

An Ecological Characterization of the Marine Resources of Vieques, Puerto Rico



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NOAA in Vieques

- The National Oceanic and Atmospheric Administration (NOAA) provides technical support on the investigation and cleanup on hazardous waste sites around the country
- NOAA received funding from Congress in 2005, 2006 and 2007 to provide additional assistance in the cleanup and protection of the marine and coastal resources of Vieques



NOAA in Vieques

This funding was used to complete the following projects:

- Land and Fiddler Crab Study
- Underwater Ordnance Demonstration Project
- Coral Reef Restoration Demonstration Project
- Education and Outreach
- Ecological Characterization of the Marine Resources of Vieques



Background

- Land use activities can have dramatic effects on marine ecosystems
- Vieques has a unique land use history (sugar cane, military activities, tourism)



*Ruins of sugar
plantation*



Amphibious Landing



Esperanza

Background

- Pollutants in marine systems can affect a wide range of animals including: lobsters, conch, corals and fish
- Sampling sediments and corals are useful ways to measure pollution



Study Goals

- Determine the overall marine health of the waters of Vieques
- Determine to what extent land use has impacted the marine environment

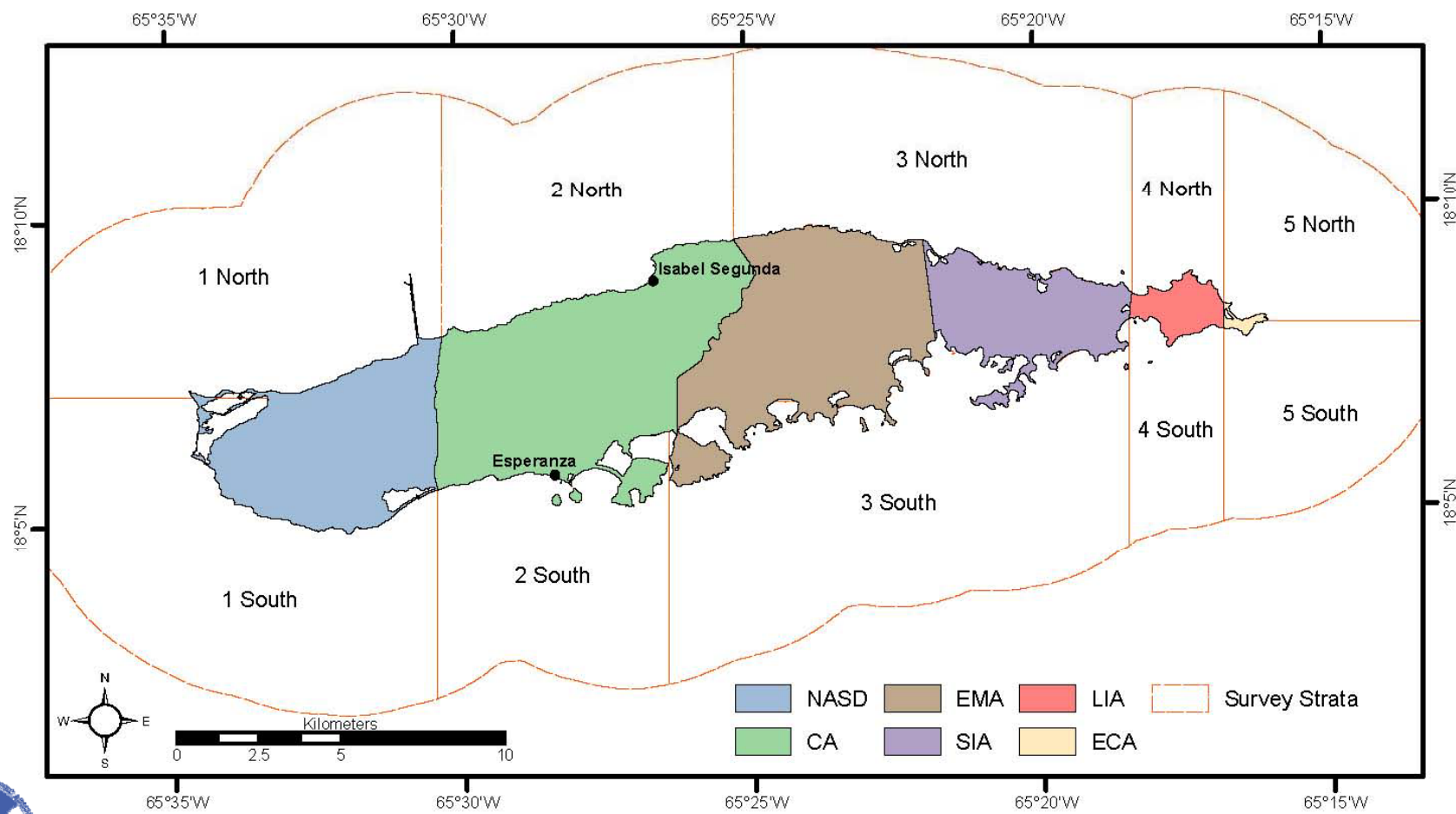


What We Measured

- Potential Contamination (162 compounds)
 - In marine sediments
 - In coral tissues (Mustard Hill coral)
- Marine Biological Survey
 - Corals, conch, lobsters, sea urchins
 - Fish (size, type and numbers)

