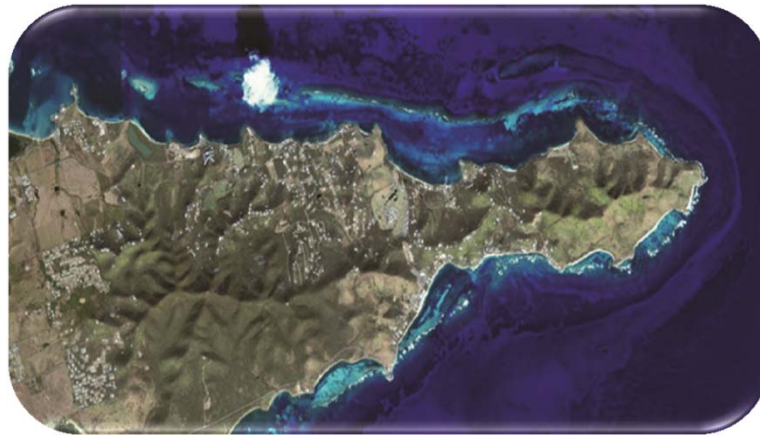


Land-Sea Characterization of East End Marine Park



Simon Pittman, Ph.D.
Dan Dorfman, Chris Jeffrey, Sarah Hile
NOAA Biogeography Branch





Content

Vulnerability of St. Croix's marine ecosystems

Objectives of the land-sea characterization

Approach and methods

Key findings and management implications

Products and next steps

Structural Decline of Coral Reefs in the Caribbean

DRIVERS OF DECLINE

Stressors acting simultaneously

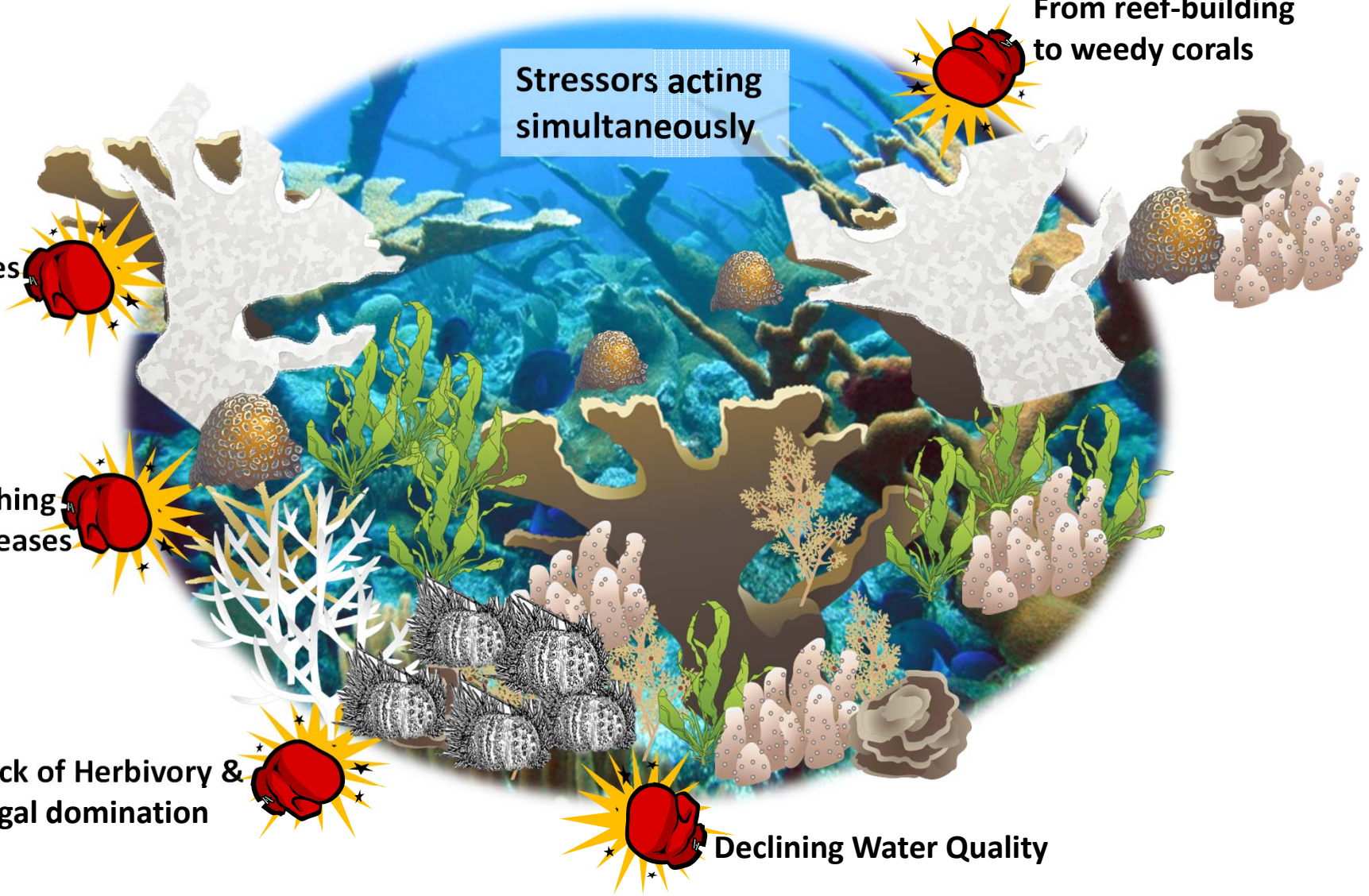
Shift in coral dominance:
From reef-building
to weedy corals

