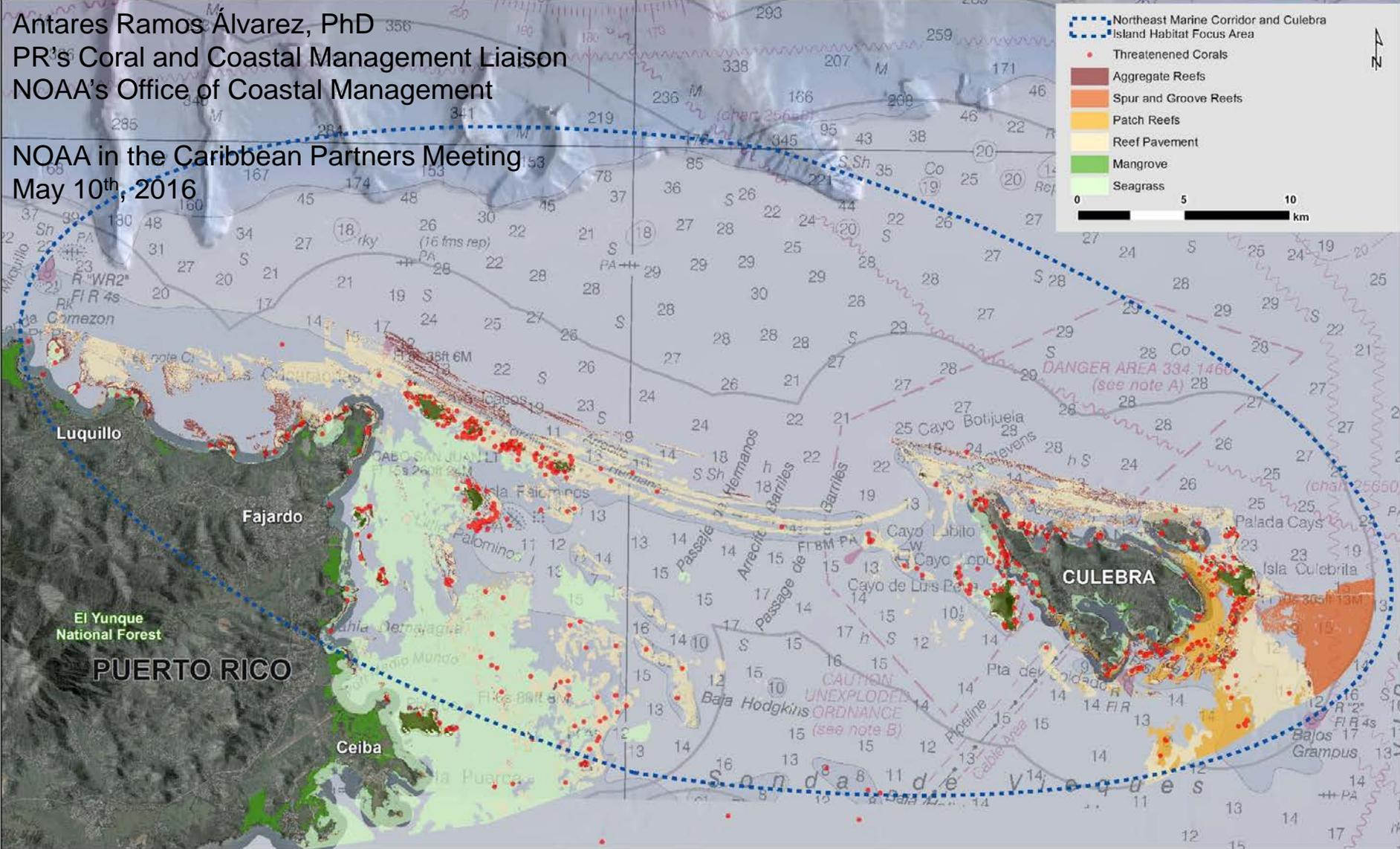
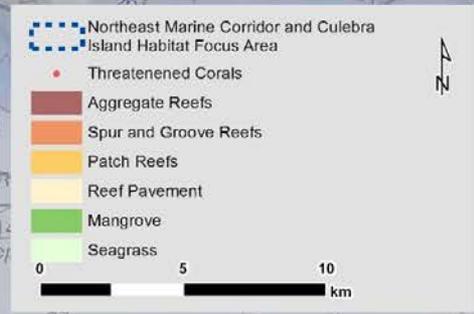


NOAA's Habitat Blueprint:

The Northeast Marine Corridor and Culebra Island Habitat Focus Area

Antares Ramos Alvarez, PhD
PR's Coral and Coastal Management Liaison
NOAA's Office of Coastal Management

NOAA in the Caribbean Partners Meeting
May 10th, 2016



NOAA's Habitat Blueprint Initiative

PURPOSE - Work as "One NOAA"

The **Habitat Blueprint** provides a forward looking framework for NOAA to think and act strategically across programs and with partner organizations to address the growing challenge of coastal and marine **habitat loss and degradation**.

We will increase the effectiveness of our efforts to improve habitat conditions for fisheries, coastal and marine life, along with other economic, cultural, and environmental benefits our society needs and enjoys.

NOAA's Habitat Blueprint Initiative

OUTCOMES

- Sustainable and abundant fish populations
- Recovered threatened and endangered species
- Protected coastal and marine areas and habitats at risk
- Resilient coastal communities
- Increased coastal/marine tourism, access, and recreation

NOAA's Habitat Blueprint Initiative

OBJECTIVES

- Foster and leverage partnerships
- Integrate and improve the delivery of habitat science across disciplines to facilitate conservation actions
- Make decisions in an ecosystem context that considers competing priorities
- Implement innovative **place-based** habitat solutions to address coastal and marine resource challenges

Steps in the HFA Process

- Competition of sites
- Site is selected and included into Habitat Blueprint Initiative as a Habitat Focus Area (HFA)
- NOAA team is put together with representative of DNER
- Implementation Plan (IP) is drafted
- IP draft taken to stakeholders and the HB National Council
- IP is finalized
- Implementation starts**

10 HFAs in the Nation

Why Puerto Rico's NE Marine Corridor and Culebra Island?



- Variety of high value ecosystems support tourism, recreational, and commercial fisheries
- NOAA and its partners can move the conservation needle here
- **Major habitat conservation issues**
 - Land based sources of pollution into marine habitats
 - Recreational pressure
 - Unsustainable and illegal fishing
 - Climate change

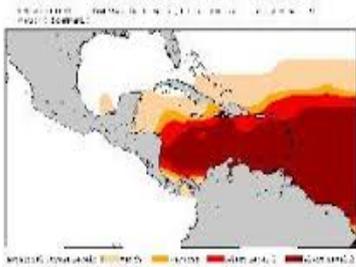
Habitat Focus Area Goals



- **Habitat Resilience** - Improved management to support coral reef, seagrass, and coastal habitat resilience.
- **ESA Coral Recovery** - Increased population size, abundance, and health of ESA-listed corals.
- **Inform Fishery Management** - Sustainable management of living marine resources.
- **Sustainable Recreation** - Promotion of recreational practices that preserve the ecological integrity of marine habitats.

How NOAA is working in the HFA:

Coral Reef Watch



Forecasting coral bleaching to prepare managers.

Weather Ready Nation



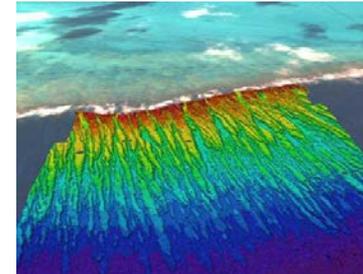
Real-time storm surge predictions to protect coastal societies.

Southeast Fisheries Science Center



Spawning aggregations and conch habitat identified for conservation.

National Centers for Coastal Ocean Science



Benthic habitat mapped, vessel use tracked for more appropriate zoning.