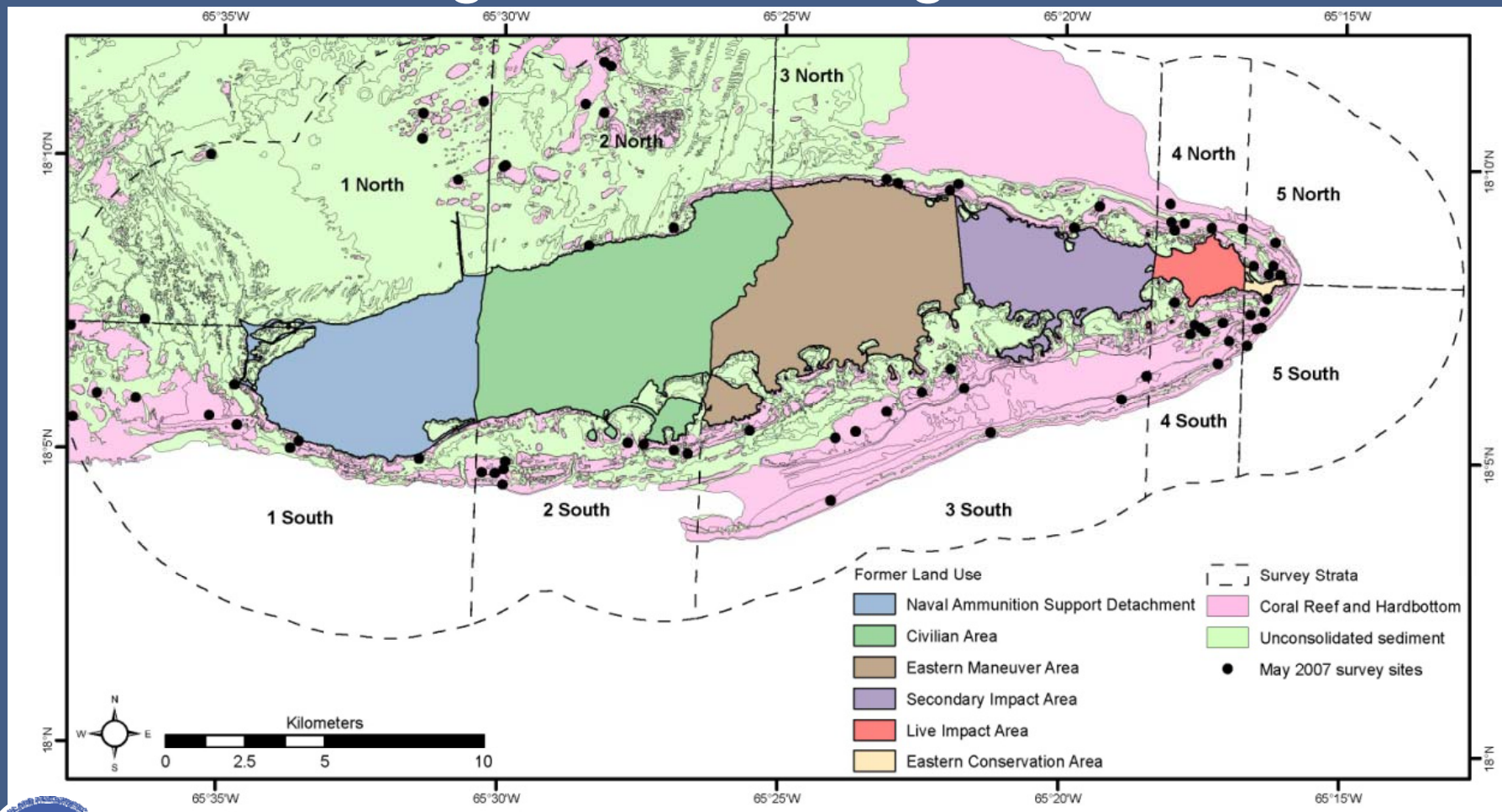


Where We Measured It: Site Selection



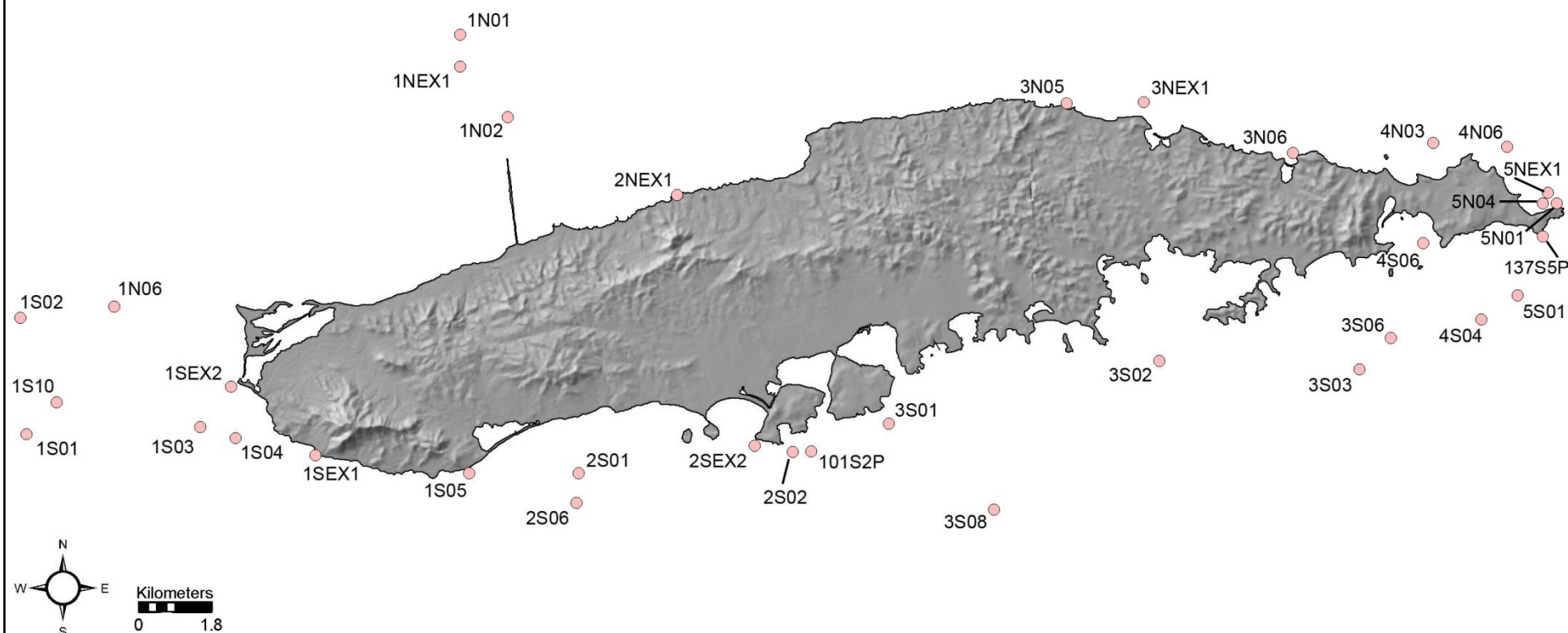
Where We Measured It

75 Biological Monitoring sites on reefs



Where We Measured It

35 coral sampling sites for possible contamination



78 sediment sampling sites in lagoons and coastal waters for possible contamination



Sediment and Coral Analyses

NOAA's National Status and Trends Program's suite of contaminants

- Polycyclic aromatic hydrocarbons (PAHs)
- Chlorinated pesticides
- Polychlorinated biphenyls (PCBs)
- Butyltins
- Trace and major elements
- Polybrominated biphenyl ethers (flame retardants)
- *Energetics (e.g. TNT)*
- *Radioactive Compounds*



Total of 162 Compounds



How do we interpret the results?

Sediment Quality Guidelines

- These are *not* regulatory levels, they are only guidelines to suggest when we should be concerned
- Based on these guidelines, the data say if pollution at a site is of:
 - “no expected concern”;
 - “low concern”;
 - or “moderate concern”
- These exist only for sediments, not for corals