Hurricanes

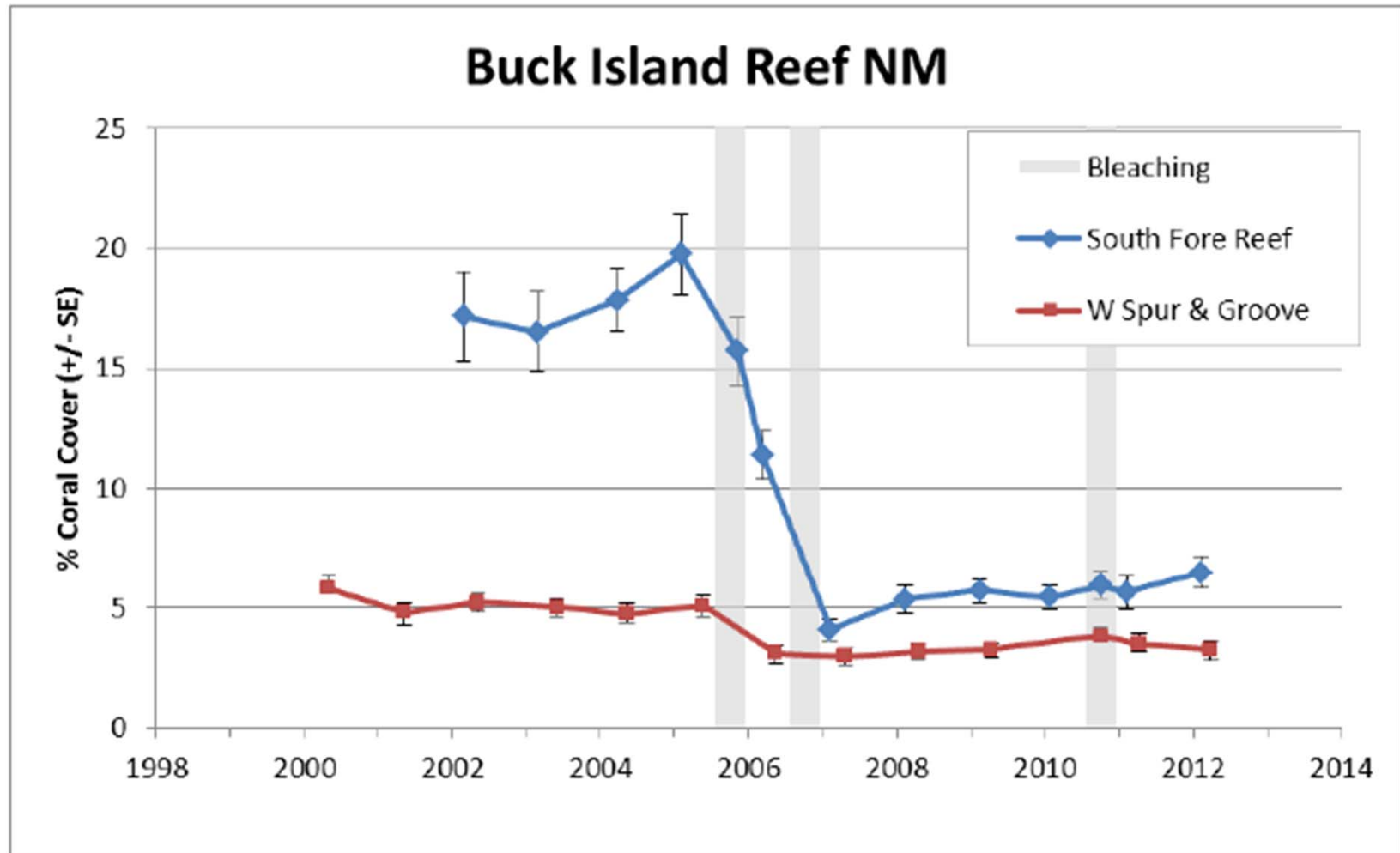
Bleaching
& Diseases

Lack of Herbivory &
Algal domination

Declining Water Quality

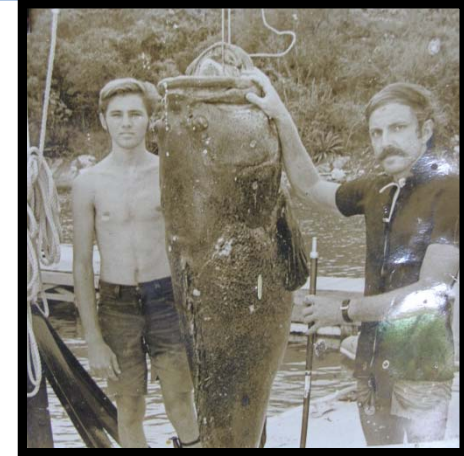
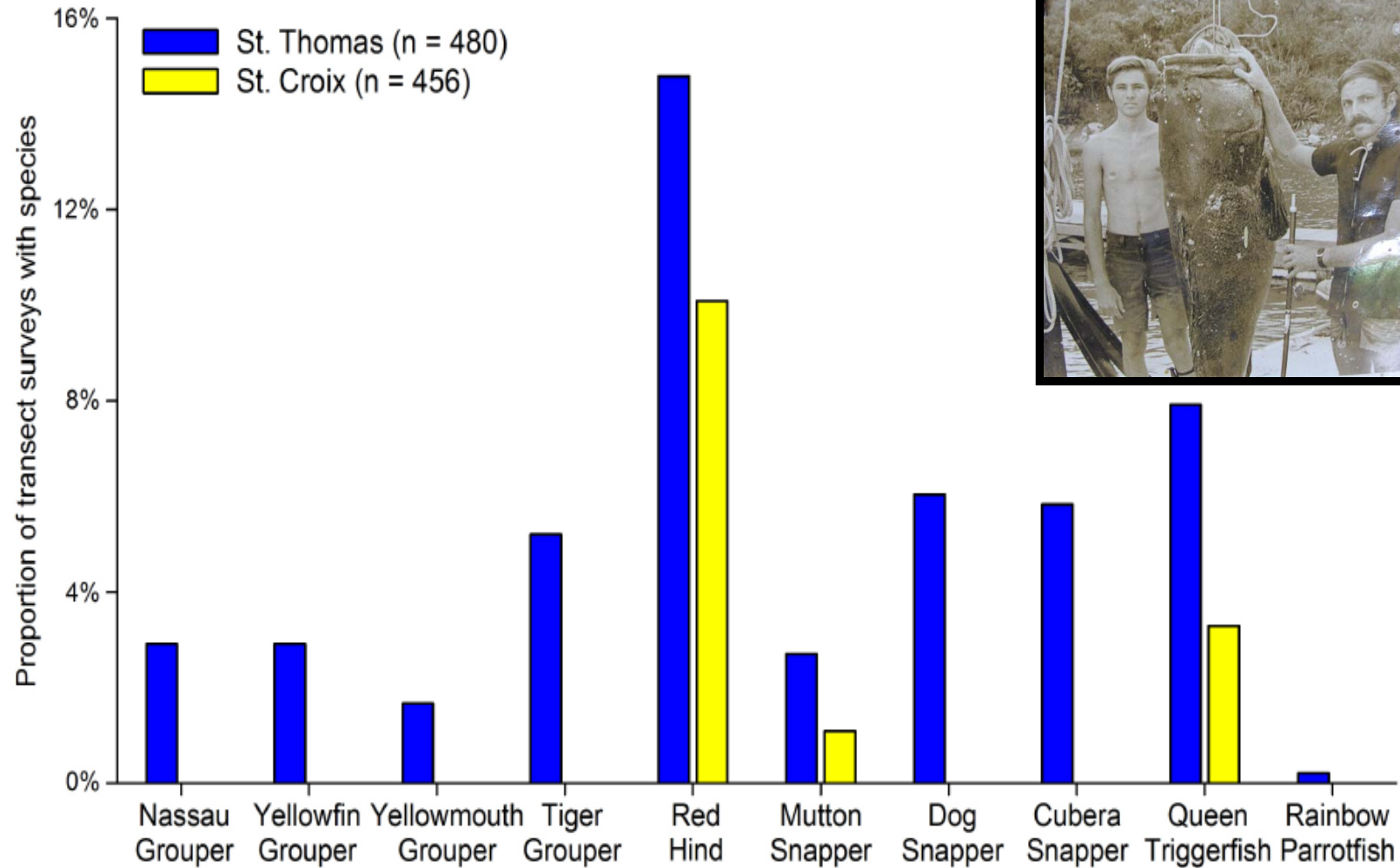


Decline of coral in St. Croix



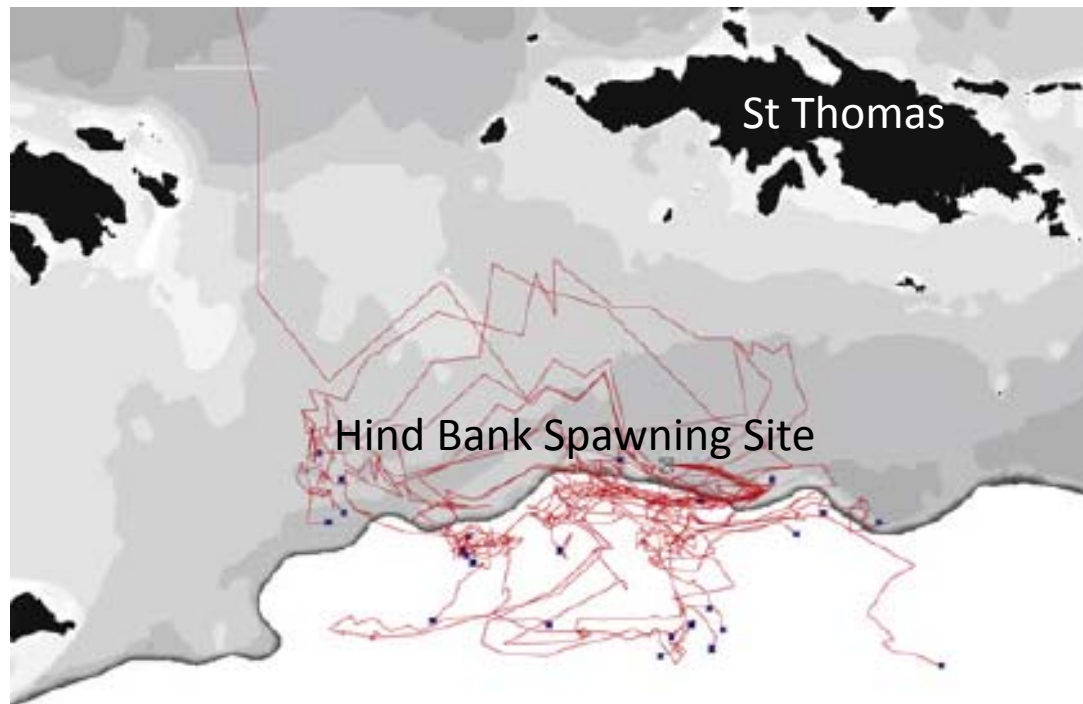
Source: Jeff Miller, National Park Service

Where did all the big fish go?



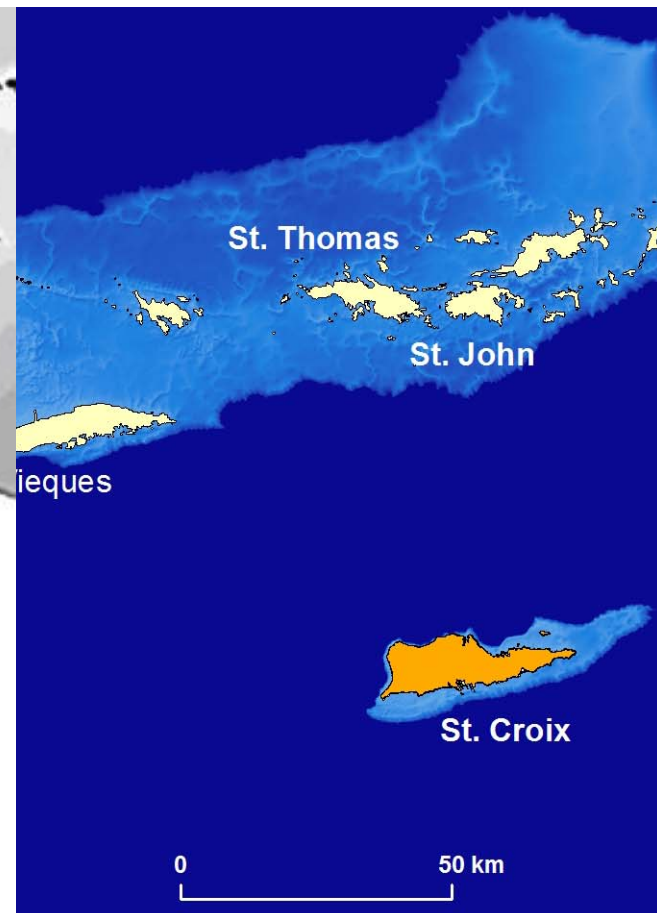
Source: DPNR/UVI Territorial Coral Reef Monitoring Program

St. Croix: Splendid isolation

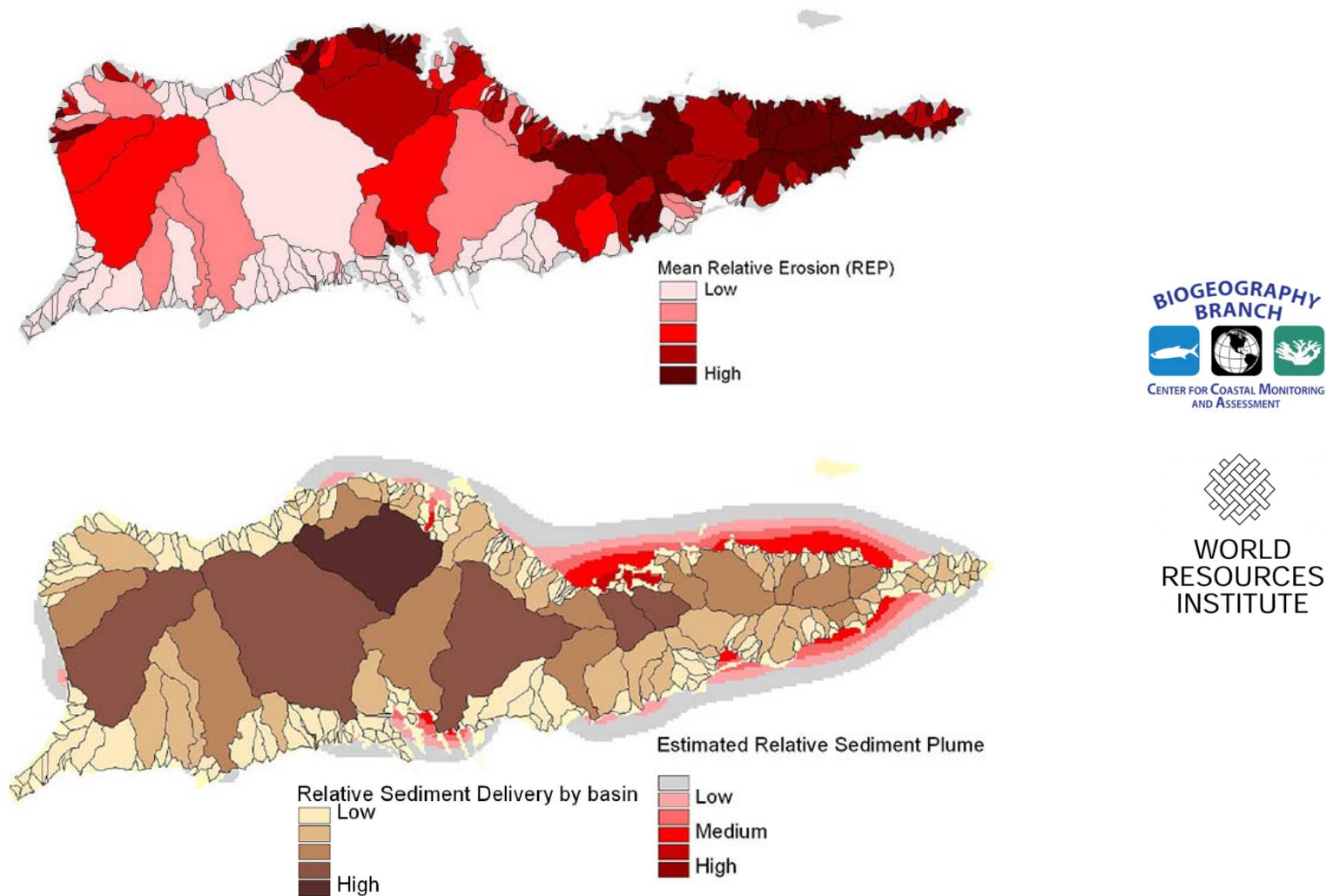


Cherubin et al. 2011, Ecol. Mod.