Restoration Center



On the ground actions to reduce threats and restore habitat.

Coral Reef Conservation Program



Supports effective management and sound science to preserve, sustain and restore valuable coral reef ecosystems for future generations.

Local Partnerships (e.g., DNER)



Culebra Action Plan Priorities



HFA Goal Culebra Action	Habitat Resilience	ESA Coral Recovery	Inform Fisheries Management	Sustainable Recreation
1: Implement Watershed Restoration Projects	X	X		
2: Recover threatened Acropora coral populations.	X		X	
3: Support fisheries management decision-making			X	
4: Identify nursery habitats for key fishery species			X	
5: Reduce boating, diving, swimming, and snorkeling impacts	X			X
6: Install Aids to Navigation	X	X		X
7: Implement population enhancement methods for ESA-listed corals	X	X		
8: Conduct emergency coral restoration	X	X		X

Cordillera Action Plan Priorities

La Cordillera Action \ HFA Goal	Habitat Resilience	ESA Coral Recovery	Inform Fisheries Management	Sustainable Recreation
1: Recover threatened <i>Acropora</i> coral populations	X	X		
2: Reduce recreational impacts on reefs	X	X		X
3: Support fisheries management decision-making	X		X	
4: Identify nursery habitats for key fishery species			X	
5: Develop population enhancement methods for other ESA-listed corals	X	X		
6: Install aids to navigation	X	X		
7: Conduct emergency coral restoration	X	X		X



Management-Driven Science Action Plan Priorities

HFA Goal \ Science Action	Habitat Resilience	ESA Coral Recovery	Inform Fisheries Management	Sustainable Recreation
1: Protect commercially important fish stocks through the identification of grouper spawning aggregations.	X		X	
2: Apply climatic information to enhance management actions.	X	X		
3: Establish water quality targets to inform LBSP management targets.	X		X	
4: Improve characterization of fishery impacts on managed resources and habitats.	X		X	
5: Develop and implement reef resilience surveys to inform management decision making.	X	X		
6: Model connectivity and apply remote sensing tools to target LBSP reduction efforts	X	X	X	
7: Characterize distribution of vessels to predict human-use impact.	X		X	
8: Predict storm surge in real time	X		X	



NOAA HFA Team

- **Leads** - NOS & NMFS
- **HQ Liaison**
- **Core Team**
- **Topic Leaders**
 - Human Aspects Group
 - Land-Based Sources or Pollution Group
 - Marine Group

Some NOAA products in the HFA

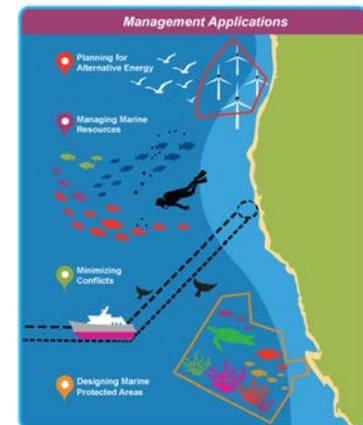
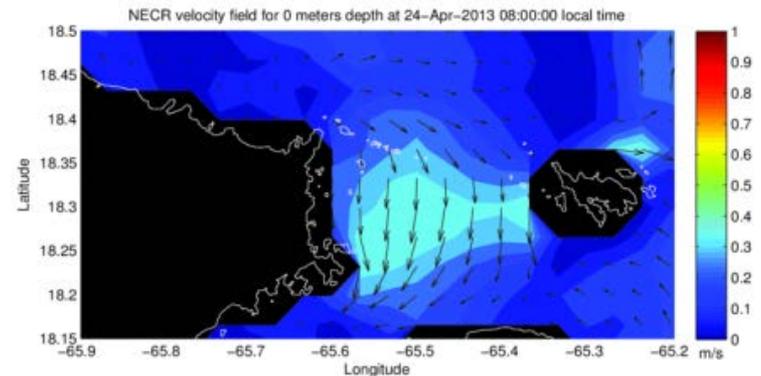
Benthic Map of NE Reserves and Culebra Island

Ecological Characterization

Ecological Prioritization

Characterization of hydrodynamics of area

User profiling and perspectives



Next Steps

Implementation of Implementation Plan (IP)

Continue building Partnership

→ How can NOAA in the Caribbean and Habitat Blueprint efforts complement each other?

→ Identify opportunities to collaborate with Partner initiatives and efforts being carried out or planned

Ongoing Partnerships & Successes

USCG – Waterway Analysis and Management System (WAMS)

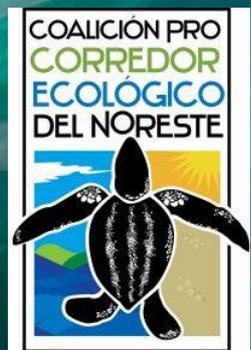
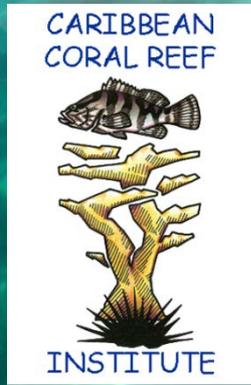
USFS – El Yunque Tropical Forest Social and Ecological Rehabilitation Blueprint

NRCS – Commitment of funds for community empowerment in eastern Puerto Rico

Partnership & Collaboration Opportunities

- EPA, PR EQB, PRASA: improve sewage treatment in the HFA
- EPA, PR EQB, DNER: address unsustainable development in HFA
- USDA NRCS: implementation of agricultural conservation practices in the NE reserves through EQIP
- DOI FWS: conservation assistance through Conservation Partnership Program
- USDA Rural Development funds for sewage treatment on Culebra
- USCG aids to navigation* to mark shallow reefs
- USCG keep up the good work with reporting grounding events!
- USACE and DOD coordination in planning for removal of unexploded ordinance in Culebra

PARTNERS





Landscape Conservation Design for Caribbean Cays



Brent A. Murry
Caribbean Landscape
Conservation
Cooperative

Current Partners

Commonwealth & Territorial



Academic



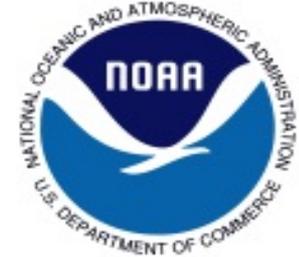
NGOs



For Profit



Federal



Landscape Conservation Design (LCD)

Landscape conservation design is a partnership-driven adaptive learning process that integrates societal values and multi-sector interests with the best-available transdisciplinary science to assess spatial and temporal patterns, risks, and opportunities; that result in spatially-explicit products and coordinated strategies that protect biodiversity and ecosystem services, and increase the resilience and sustainability of social-ecological systems for future generations.

-- Campellone et al. 2015

Landscape Conservation Design (LCD)

PURPOSEFUL & INTENTIONAL, multi-partner, collaborative, landscape-scale, future-oriented, conservation strategy and delivery plan mindful of socio-economic forces

1. Data-driven
2. Agreement on common goals
3. Multi-disciplinary design team consisting of scientists, managers, policy-makers from all relevant sectors
4. Partners committed to implementation and delivery

Goal to preserve ecological and cultural resources and ecosystem function for future generations.

Today's Landscape Conservation Design



- Recognizes that modern threats and vulnerabilities too large to tackle locally
 - Require a landscape scale perspective
- Recognizes that individual conservation efforts are no longer sufficient
 - Need to develop synergies based on complementary strengths and **shared goals**
- Recognizes that decisions and actions must be based on multi-organizational shared visions and objectives
 - Must be coordinated to *avoid “random acts of conservation”*
- Recognizes the importance of cultural and socio-economic needs and engagement in landscape-scale conservation
- It is a set of spatially-explicit strategies

LCD for Caribbean Cays: the U.S. and British Caribbean

- > 750 cays in the U.S. Caribbean alone
 - High ecological, cultural, historical, recreational, and economic value
 - Multiple management stakeholders, federal, commonwealth and territorial, NGO, private, and international
 - No regional plan....