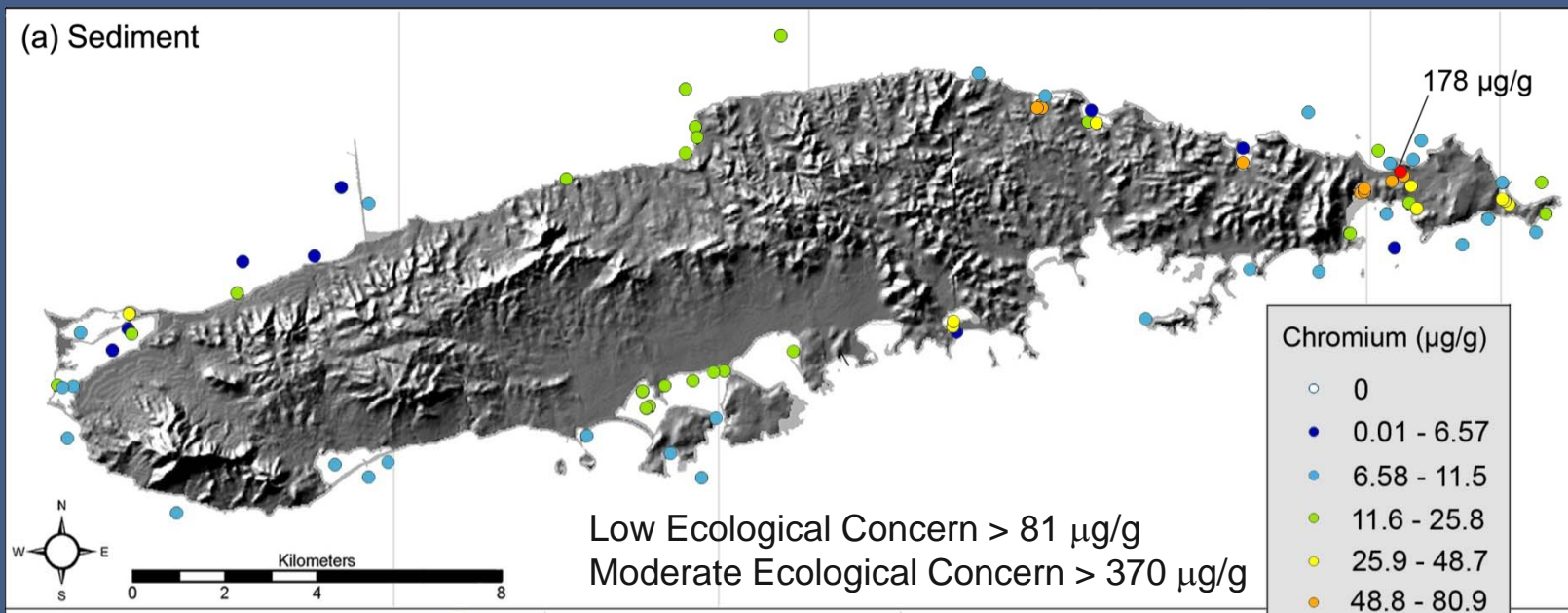
Overall Findings

- Only 2 compounds were detected at levels high enough to be of concern.
 - Chromium was slightly high at one site (low concern)
 - DDT was high at 4 sites (moderate concern)