December



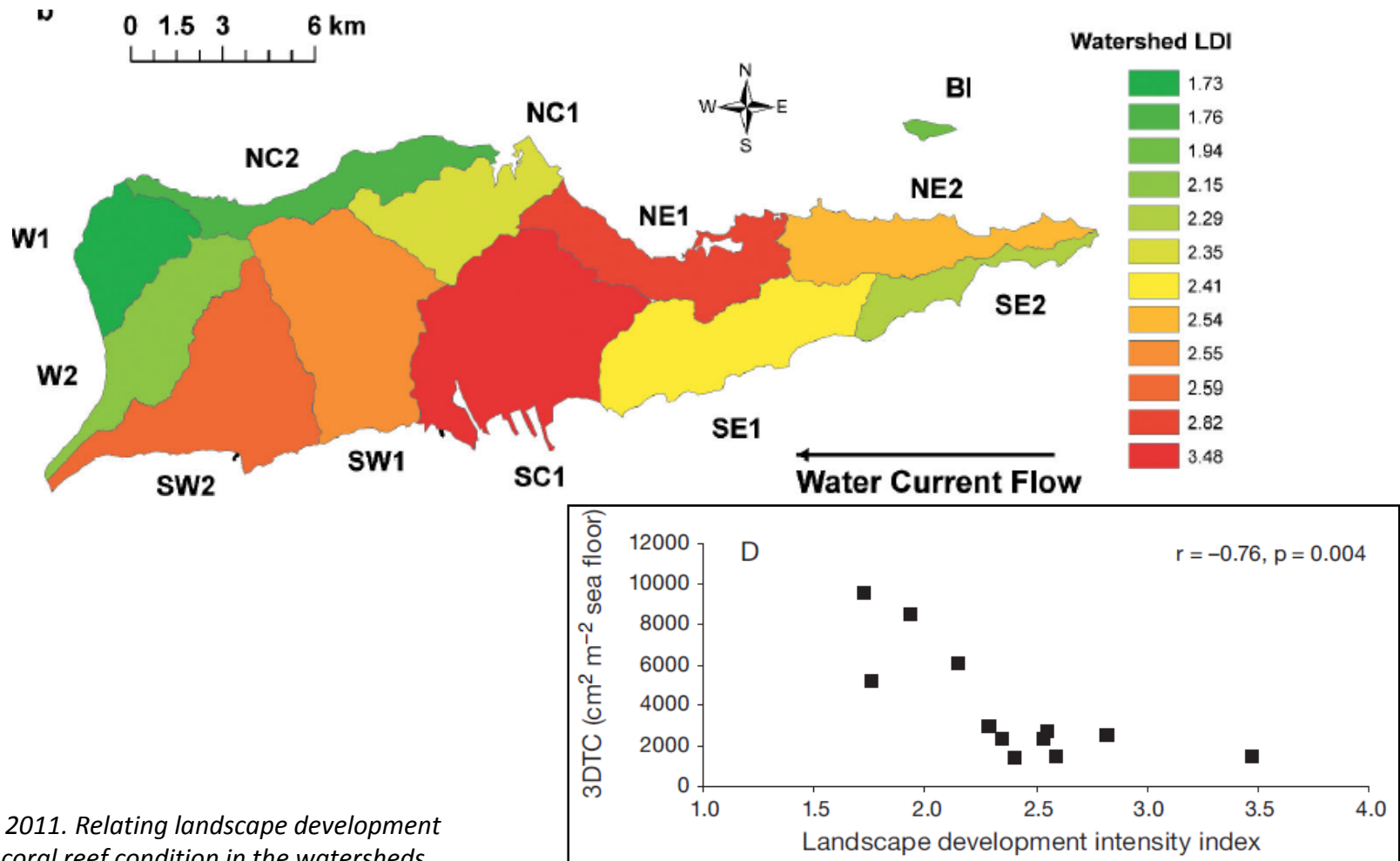
Reefs at Risk: East End watersheds threaten coral reef ecosystems



Reefs at Risk Project

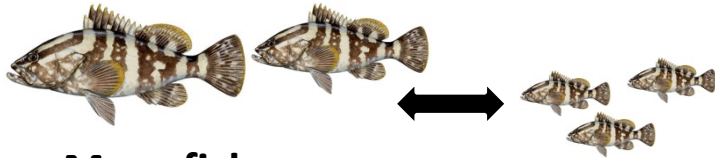
Land based sources of threat to coral reefs in the U.S. Virgin Islands (World Resources Institute, 2006)

EPA study shows more watershed development = less coral



Oliver et al. 2011. Relating landscape development intensity to coral reef condition in the watersheds of St. Croix, US Virgin Islands. MEPS 427

Expectations of Marine Protected Areas

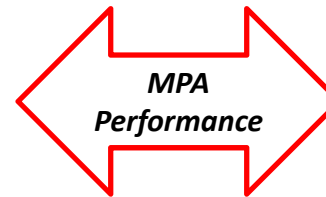


More fish
More bigger & older fish
Spillover

*Optimal performance
depends on:*

MPA Design:
Placement, size & shape

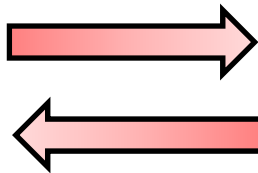
Maintain/Enhance
Biodiversity & Ecological Integrity
Rebound from disturbance
Prevent coral loss



Local ecology & resilience

Management of stressors

Duration of protection



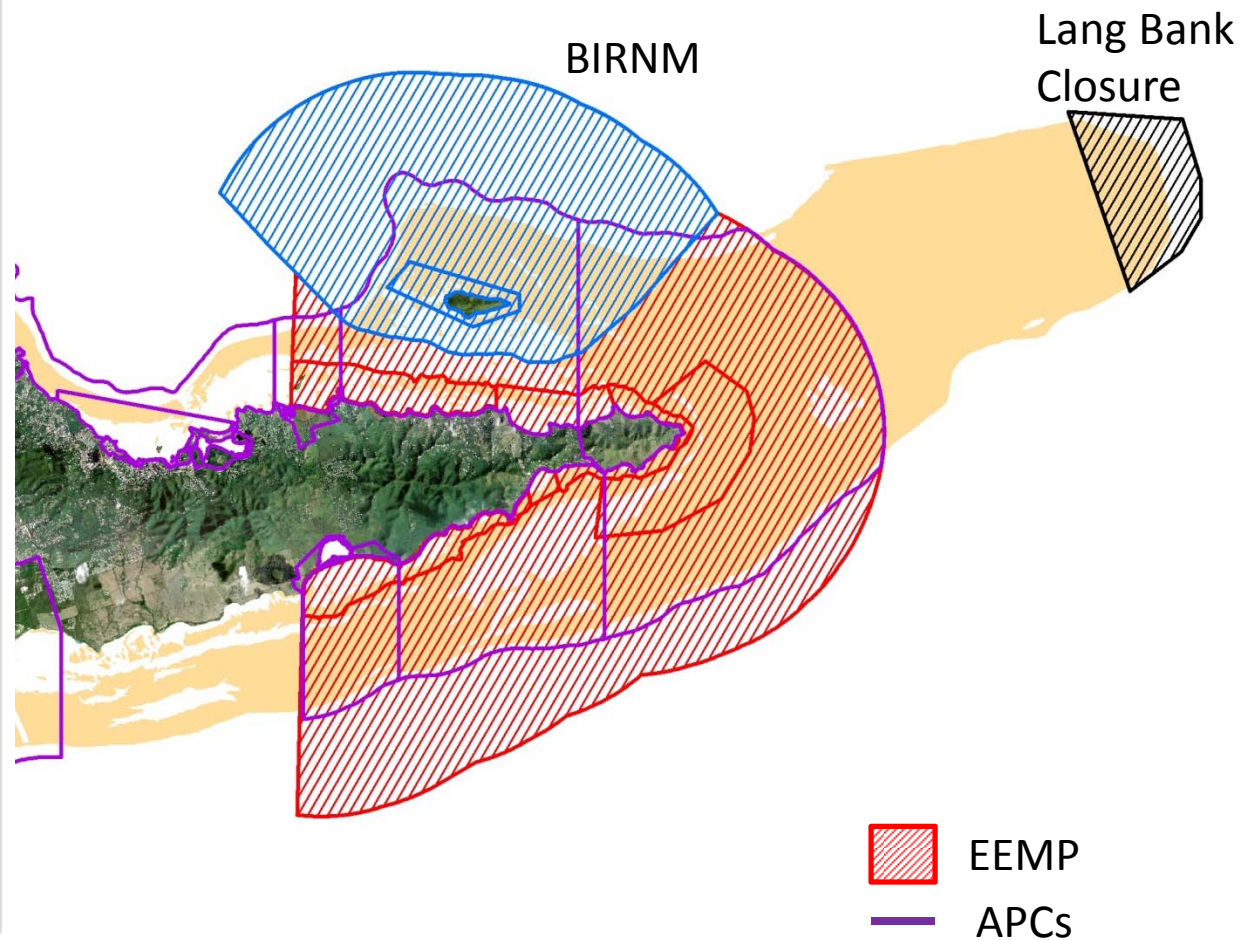
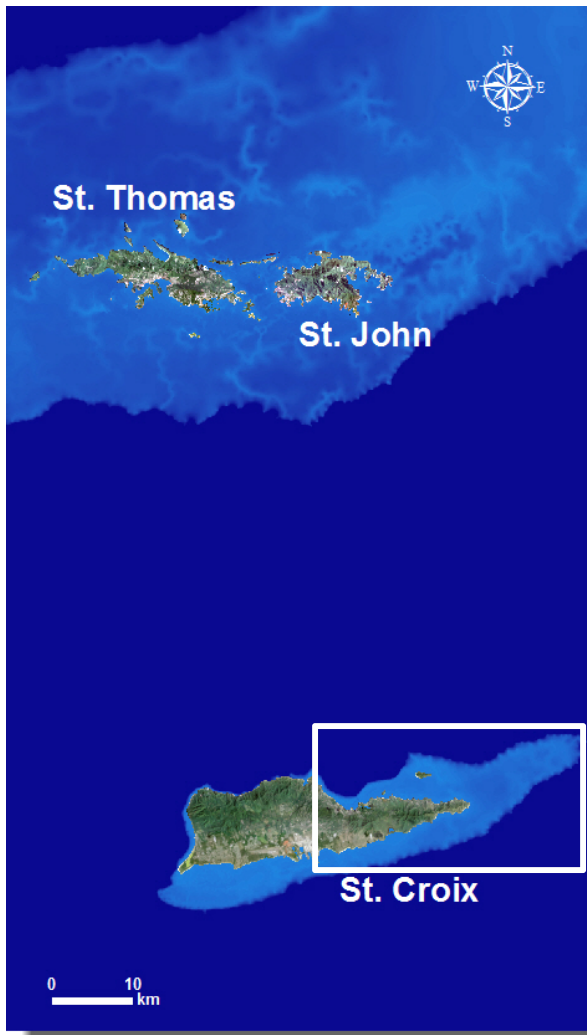
Socioeconomic
Impact & wellbeing



East End, St Croix



EEMP: First Territorial Park (2003) & member of U.S. National System of MPAs (2010)





EEMP Objectives

- First large multi-use marine park managed by VI Government – Territorial Marine Parks Initiative
- Important component of Territorial Coral Reef Initiative to address National Coral Reef Action Plan
- To better manage human uses and increase protection for priority ecosystems in areas of concern
- Management plan 2003 due for review 2015?