Cross-boundary Natural Resources in the Caribbean



http://www.1yachtua.com/caribbean_sailing/caribbean_sea.asp

- Fisheries
- Aquatic mammals
- Seabirds
- Shorebirds
- Neotropical migrant songbirds
- Invasive species

Despite effort, resources fail to respect political boundaries...

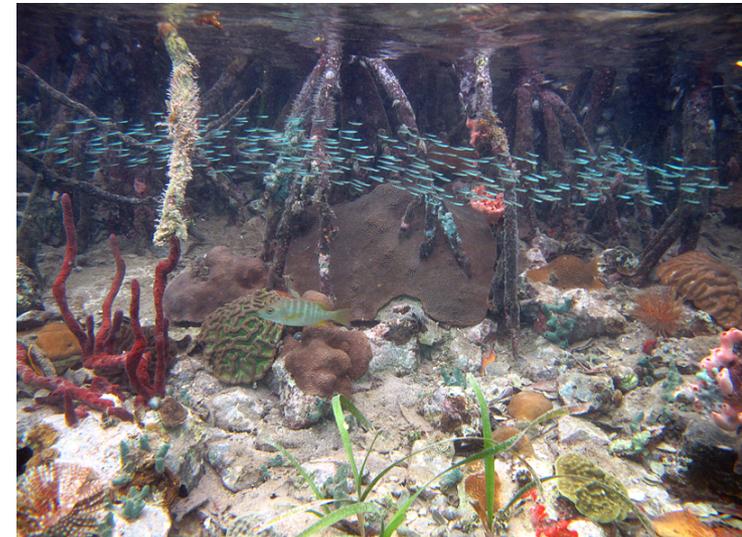
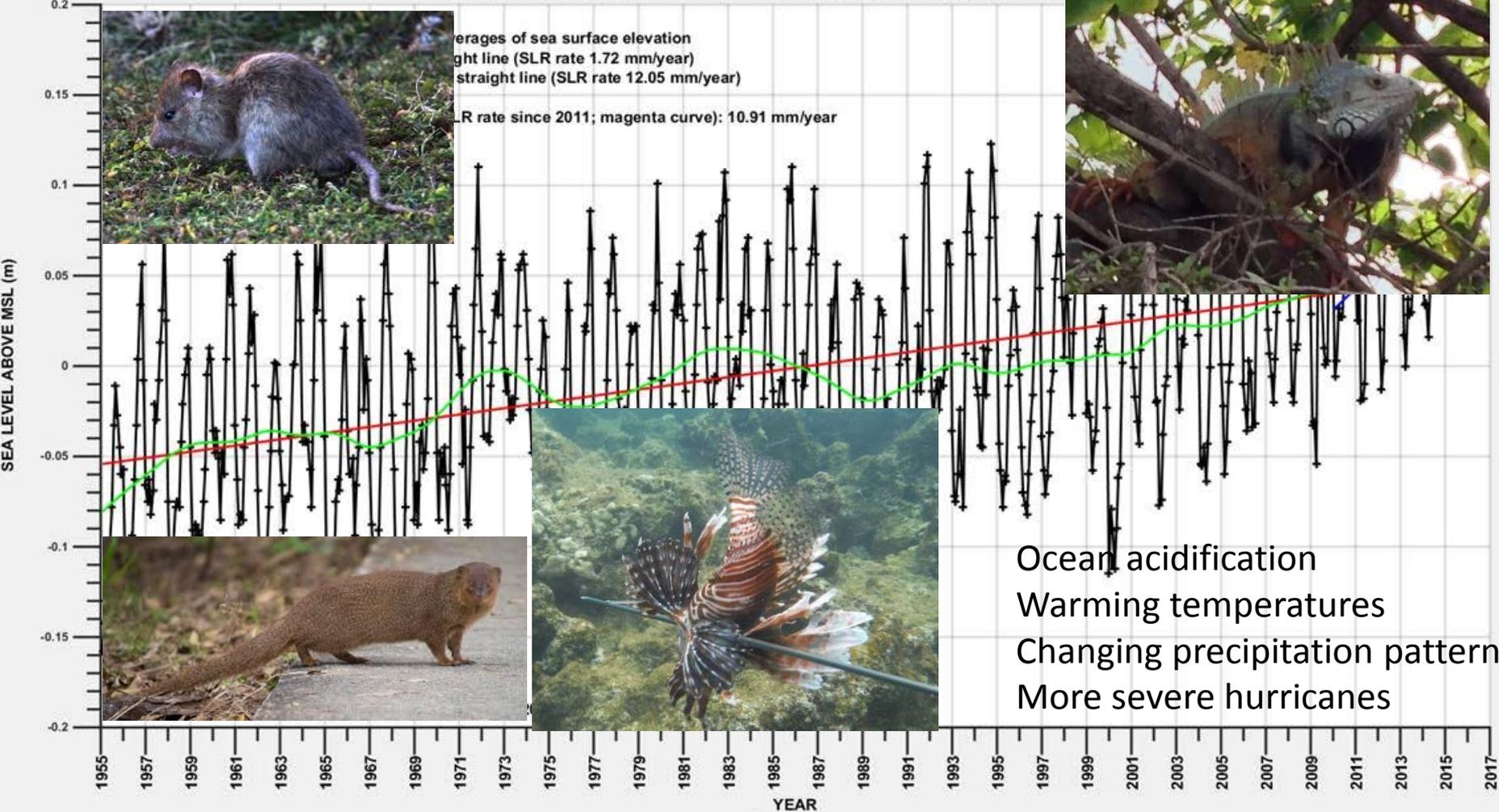


Photo credit: Caroline Rogers

Common Threats



MONTHLY MEANS MAGUEYES ISLAND SEA LEVEL RISE (from January 1955)



- Ocean acidification
- Warming temperatures
- Changing precipitation patterns
- More severe hurricanes



Photo: Kasey Jacobs CLCC Staff



Regional meta-populations and endemic species Crossing international boundaries



http://www.fws.gov/refuge/Cabo_Rojo/wildlife_and_habitat/index.html

**Beg
for
LCD**



Photo: Glenn Gerber, San Diego Zoo & CLCC Partner

CLCC Cays Conservation Action Team: LCD

- Resources cross political boundaries and no single entity sufficient to manage resources
 - Setting regional targets
 - Prioritizing conservation
 - Directing resources
- Effectiveness and efficiency: understanding regional trends
 - Coordinated monitoring, data consolidation
 - Addressing shared science needs
- Common platform to address competing goals
 - Development and economic priorities, cultural priorities, competing WL priorities