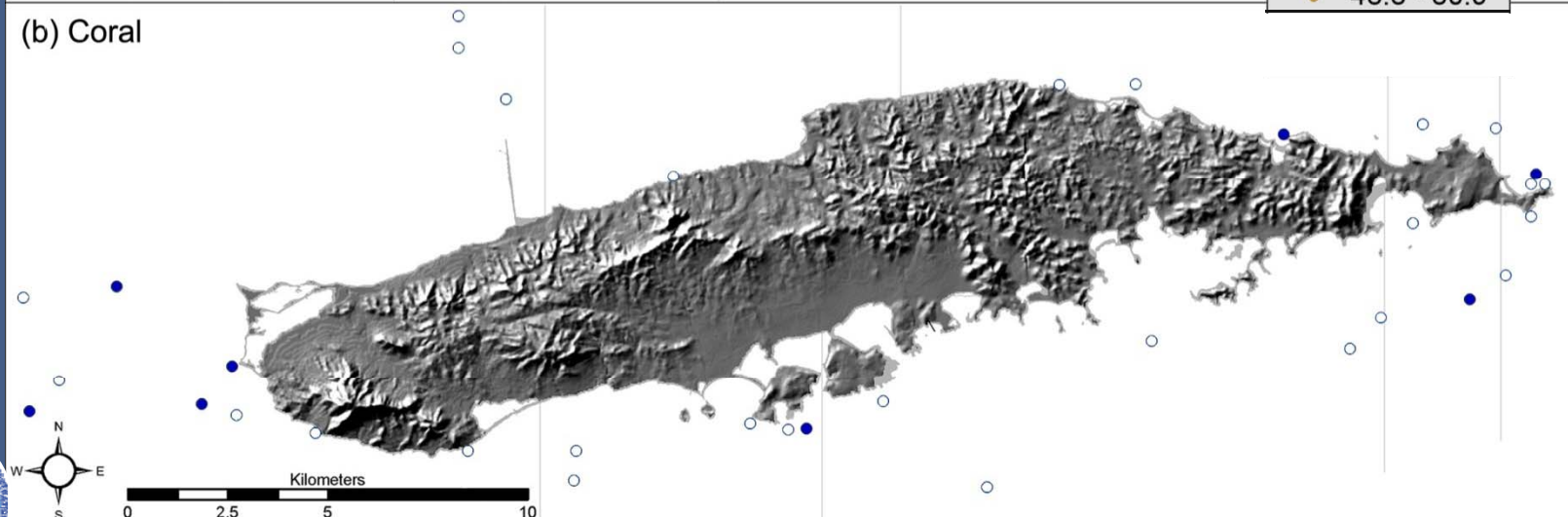


Chromium in Sediment and Coral

(a) Sediment

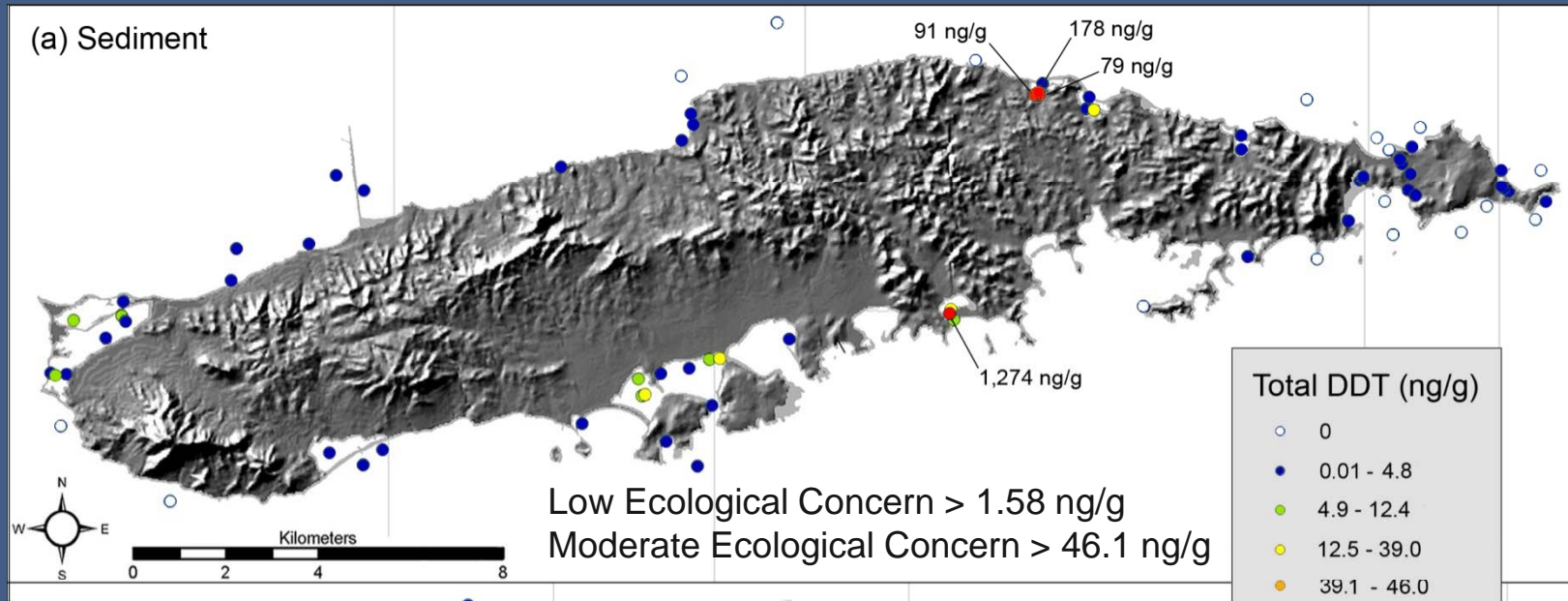


(b) Coral

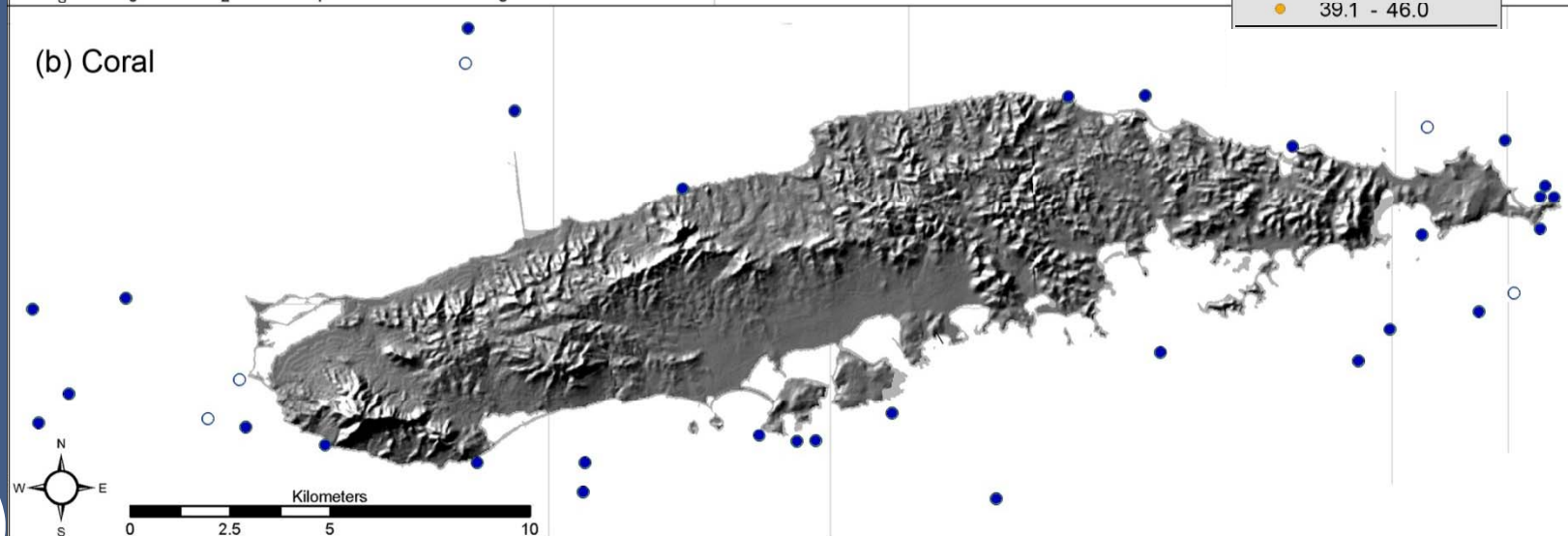


DDT in Sediment and Coral

(a) Sediment



(b) Coral



Geographic Patterns

- DDT was significantly higher in the Eastern Maneuver Area
- Chromium was significantly higher in the LIA
- PAHs were higher in lagoons and higher on the western portion of the island (but were never elevated above the guidelines).



Summary of Contaminants

Contaminant concentrations are generally low in sediments and corals, with a few exceptions.