EEMP Principles

Protect and maintain the biological diversity;

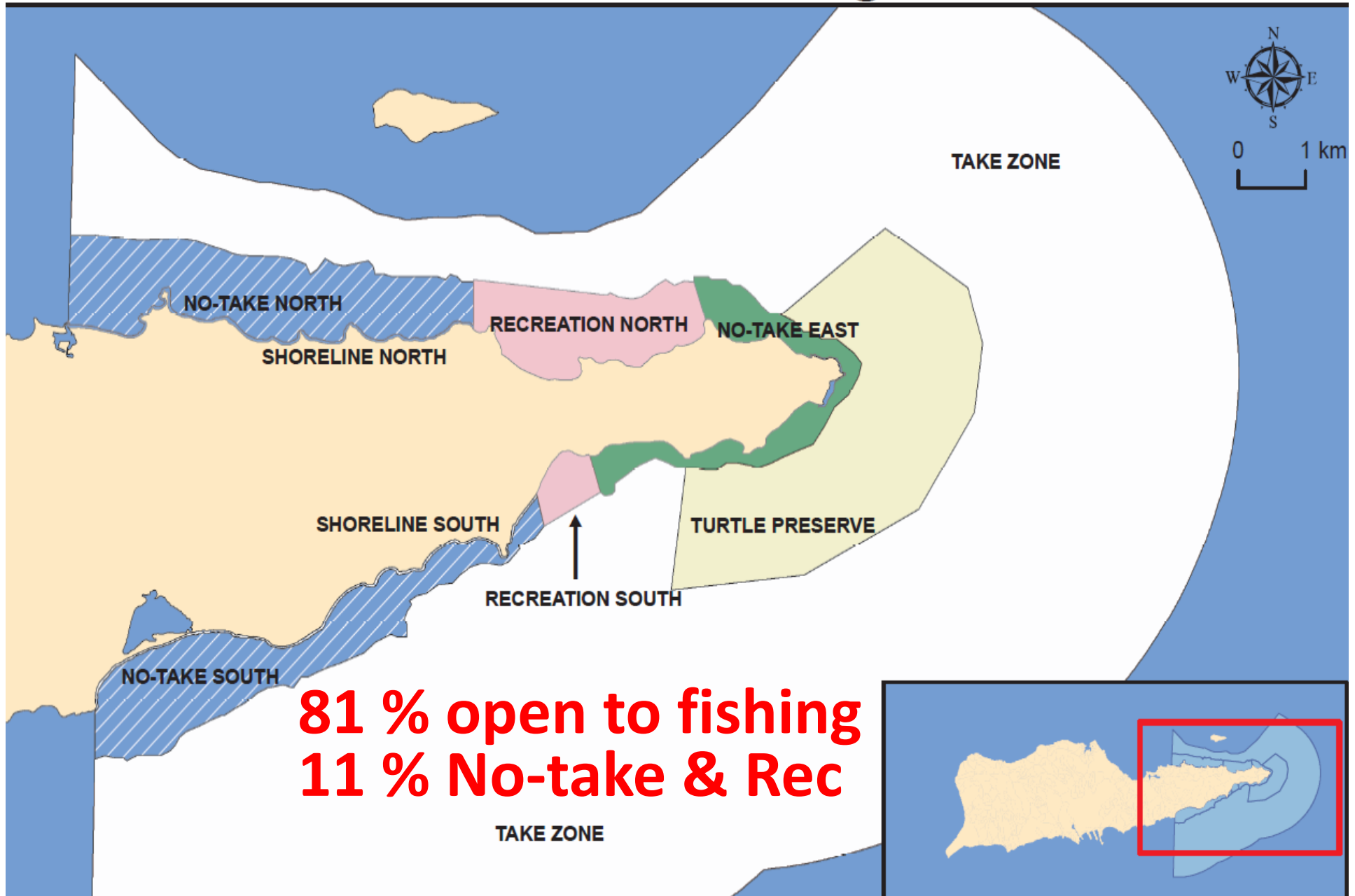
Promote sound management practices for sustainable production;

Protect the natural resource base from detrimental land use;

Contribute to regional and national development

(The Nature Conservancy, 2002).

East End Marine Park Management Zones



Project objectives

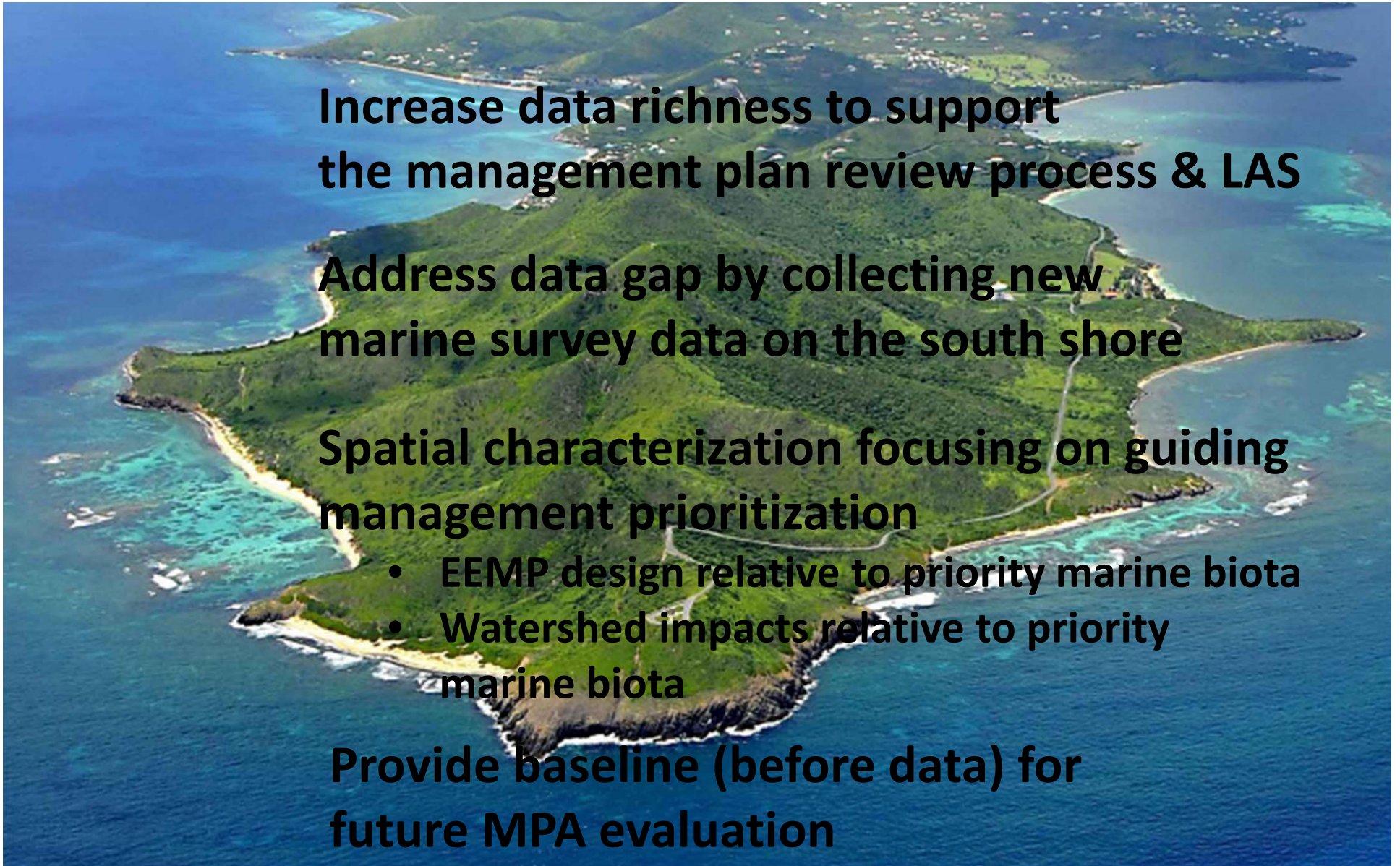
Increase data richness to support the management plan review process & LAS

Address data gap by collecting new marine survey data on the south shore

Spatial characterization focusing on guiding management prioritization

- **EEMP design relative to priority marine biota**
- **Watershed impacts relative to priority marine biota**

Provide baseline (before data) for future MPA evaluation



Approach & Methods

Linking Land & Sea

- Patterns of landscape development and adjacent marine biota in EEMP

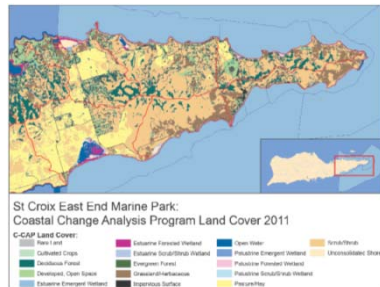
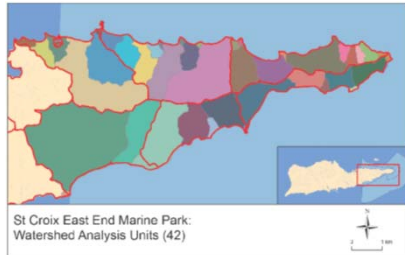
Who's in the Zone?

- EEMP management areas/zones and the biotic communities they contain



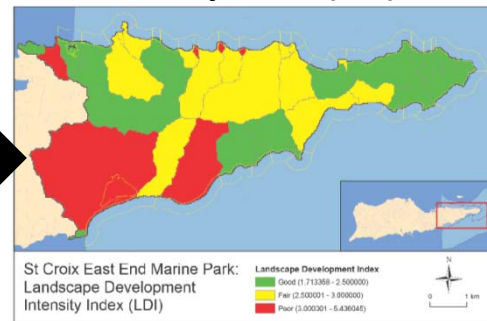
Watershed condition & impact zone

Merged USGS units
n = 42



NOAA CSC
Land cover map 2011

Landscape Development
Intensity Index (LDI)