- Collaborative vulnerability assessments
- USFWS, PR-DNER, NOAA

Current Partners

Commonwealth & Territorial



Academic



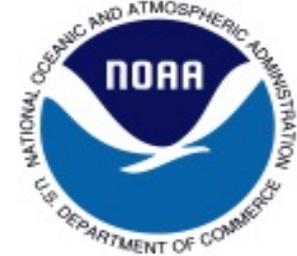
NGOs



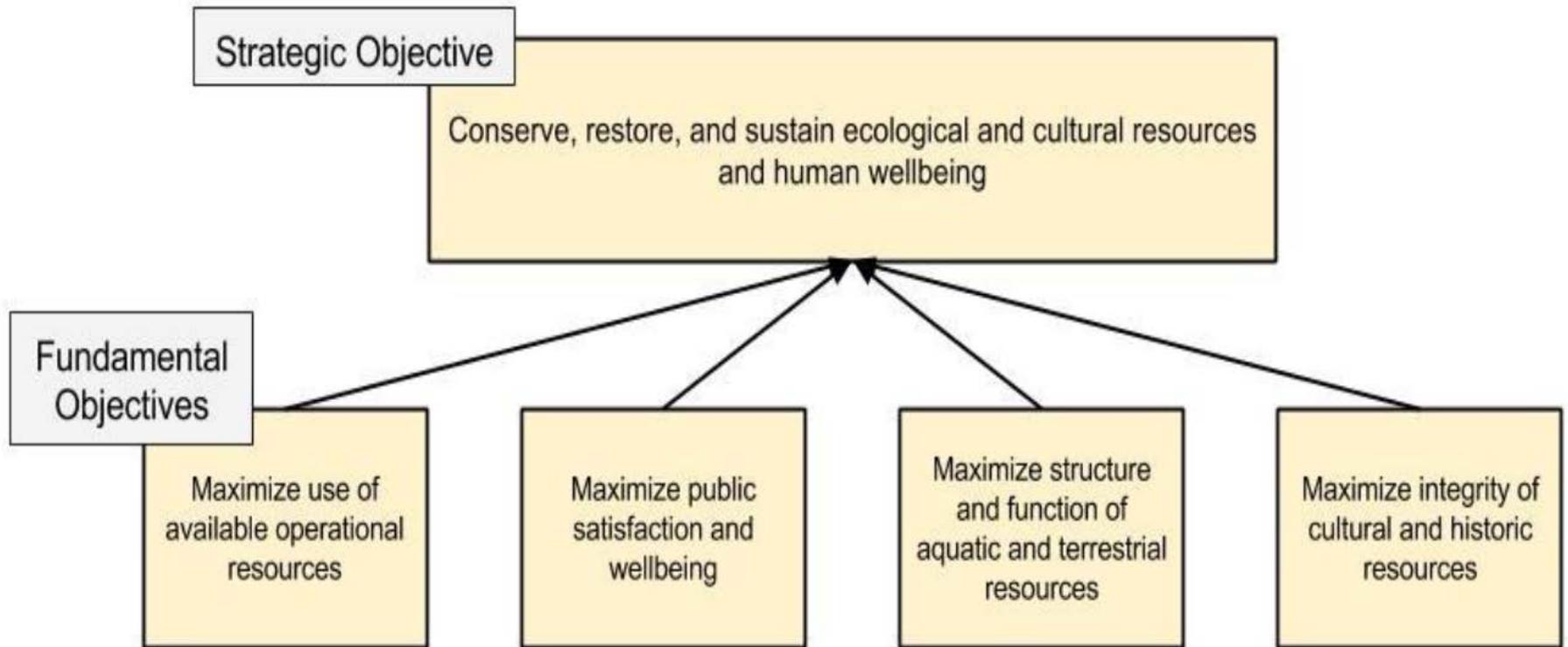
For Profit



Federal



SDM-derived Fundamental Objectives



Maximize structure and function of ecosystems

Maximize ecosystem connectivity

Maximize headwater / highlands integrity

Maximize lowlands / coastal integrity

Maximize marine ecosystem integrity

Abiotic

Biotic

Maximize hydrologic connectivity

Minimize invasive species populations

Maximize shrimp, crab, and fish populations

Minimize storm water runoff

Optimize natural sediment transport

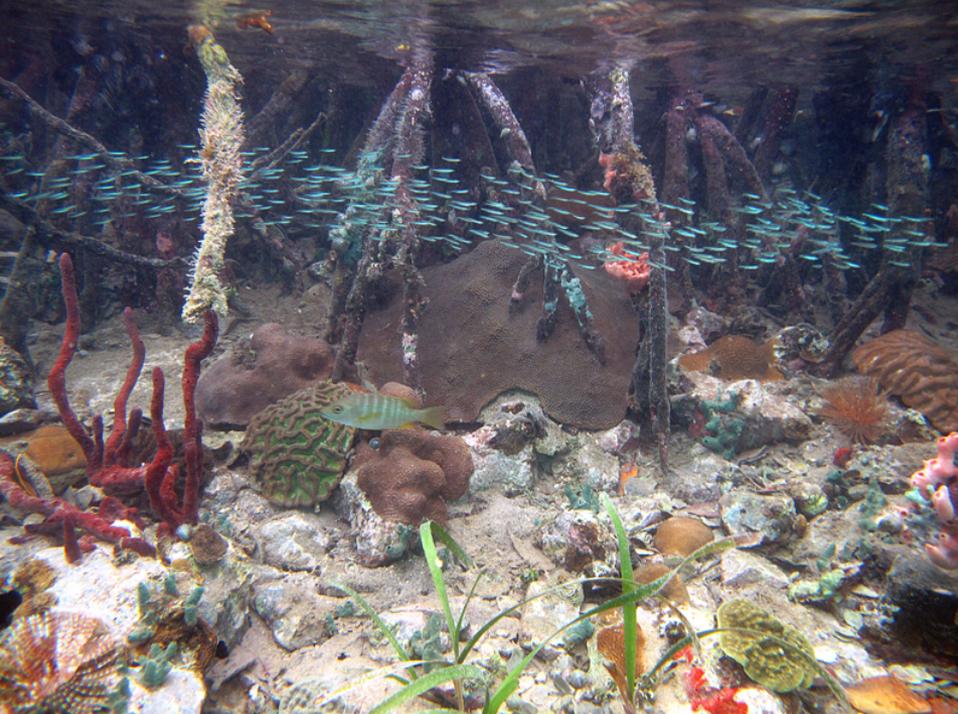
Conclusions

For LCD in general and specifically in marine archipelagos:

- No set recipe; regional differences in ‘how things get done’
- Identify opportunities and existing collaborations that have energy, momentum, and excitement
- Be patient, we’re in this for the long haul, not just the next funding cycle!
- Is a living plan – be ready to adapt previous versions as new partners, resources, and needs are added
- Make sure partners are engaged in ALL project stages
- Assure partners receive USEFUL products along the way

Build and maintain strong relationships

Discuss goals often





Habitat Vulnerability Analysis of Small Islands of Puerto Rico and U.S. Virgin Islands



Carlos Pacheco
Caribbean Ecological Service Field Office
US Fish and Wildlife Service

Background:

Small islands have characteristics that make them highly vulnerable to the effects of climate change, sea-level rise and other extreme events. Some studies suggest that climate change stressors, such as the sea-level rise, could lead to a reduction in the size of a number of low-lying islands while others that are morphologically resilient are expected to persist. Several recent studies strongly suggest that global sea level will rise substantially by the end of the century, with estimates ranging from 0.5 m to 2.3 m increase. Such increases could lead to the immersion of very large proportions of many islands with low elevation and in many cases, may lead to their total submersion, destroying completely self-contained ecosystems and the species inhabiting these islands





© 2010 Mike Meyel



Palometa (*Sterna dougallii*)



Carey de concha (*Eretmochelys imbricata*)



Tinglar (*Dermochelys coriacea*)



Peje Blanco o Tortuga verde (*Chelonia mydas*)



Manatí Antillano (*Trichechus manatus manatus*)



Coral cuerno de ciervo (*Acropora cervicornis*)