- *Four sites had elevated DDT concentrations*
- *One sediment site had a slightly elevated concentration of chromium.*
- *Neither energetics nor radioactivity were detected at any sediment sites*



Biological Assessment

- Objectives:
 - Characterize biological communities on the reefs
 - Identify differences in communities adjacent to former land use zones

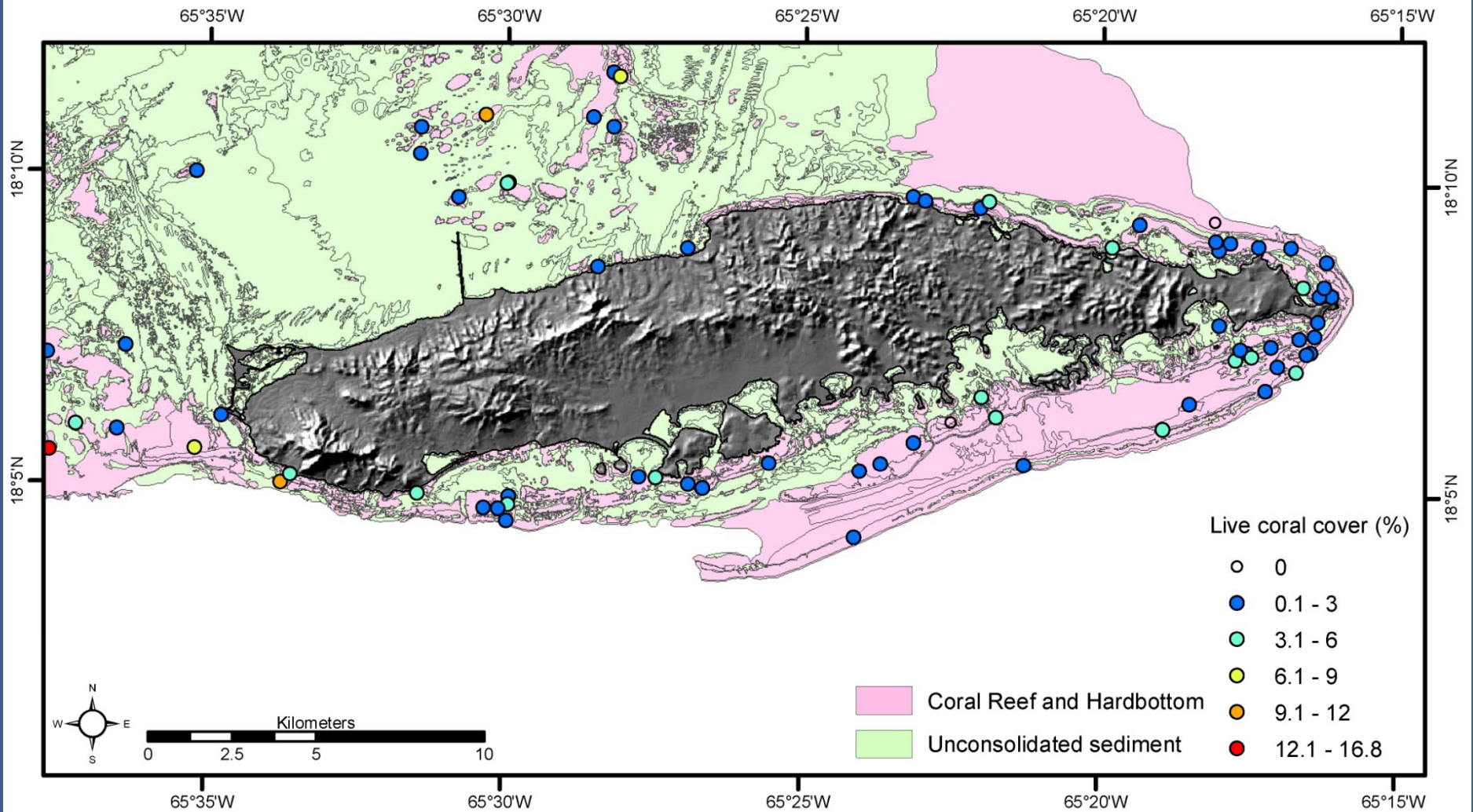


Field Methods

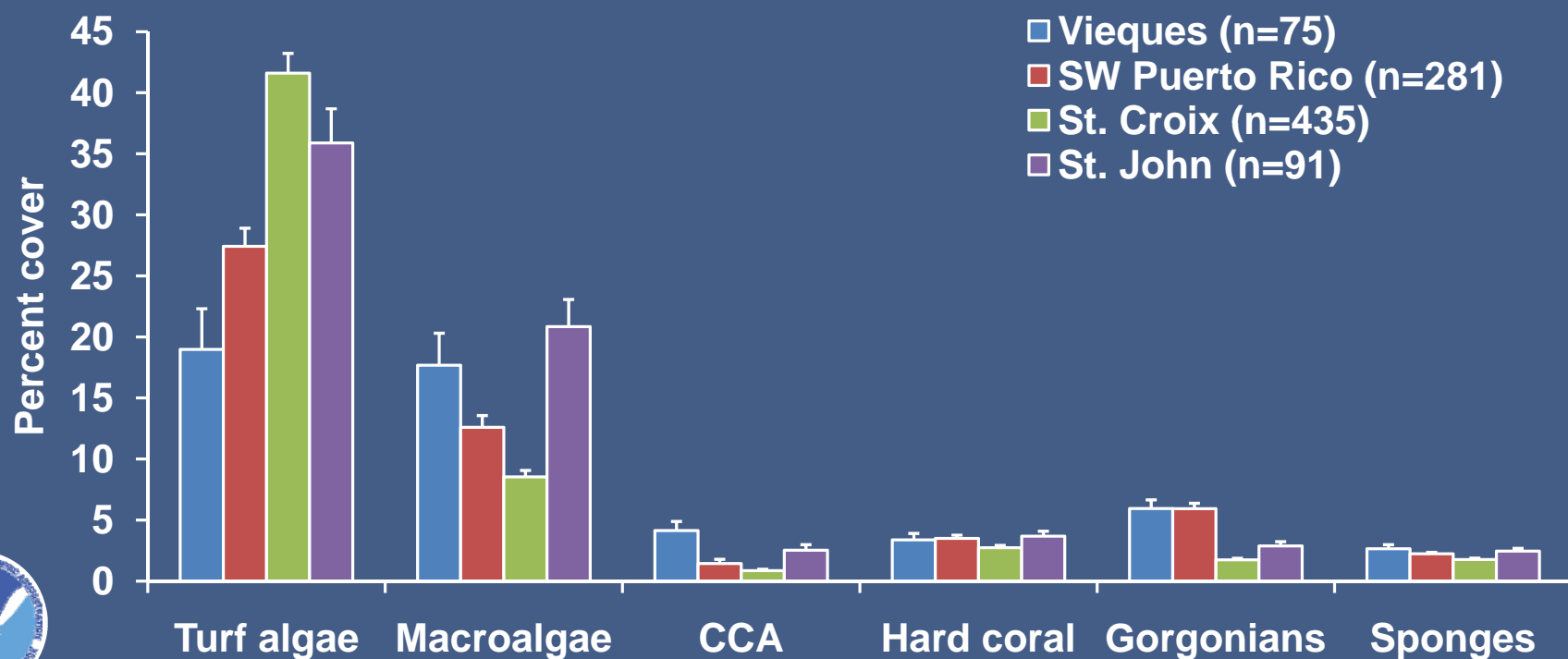
- What Does the Bottom Look Like?
 - Coral vs algae vs sponges
 - Conch, lobster, sea urchins
- Fish
 - What type of fish are present?
 - How big are they?
- Marine Debris