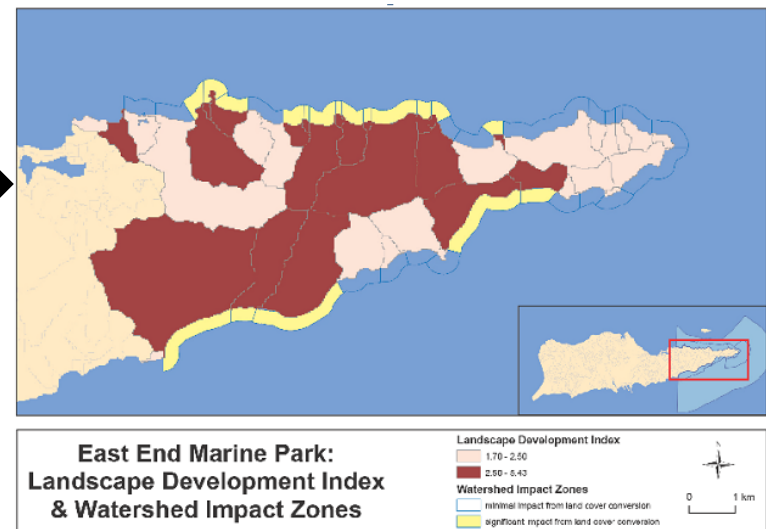
Follows Brown & Vivas 2005

High alteration:
Impervious surfaces
& Cultivated crops

Low:
Open water,
wetland, forest

LBSP

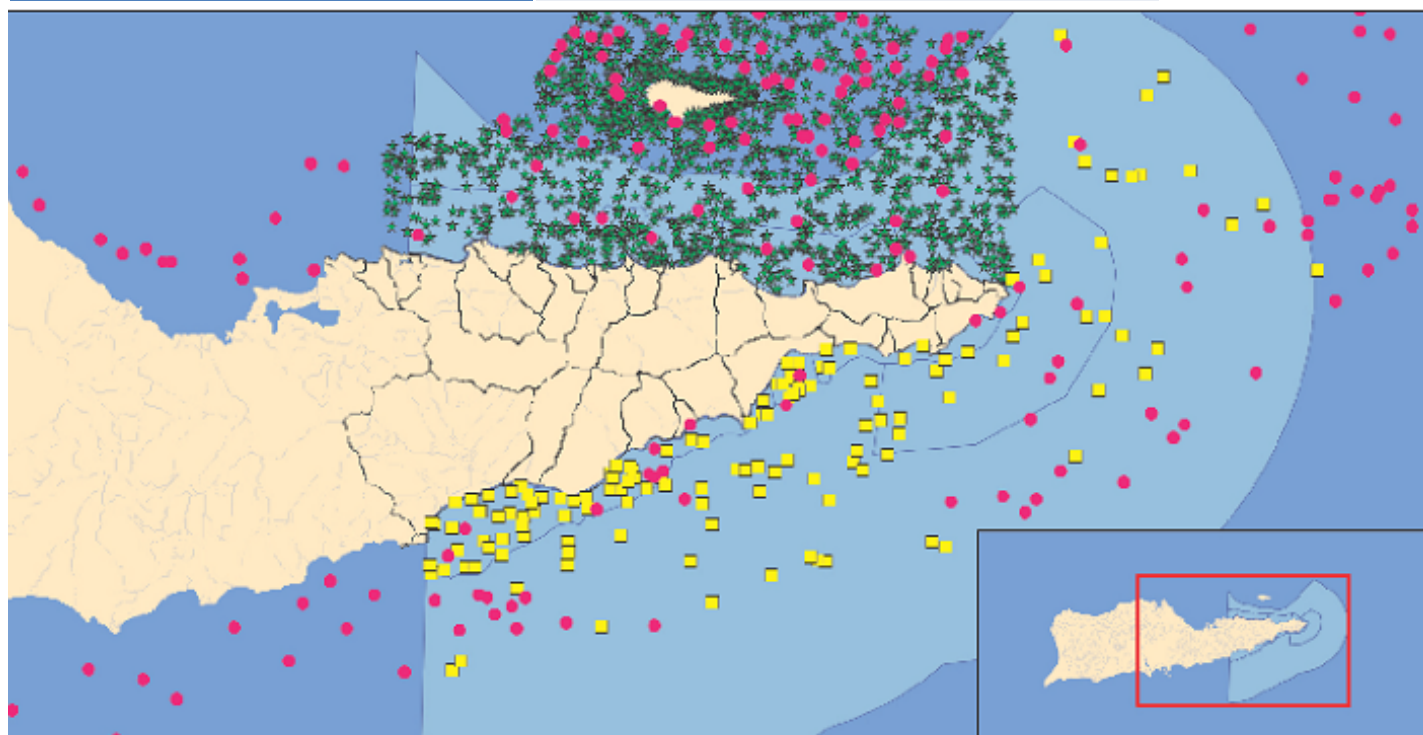
Watershed Impact Zone (300 m buffer)



More than a decade of sampling

Zone type	Number of surveys
No-take	320
Take	502
Recreation	124
Turtle preserve	38

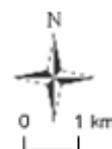
N = 984 surveys (2001 – 2012)



St Croix East End Marine Park:
Survey Sites

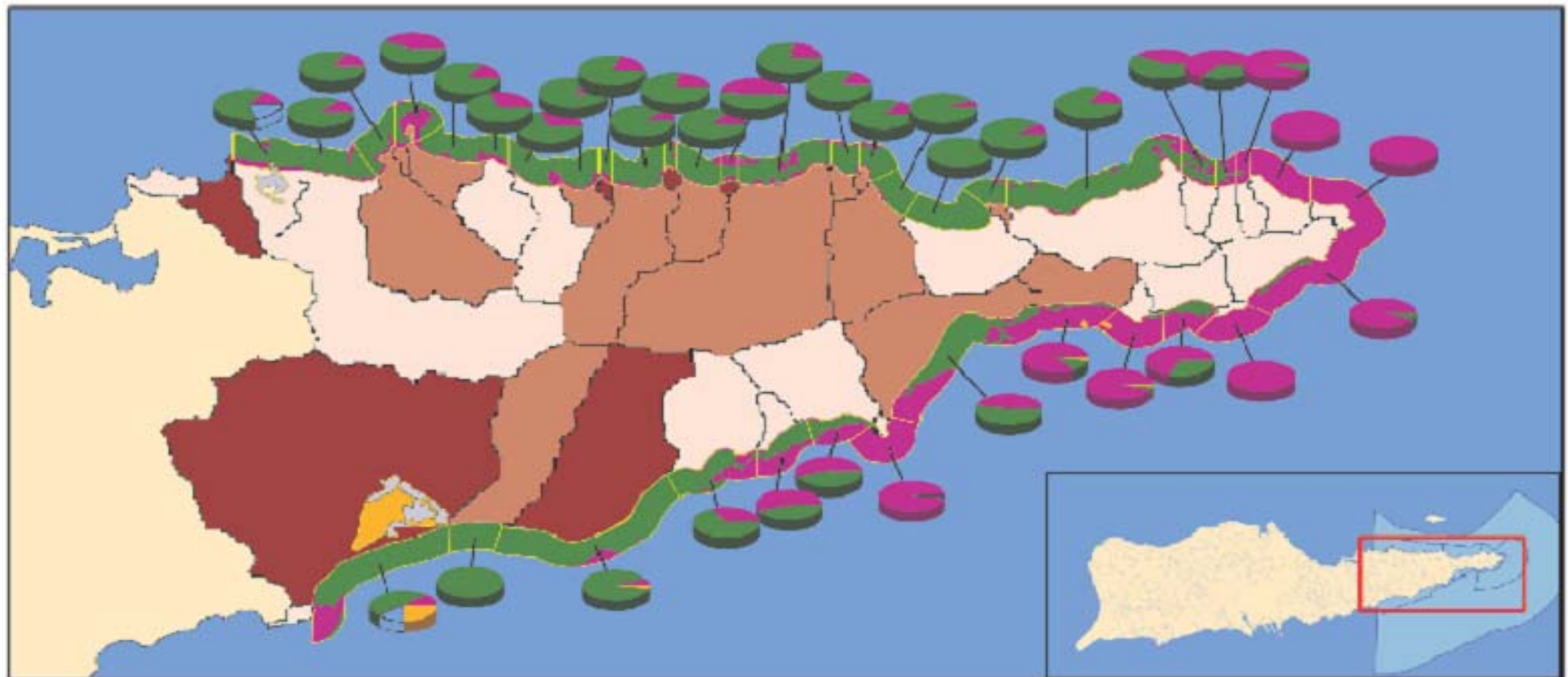
Survey Projects

- ★ Buck Island
- NCRMP
- Land-Sea



<http://ccma.nos.noaa.gov/about/biogeography/>

Low coral reef in mid to high LDI watershed impact zones



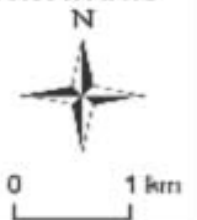
East End Marine Park:
Benthic Habitat Composition
within Watershed Impact Zones
Benthic Habitat: Derived from Habitat Maps



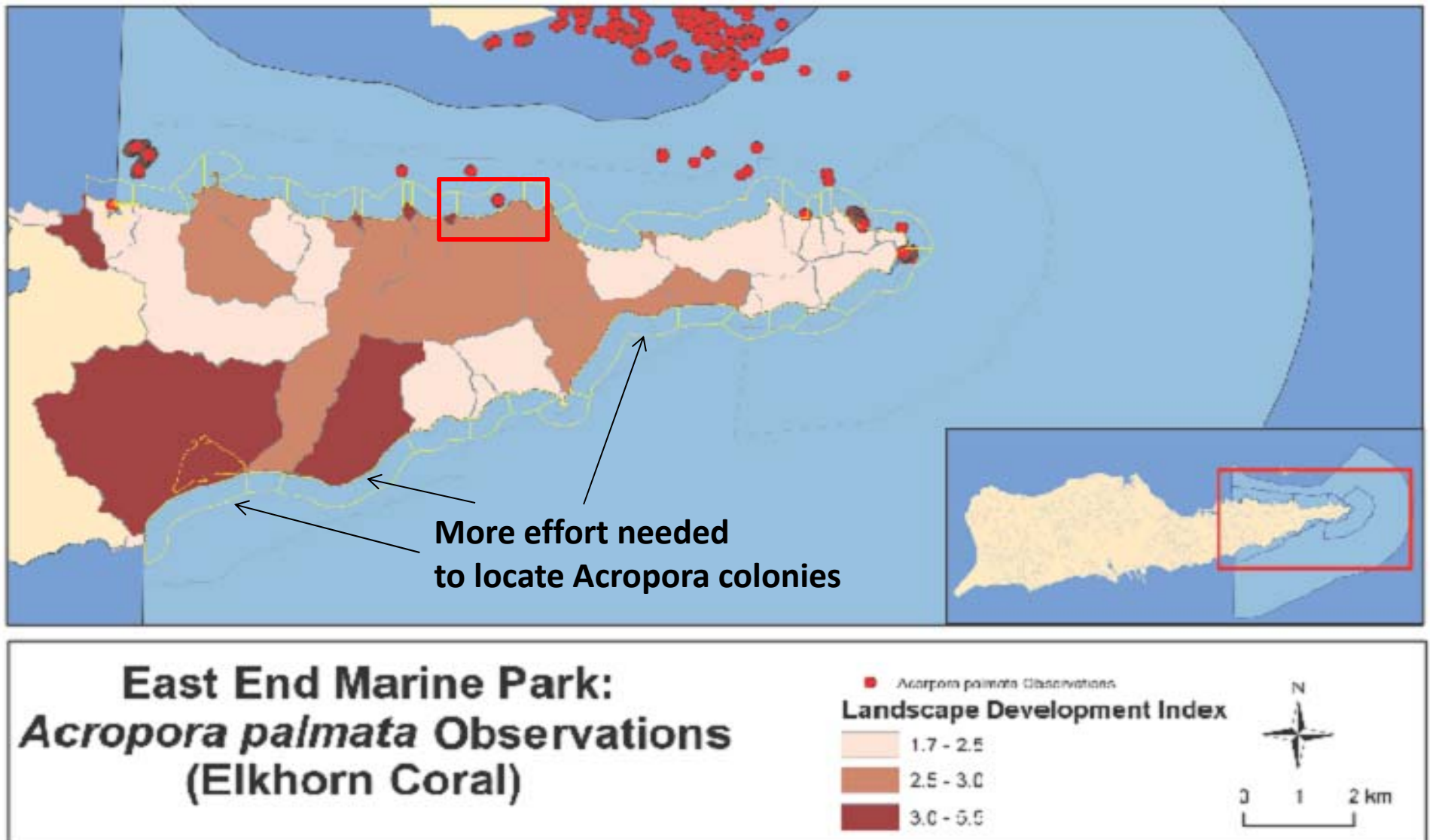
- Coral Reef and Colonized Hardbottom
- Submerged Vegetation
- Other Delineations
- Uncolonized Hardbottom
- Unconsolidated Sediments