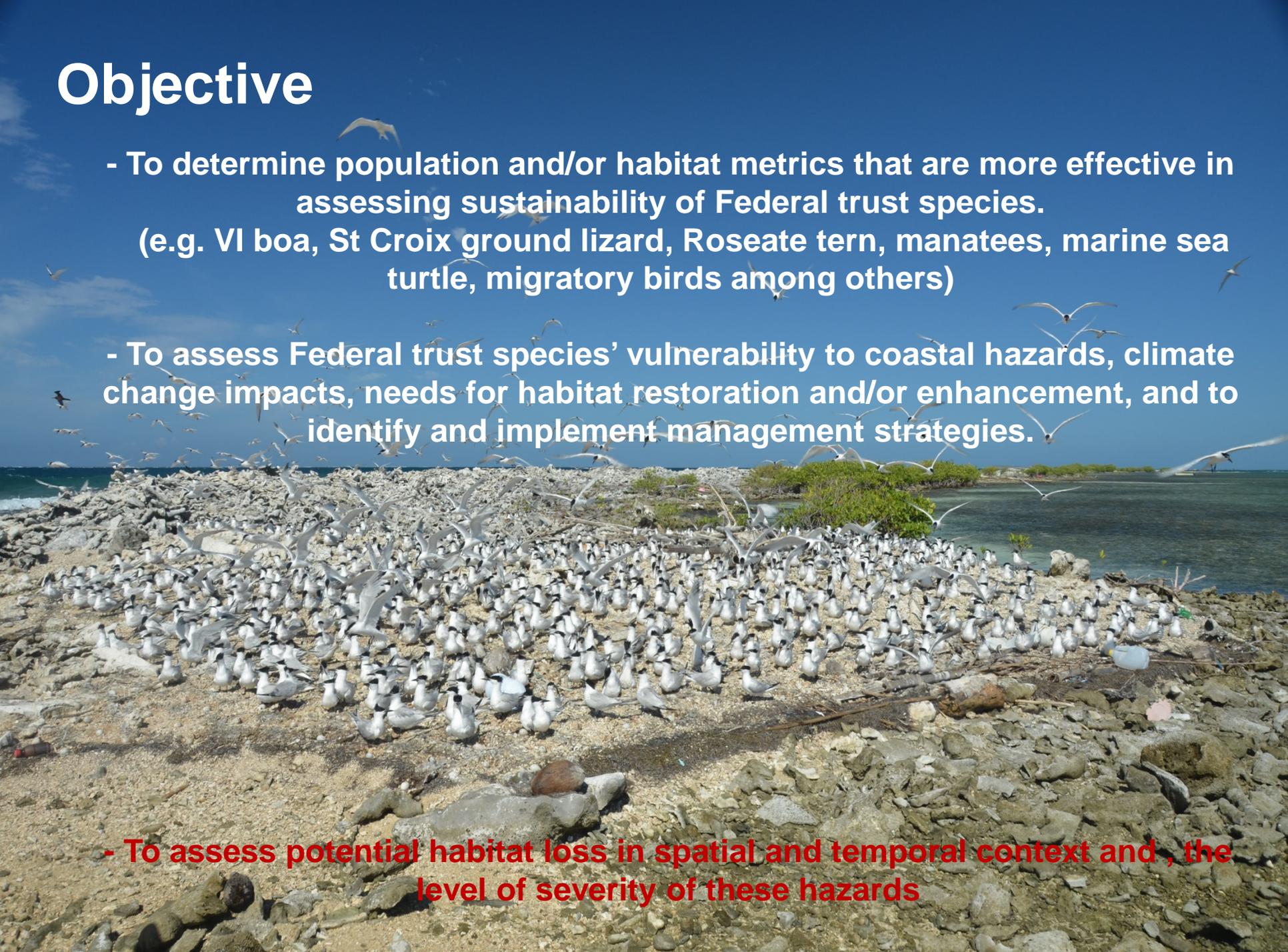
Coral cuerno de alce (*Acropora palmata*)

Objective

- To determine population and/or habitat metrics that are more effective in assessing sustainability of Federal trust species.
(e.g. VI boa, St Croix ground lizard, Roseate tern, manatees, marine sea turtle, migratory birds among others)

- To assess Federal trust species' vulnerability to coastal hazards, climate change impacts, needs for habitat restoration and/or enhancement, and to identify and implement management strategies.

- To assess potential habitat loss in spatial and temporal context and , the level of severity of these hazards



The methods developed and enhanced in this project will provide the basis for developing assessment methods that widely applicable to many coastal setting along the Southeastern U.S. Region and the entire Caribbean



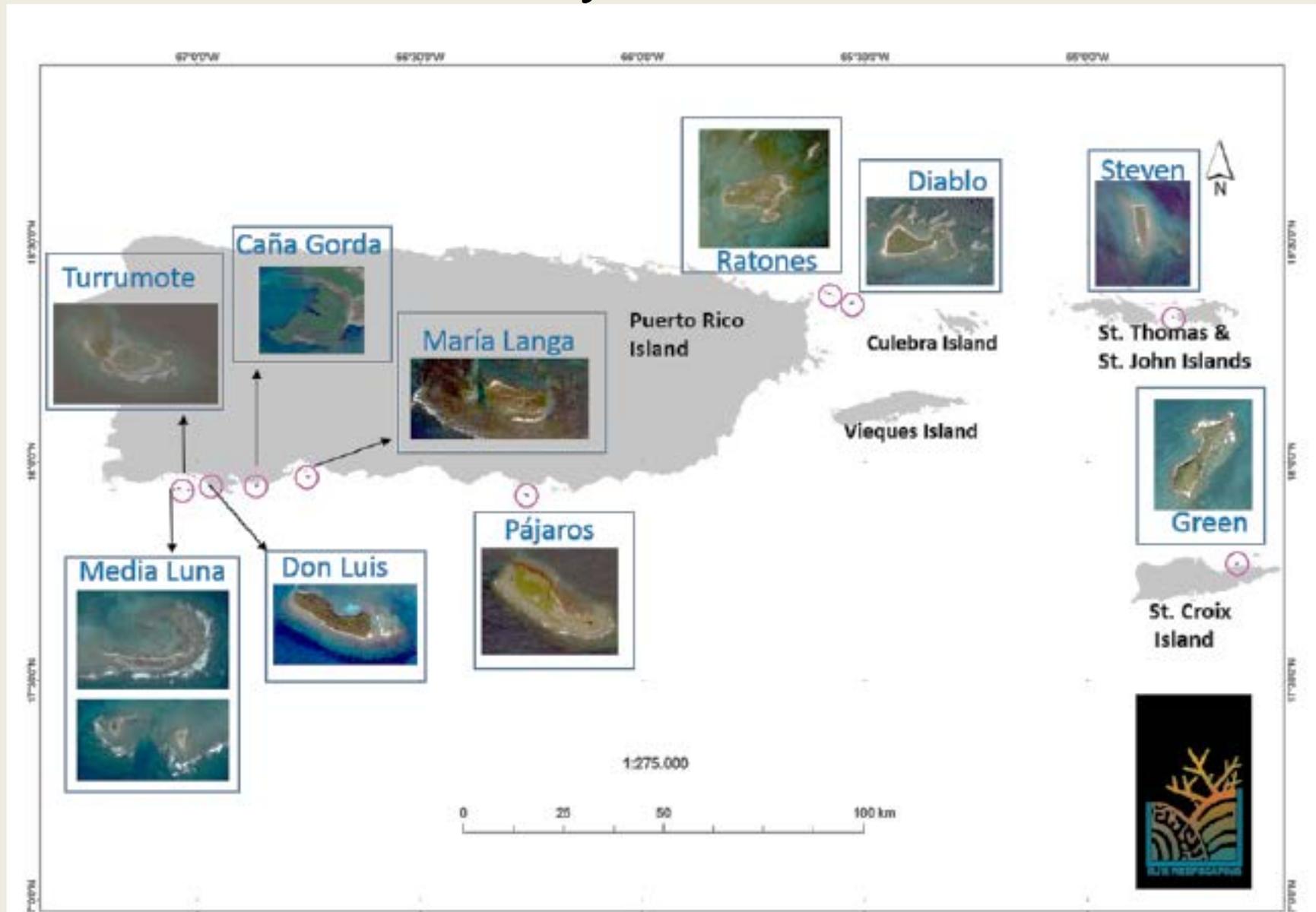


Expected outcomes

- Habitat map of at least 10 cays (Landscape and Seascape)
- Landscape ecological information
- Outreach and education



U.S. Caribbean Cays Conservation Initiative





Thank you!!