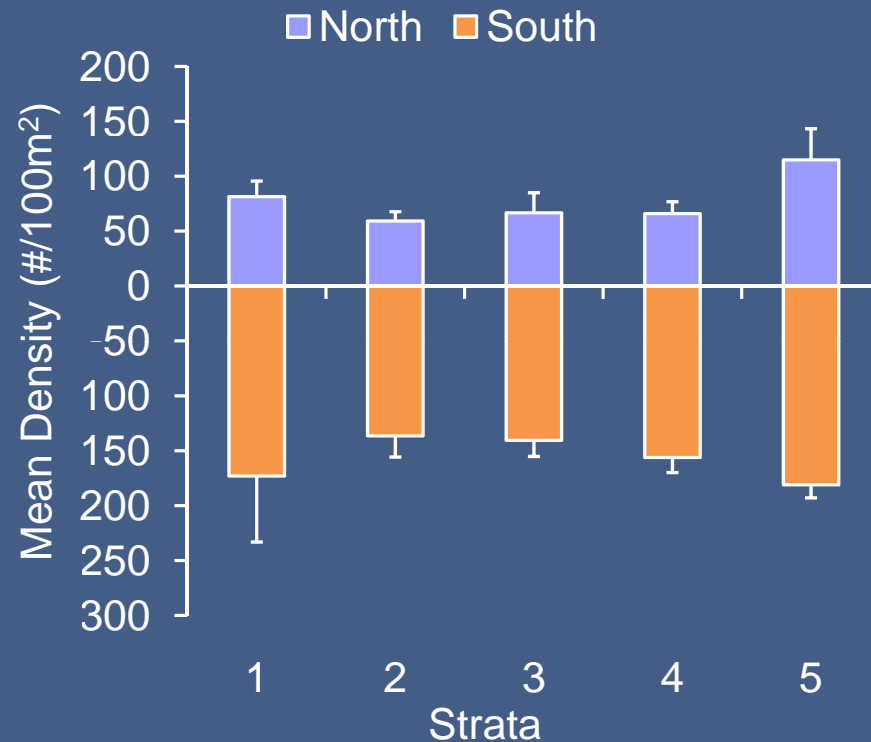
Results: Coral Cover



Vieques is similar to other locations in U.S. Caribbean

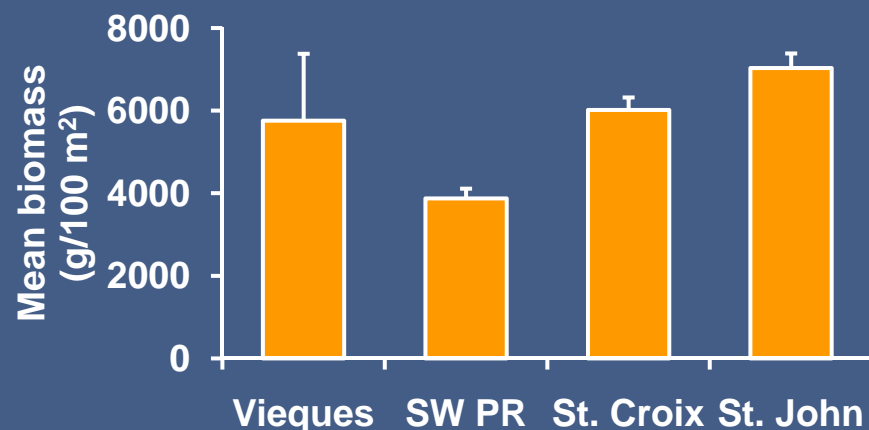
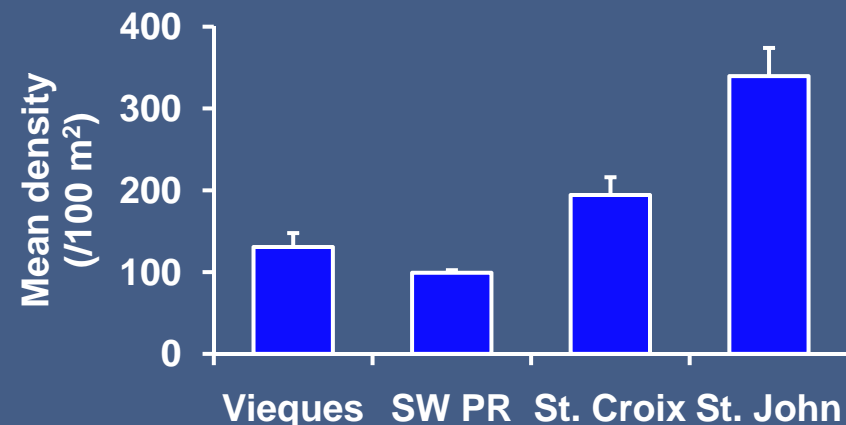


Results: Fish Communities



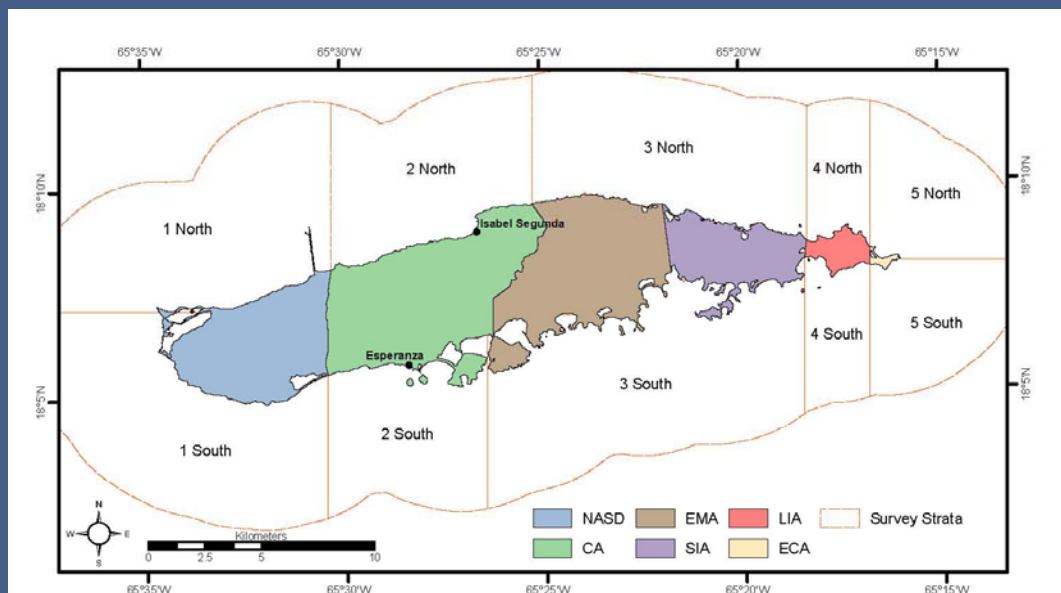
There were generally more fish on the south shore than the north shore (no east-west differences)

Vieques is similar to other locations in U.S. Caribbean



Summary of Biological Assessment

- Vieques is similar in terms of marine biology to other nearby monitoring locations in the U.S. Caribbean
- Differences in marine biology around the island were not linked to former land use patterns



Report is Available Online

<http://ccma.nos.noaa.gov/ecosystems/coralreef/vieques.html>

Or simply Google:

“NOAA Vieques”



An Ecological Characterization of the Marine
Resources of Vieques, Puerto Rico
Part II: Field Studies of Habitats, Nutrients, Contami-
nants, Fish, and Benthic Communities



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Project Partners

- NOAA /National Centers for Coastal Ocean Science
- NOAA/Office of Response and Restoration
- NOAA's Coral Reef Conservation Program
- U.S. Fish and Wildlife Service (logistical support)
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THE VIEQUES
CONSERVATION
AND HISTORICAL
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