Landscape Development Index

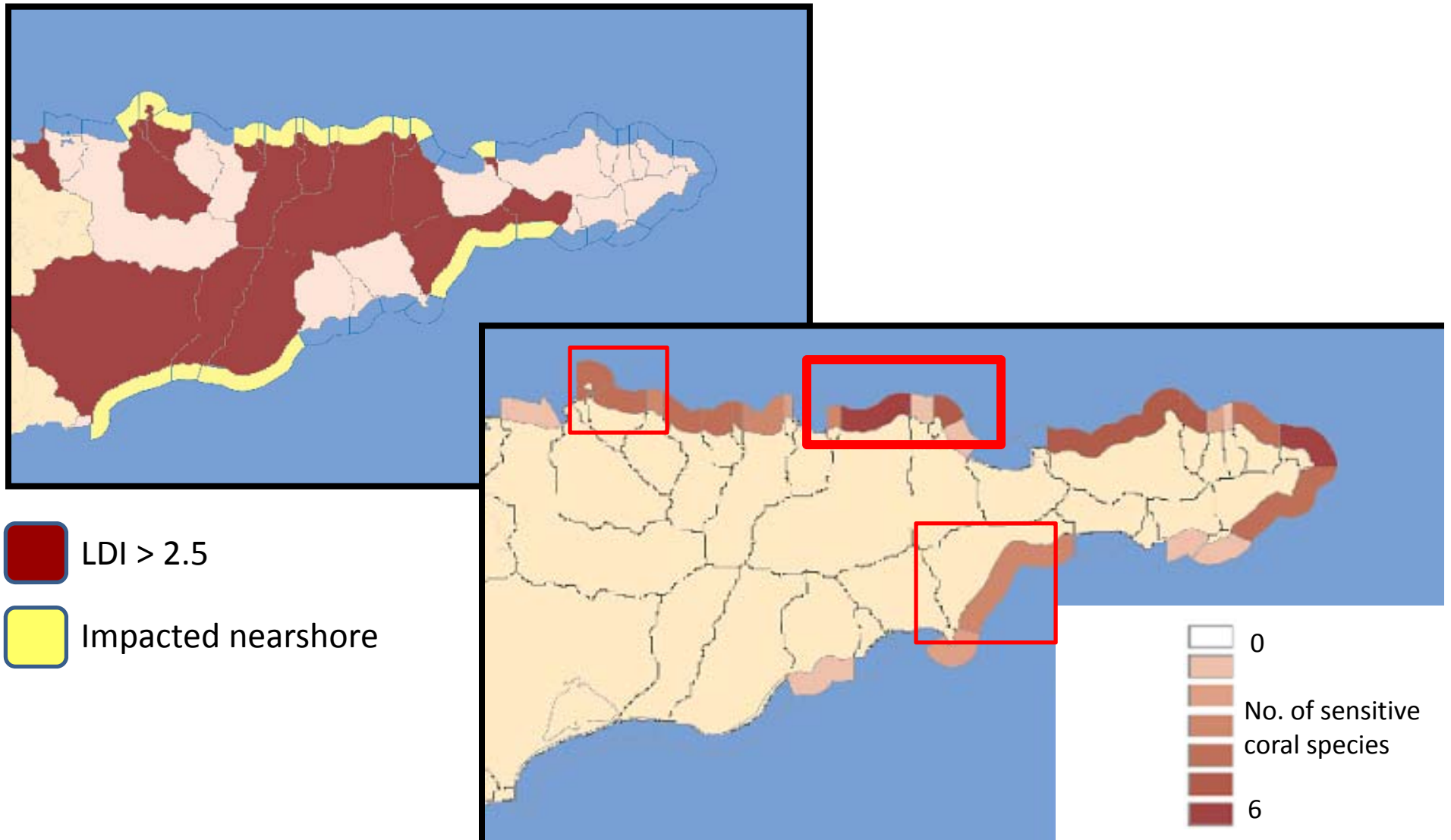
- 1.7 - 2.5
- 2.5 - 3.0
- 3.0 - 5.5



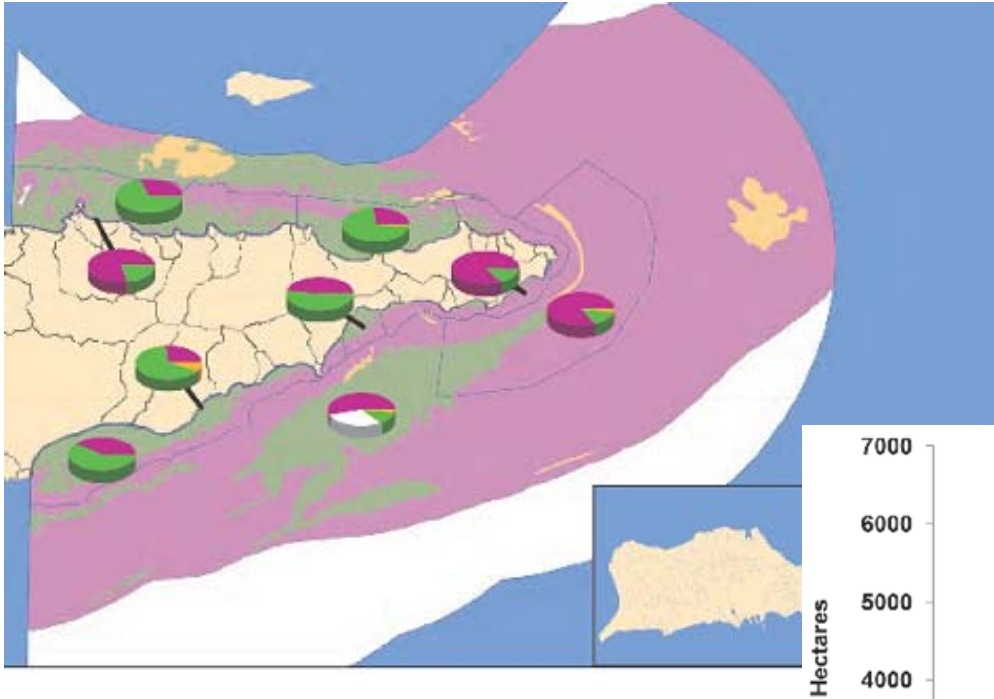
Are any elkhorn colonies threatened by watershed condition?



Distribution of sensitive corals in watershed impact zones

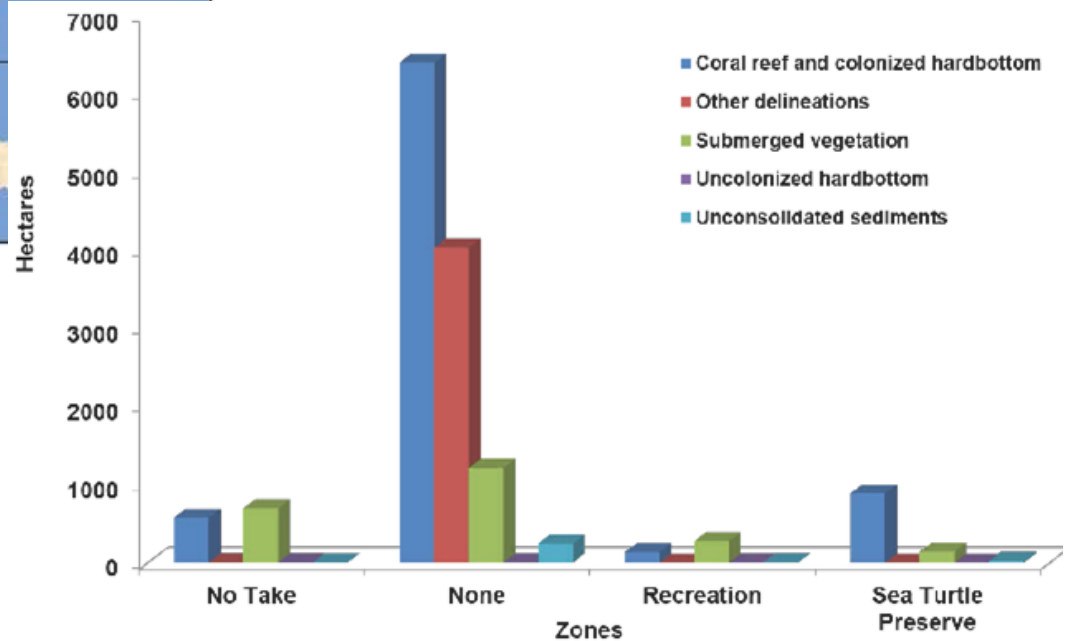


Who's in the Zone?



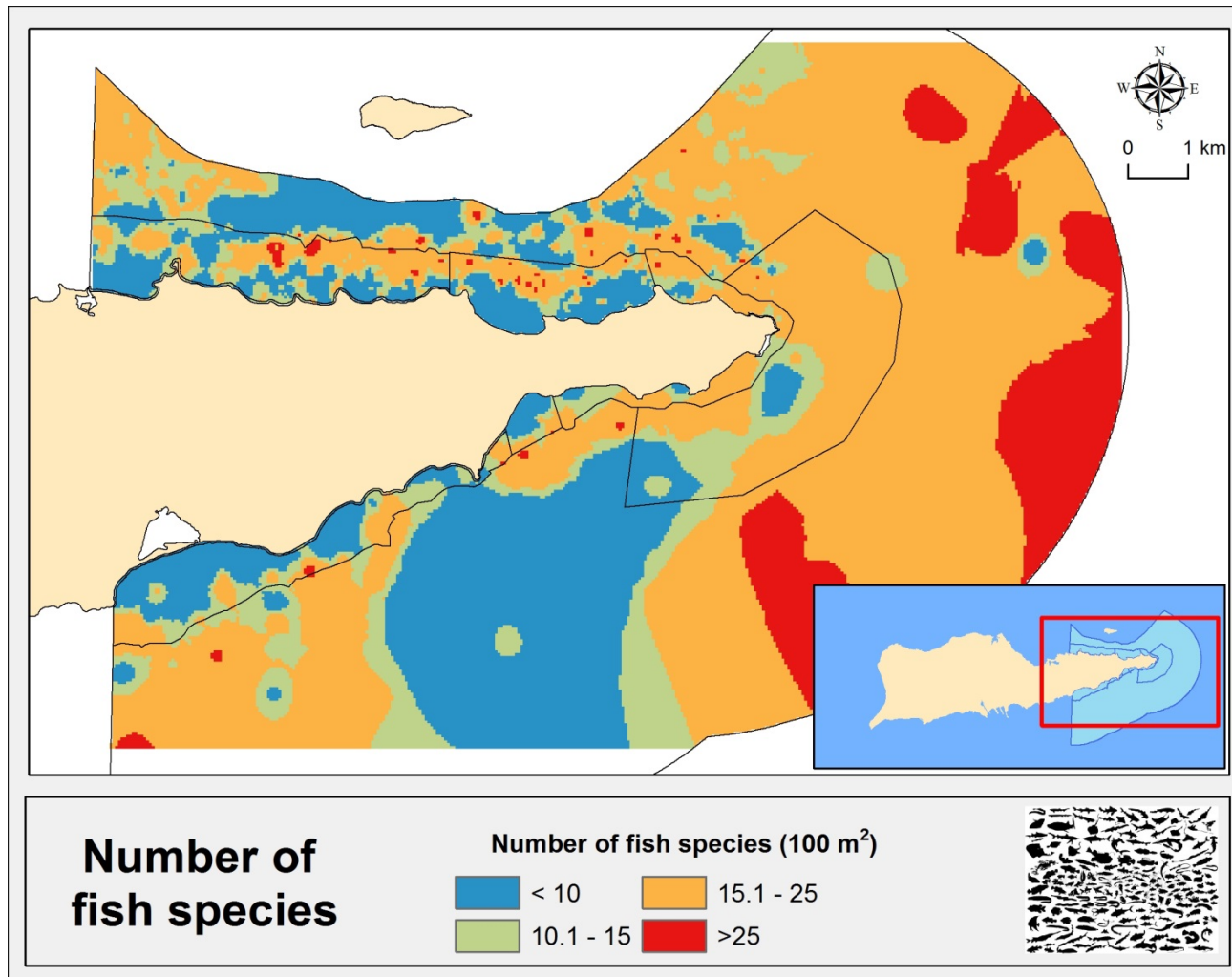
Most of the coral reef/pavement in the unprotected zone

No-take & recreation zones mostly seagrass/algae



Who's in the Zone?