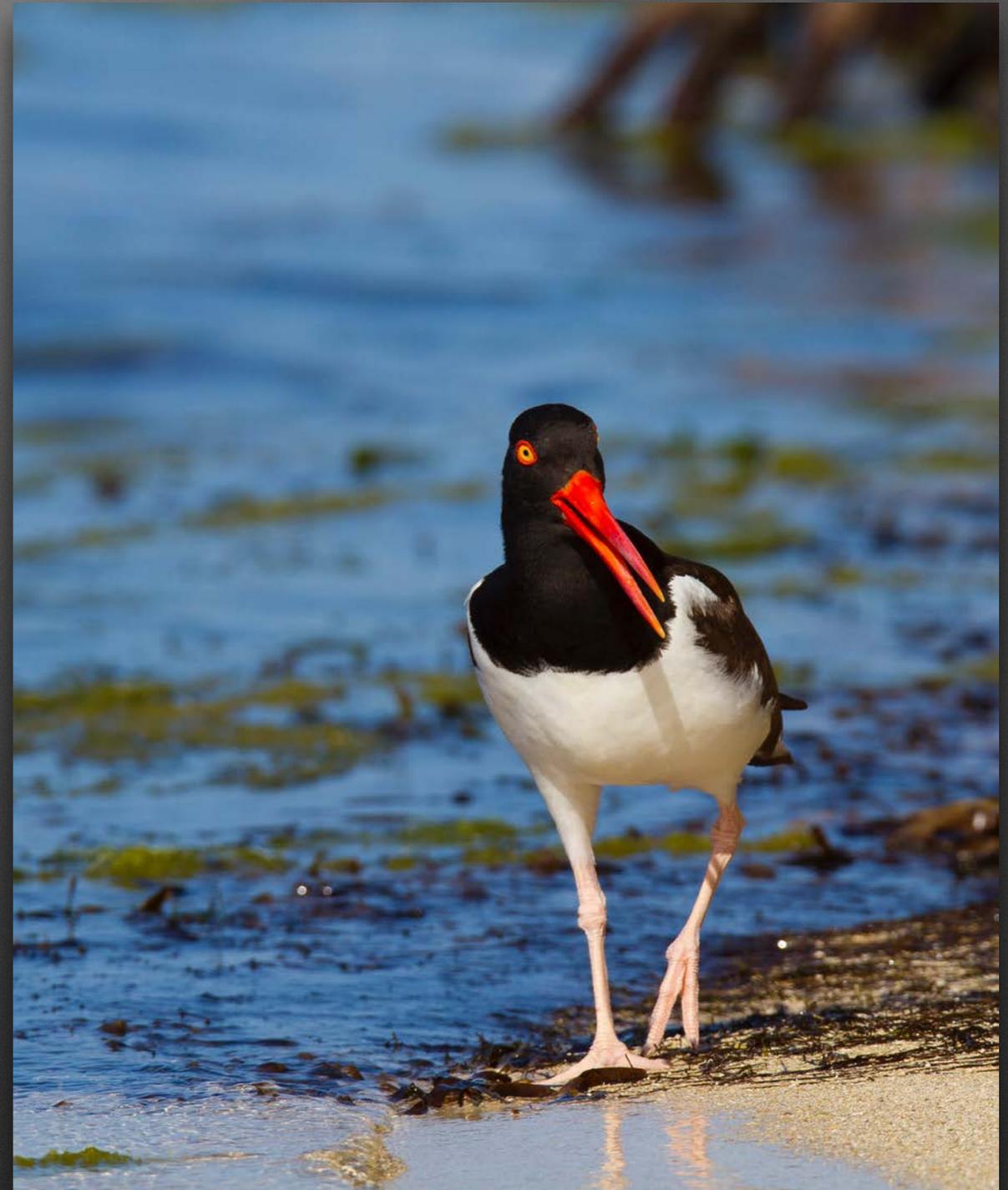
Habitat Vulnerability Assessment of Small Islands of Puerto Rico and U.S. Virgin Islands

Federal Grant Number: F14AC00459

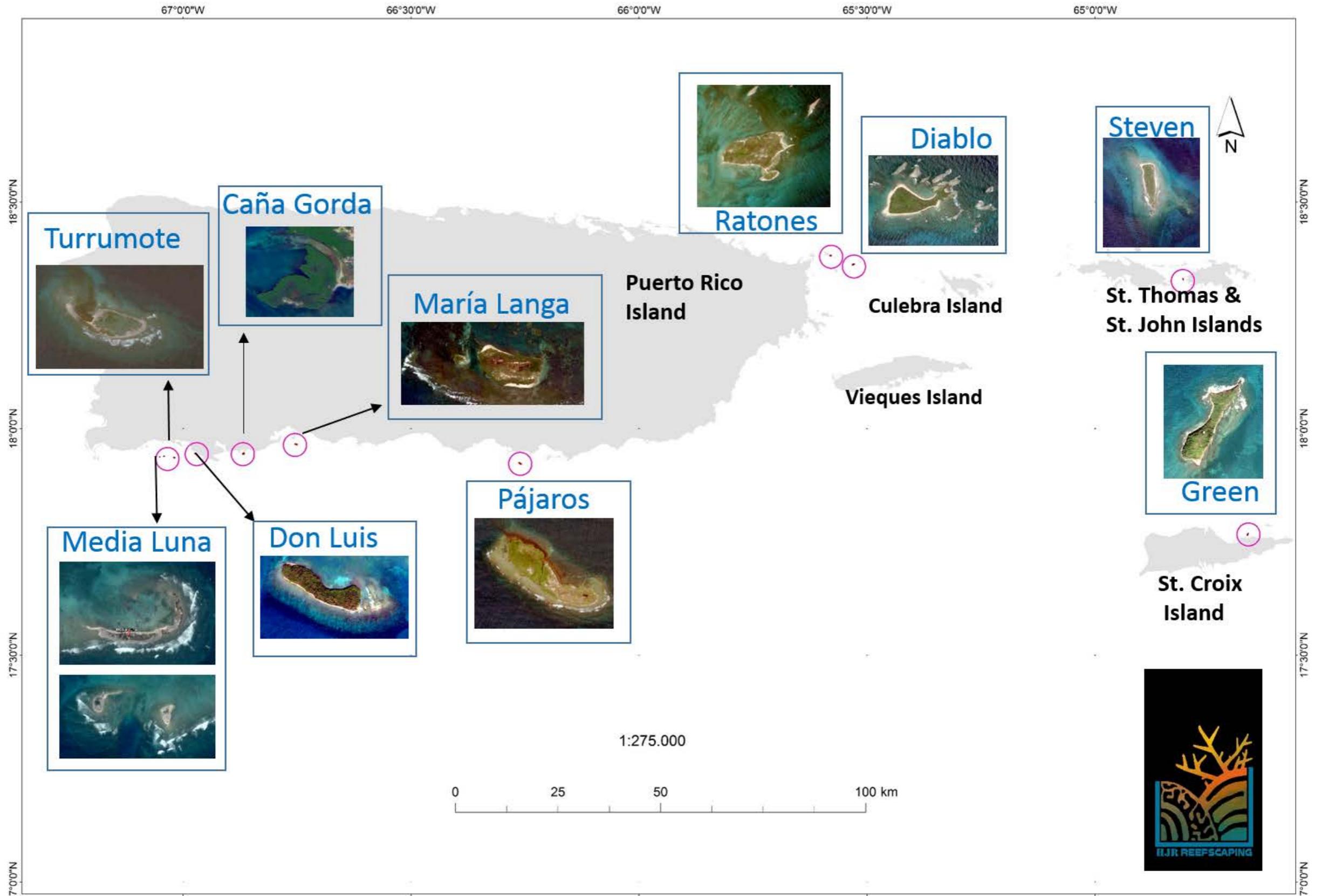


Project Objectives

- Collect data at landscape and seascape scales at 10 cays of Puerto Rico and U.S. Virgin Islands
- Determine the presence and distribution of terrestrial and marine species
- Develop educational and outreach materials

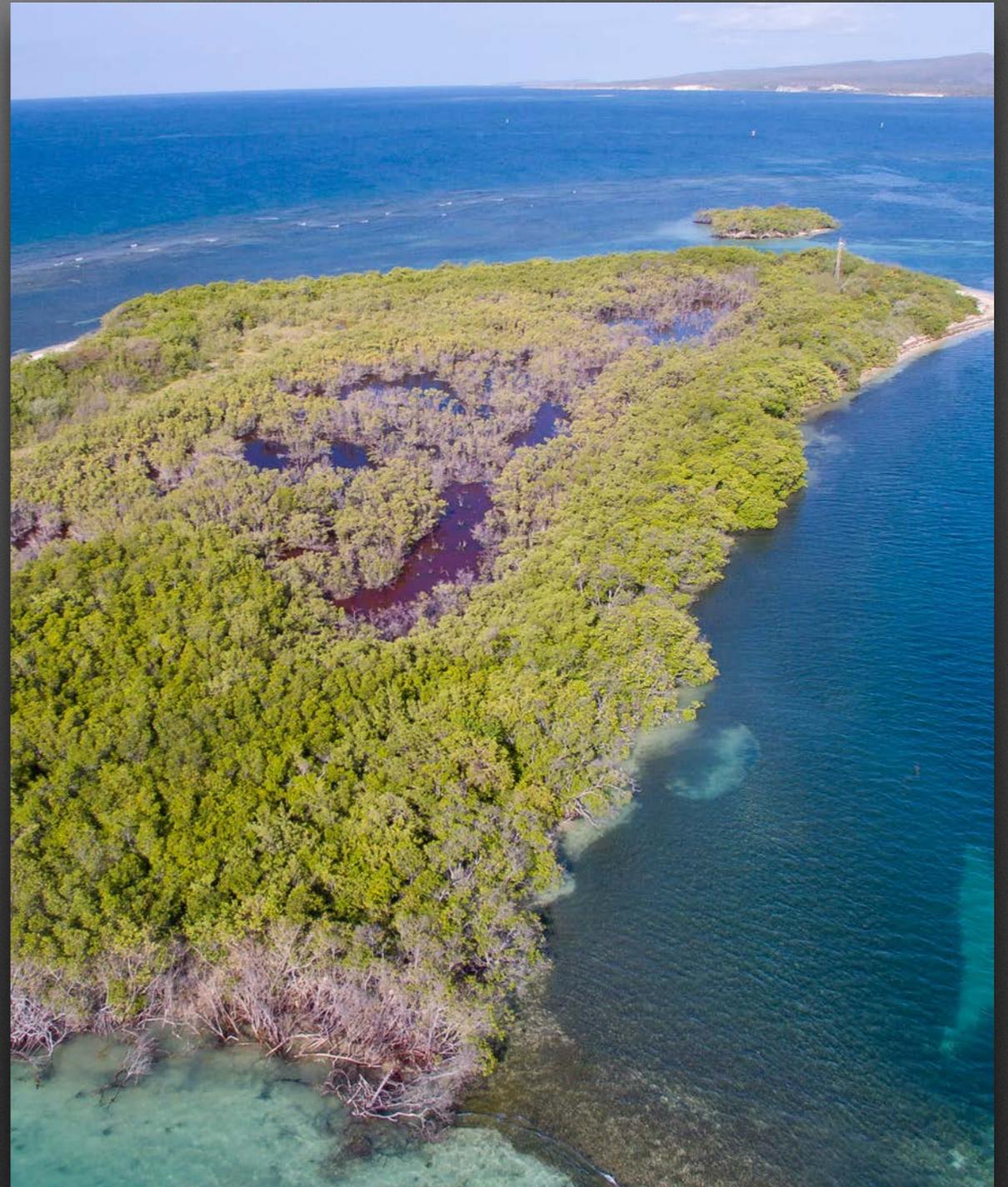


Selected Cays



Methodology

- Habitat map development
- Landscape ecological information
- Seascape ecological information
- Outreach and education



Habitat Mapping

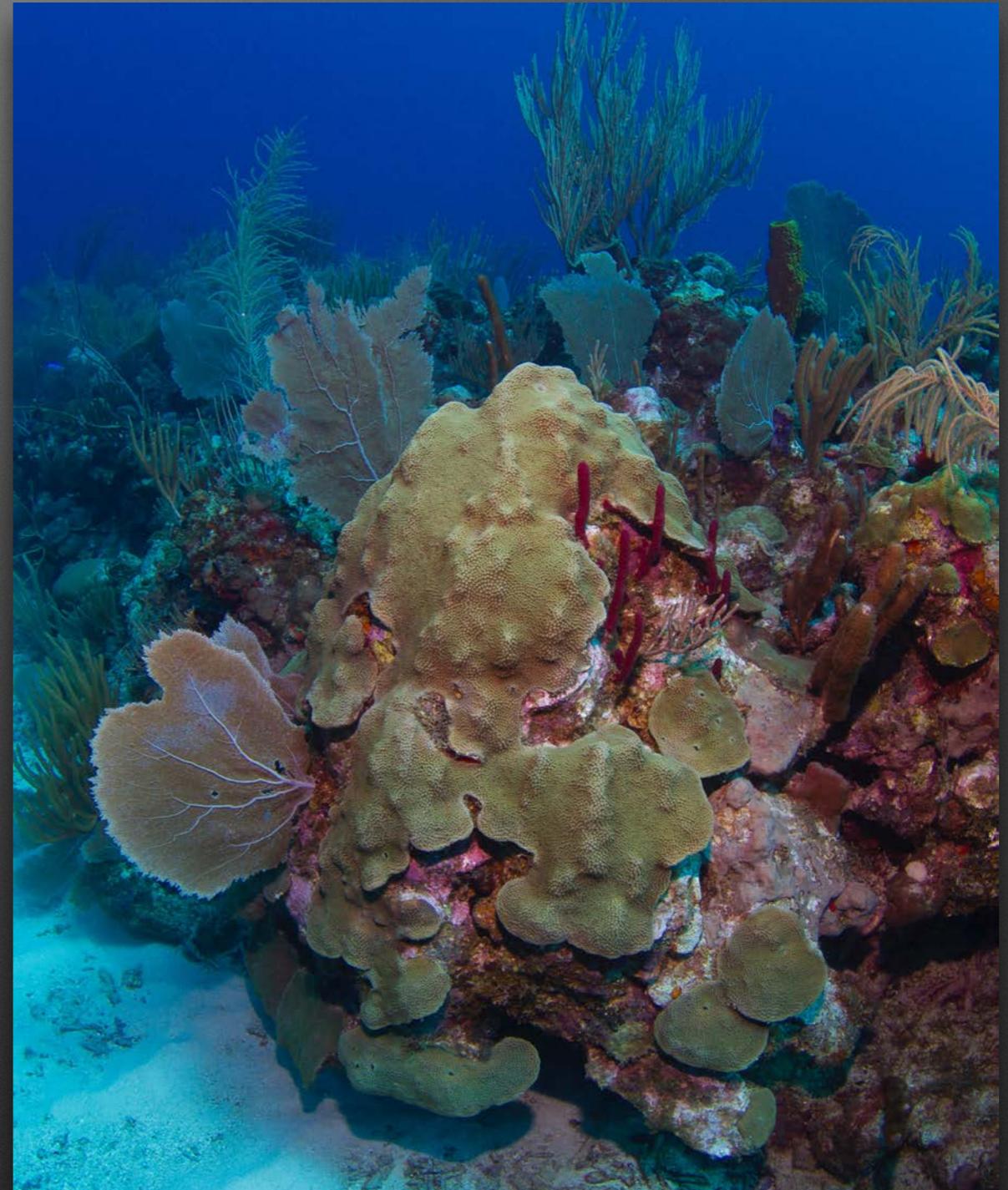
- Search of the most updated photos available for the selected cays
- Developed a hierarchical habitat classification scheme (terrestrial and marine)
- Visual interpretation of aerial orthomosaics that met criteria (i.e. high spatial and temporal resolution, areal coverage)
- Digitized habitat polygons at a scale of 1:500
- Fieldwork to groundtruth habitat maps