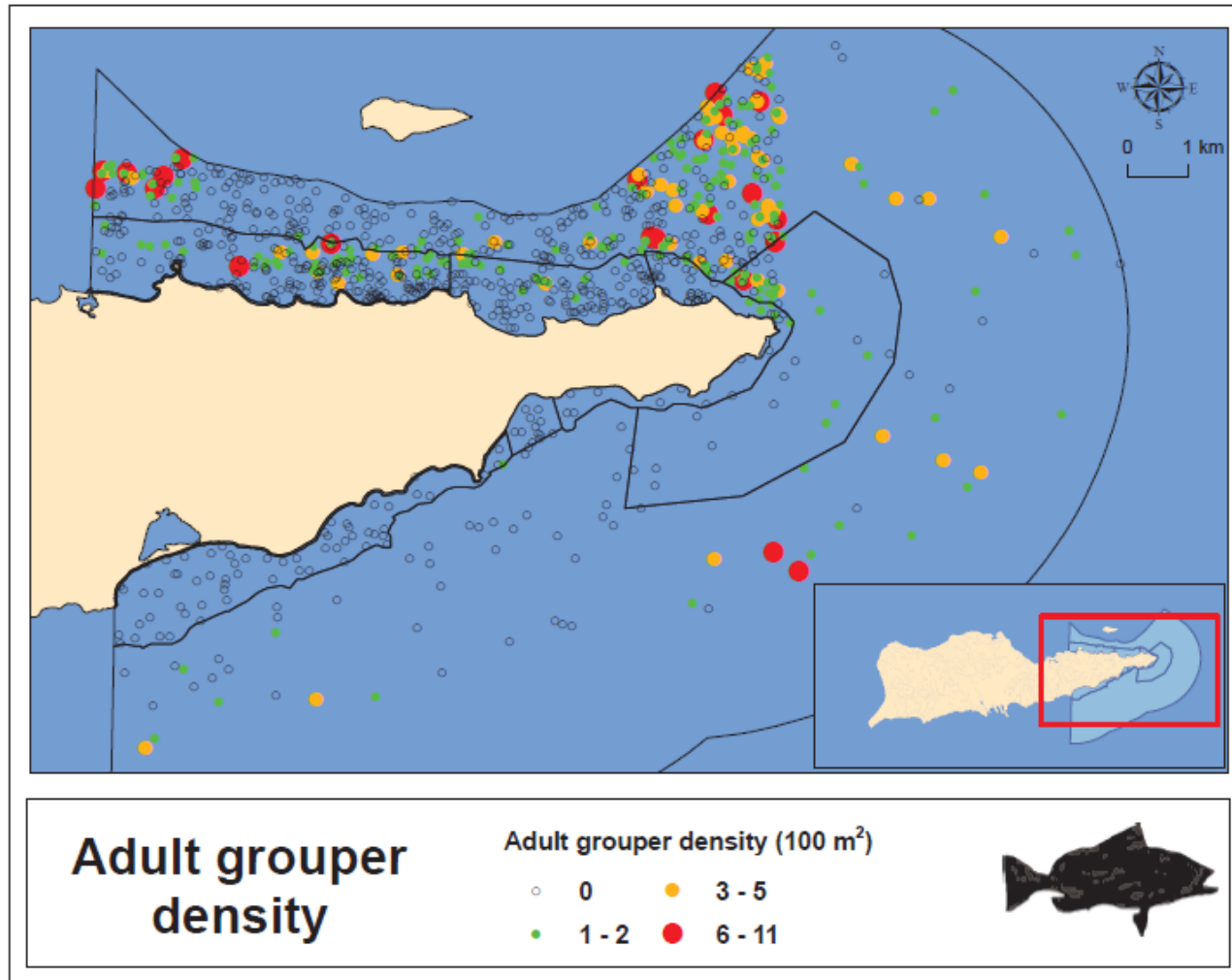
Diversity hotspots, warmspots and coldspots



**Average fish richness
in Fishable Area
higher than No-take
areas**

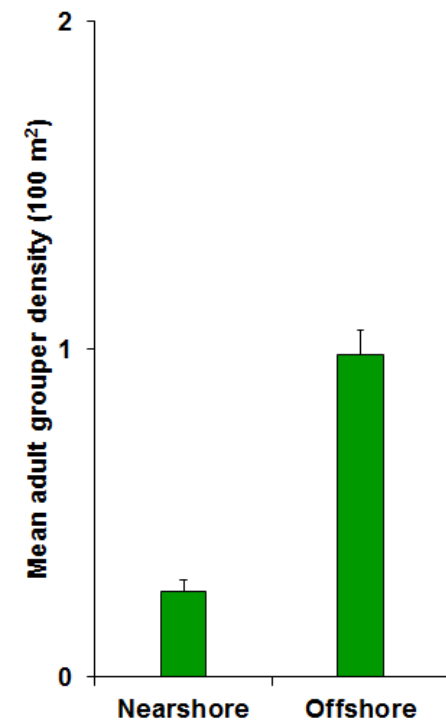
**For EEMP no-take
hotspots straddle the
boundary – no buffer**

Who's in the Zone?

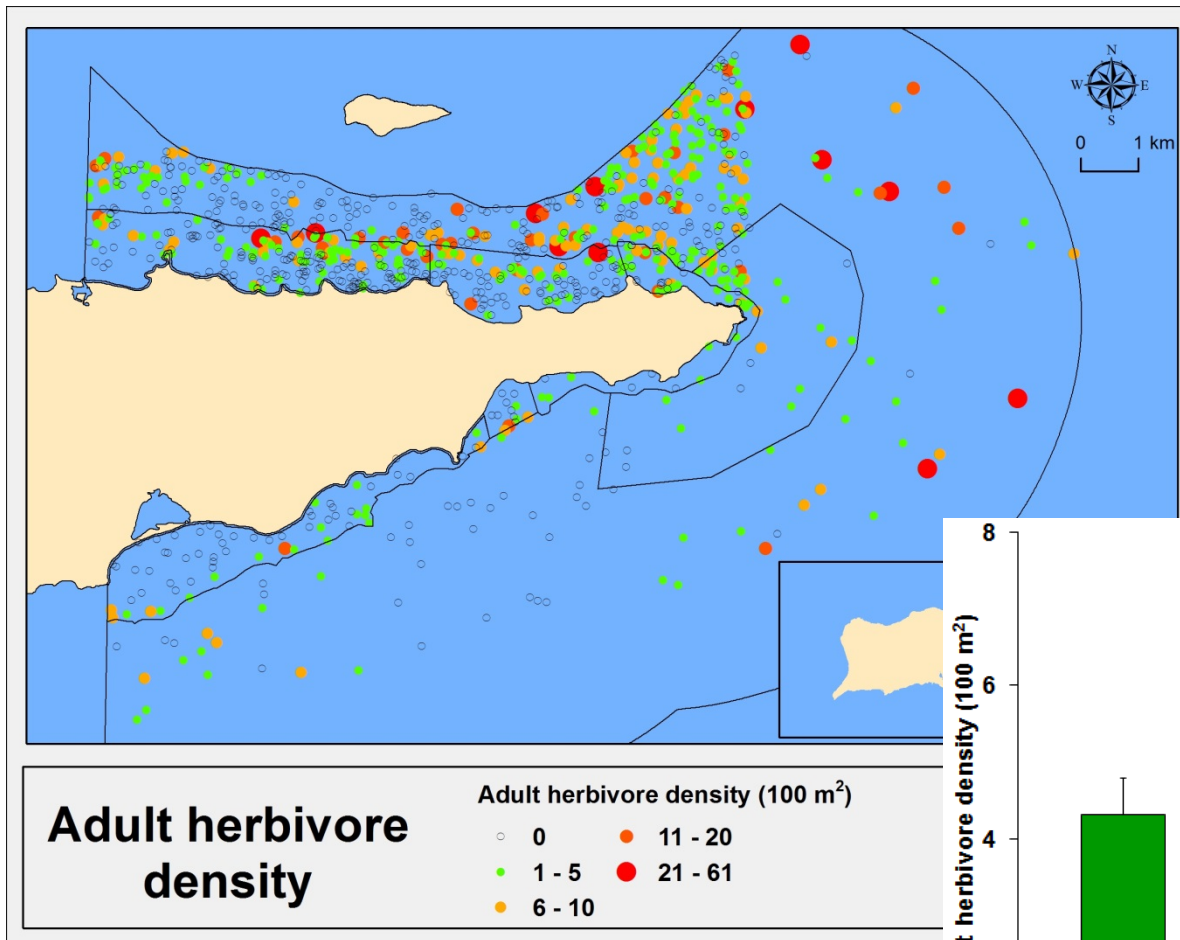


More adult grouper
in the fishable zone

Low density
on the south side



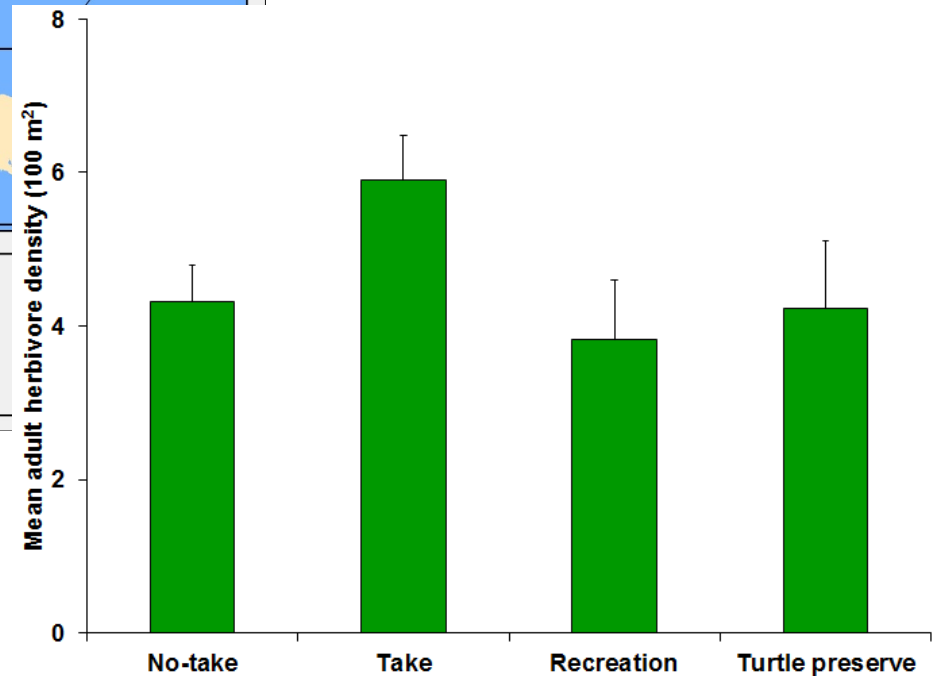
Who's in the Zone?