Landscape Data

- Belt transects (50m x 2m) for rapid ecological assessment
- Surveys are georeferenced
- Fieldwork during daytime hours
- Record all species (plant and animal) within transects
- Observations of nesting, breeding and feeding of all animals
- Invasive species assessment (iguanas, rats, feral cats)

Seascape Data

- Proposed study area limited by 50m from cay shoreline
- Line point intercept (every 15cm in 15m) and belt transects (15m x 2m) (NCRMP 2016 methodology)
- Percent cover estimates of major benthic components (biotic & abiotic)
- Density of coral colonies of species listed under Endangered Species Act



Results

- Nautical Charts for selected cays (1:100,000 to 1:10,000)
- LIDAR image of Southwestern Puerto Rico
- Multibeam image of Northeast Puerto Rico
- High resolution (2.4cm/pixel) aerial orthomosaic (Maria Langa, Turrumote, Media Luna & Don Luis)
- Hierarchical habitat classification scheme
- Preliminary habitat maps (Maria Langa, Turrumote, Media Luna)
- Landscape rapid ecological assessment of Turrumote
- Preliminary seascape rapid ecological assessment of Turrumote

Google Earth Satellite Imagery at Turrumote Cay, Puerto Rico.

17°56'15"N

17°56'10"N



Aerial Photo-mosaic at Turrute Cay, Puerto Rico.

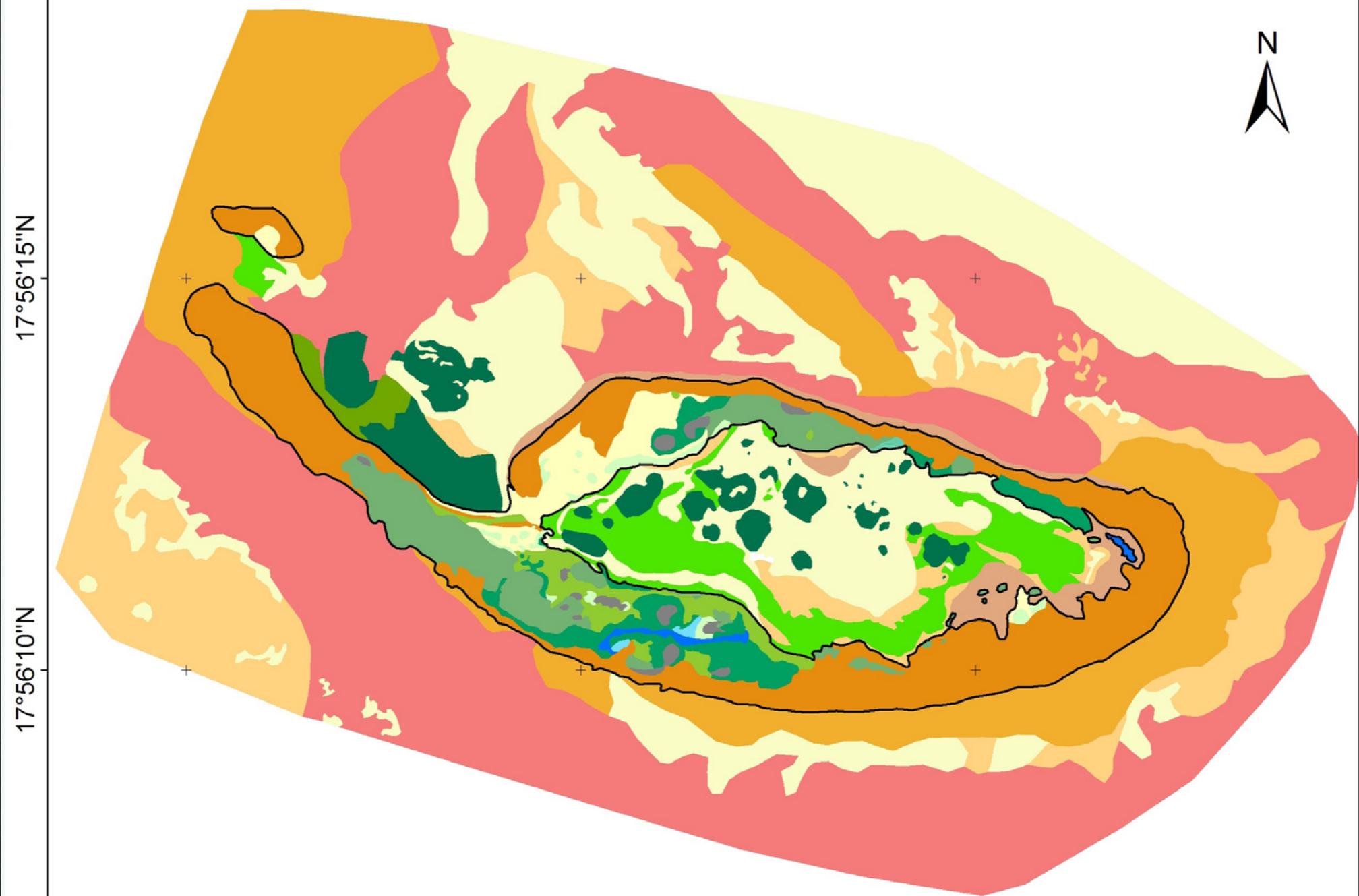
17°56'15"N

17°56'10"N



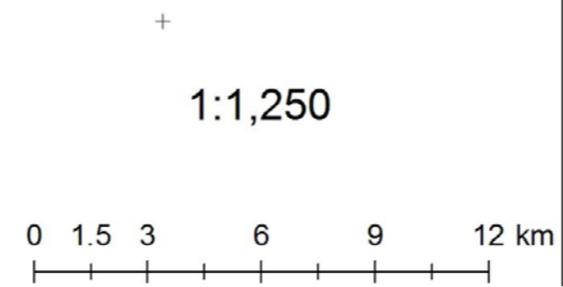


Preliminary Habitat Map at Turrumote Cay, Puerto Rico.



17°56'15"N
17°56'10"N
17°56'5"N

Legend	
Benthic habitat	Seasonal lagoon
Scrub/shrub	Coral pavement
Low-lying vegetation	Coral sparse
Red mangrove	Seagrass dense
White mangrove	Seagrass sparse
Mixed mangrove	Macroalgae
Dead mangrove	Sand
Cobble/gravel	Sand invertebrates
Sandy beach	Rubble
Persistent lagoon	



Preliminary Habitat Map at Turrumote Cay

Habitat map generated by visual interpretation of November, 2015 aerial photo-mosaic at Turrumote Cay. Habitat classification scheme developed for this project.

Black contour denotes the current shoreline.

Original scale of digitizing 1:500.

Imagery donated to HJR Reefscaping by Dr. Hector Ruiz





Partners

- USFWS Caribbean Ecological Services Field Office
- USFWS Caribbean National Wildlife Refuge Systems
- Applied Coastal Research Laboratory of Georgia Southern University
- The Nature Conservancy
- NOAA Fisheries (Dr. Lisamarie Carrubba)
- CLCC (Dr. Brent Murry)
- DNER (Dr. Nilda Jimenez)
- Puerto Rico Sea Grant College Program
- Local NGOs