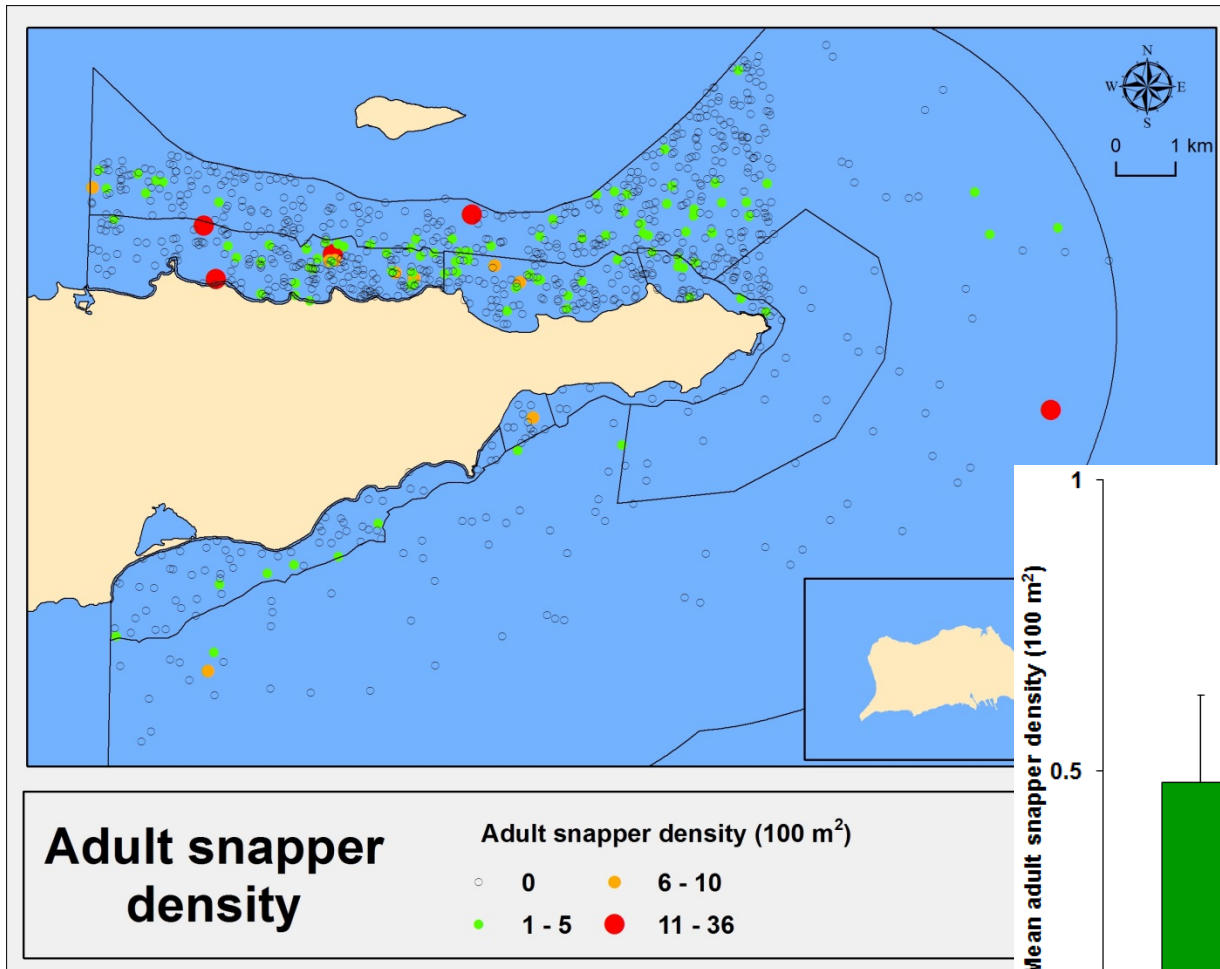
More adult herbivores
in the fishable zone

Low density
on the south side

Surgeonfish movement capabilities
1 – 8.5 km



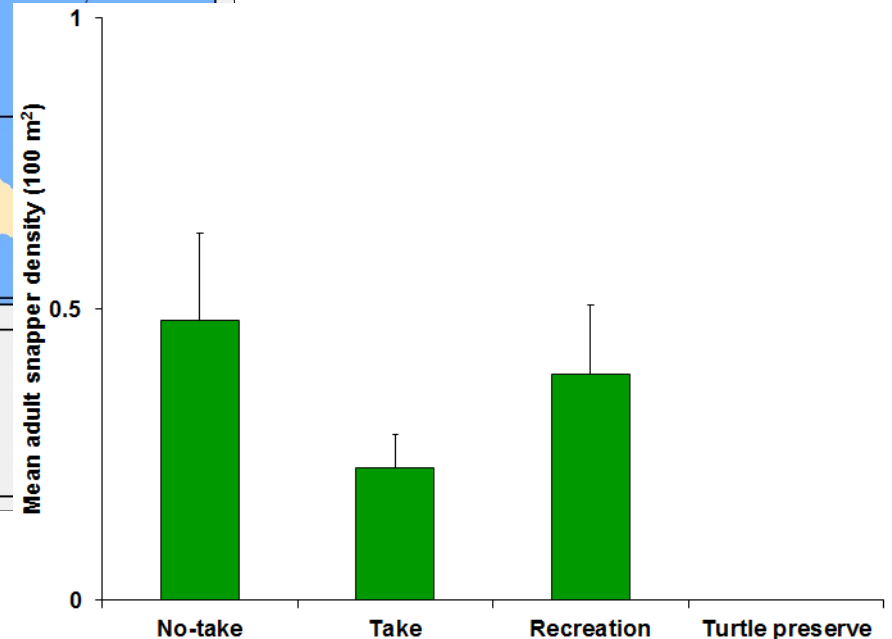
Who's in the Zone?



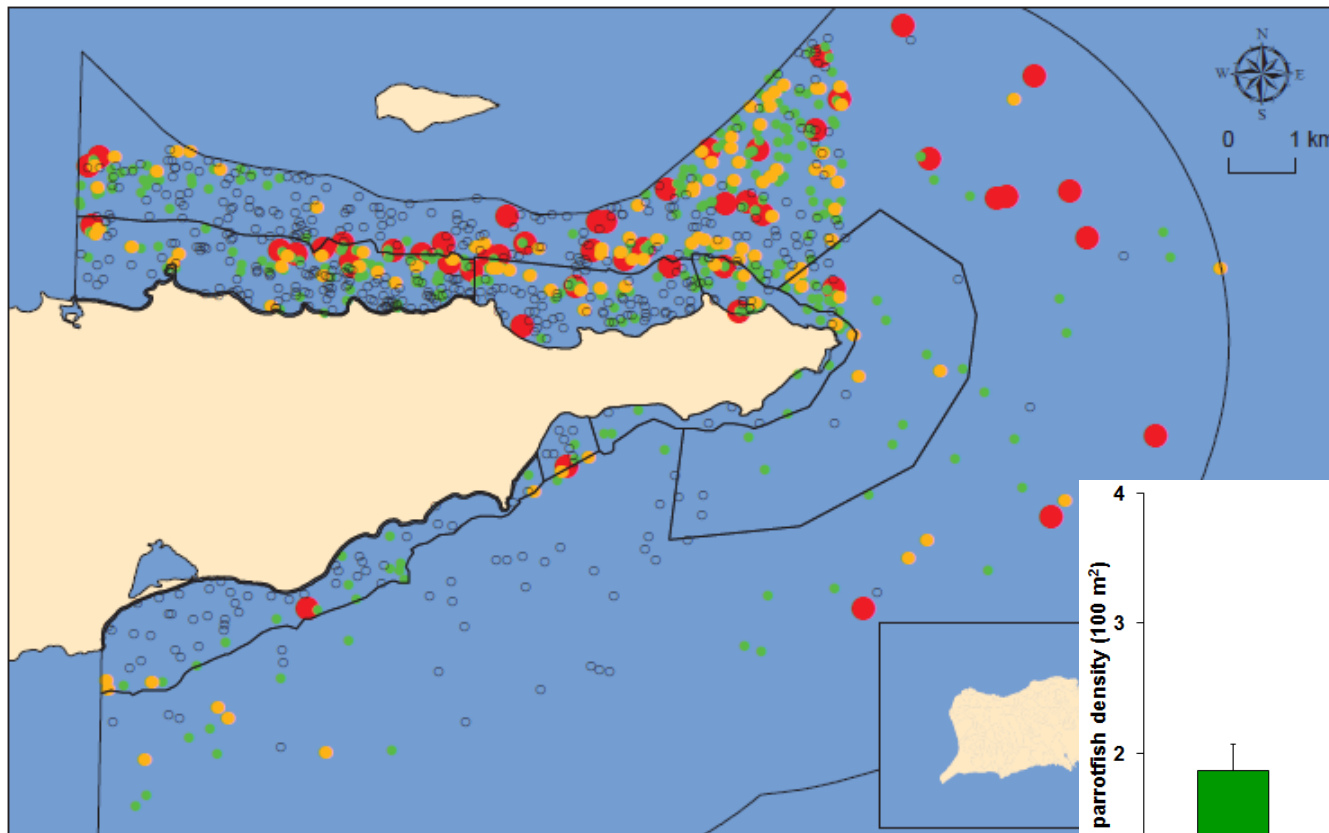
**Highest density
in the no-take zone**

**Low density
on the south side**

**Movement capability
0.3 to 33 km**

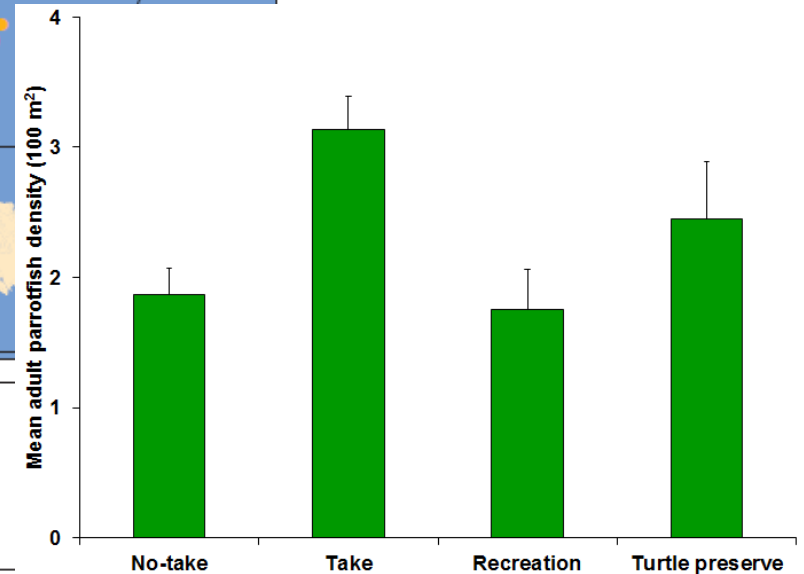


Who's in the Zone?



**Highest density
in the fishable zone**

**Low density
on the south side**



**Adult parrotfish
density**

Adult parrotfish density (100 m²)

○ 0 ● 6 - 10
● 1 - 5 ● 11 - 61

Products

- 
- **Report with maps**
 - **Recommendations**
 - **Geodatabase & metadata**

Acknowledgements

Mission Participants:

Laurie Bauer (NOAA/CCMA BB)
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