

# A NATIONAL PROGRAM TO ASSESS, INVENTORY, AND MONITOR US CORAL REEF ECOSYSTEMS

The driving need for a coordinated coral monitoring structure is to collect a robust and consistent suite of data necessary for the preparation of a biennial report on the status and trends of coral reef health, community structure, and condition for all US coral reef ecosystems.

## OBJECTIVES

- 1) Provide **leadership in the development and implementation** of a nationally coordinated program to monitor the health of US coral reef ecosystems.
- 2) **Integration of now disparate monitoring programs** and sites into a coordinated national network,
- 3) **Facilitate sharing** of monitoring information among US coral reef resource managers and scientists, and
- 4) **Fill gaps** in monitoring coverage nationwide.

**OUR MANDATE**

**HOUSE RULE 1653**

**“CORAL REEF CONSERVATION ACT OF 2000”**

**§ 207(b) - National Program authorized Activities**

**“Mapping, monitoring, assessment, restoration, and scientific research that benefit the understanding, sustainable use, and long-term conservation of coral reefs and coral reef ecosystems”**

**§ 208(b) - Effectiveness Reports**

**“Not later than 2 years after the date on which the Administrator publishes the National coral reef strategy under §203, and every 2 years thereafter, the administrator shall submit to the committee on commerce, science, and transportation of the Senate and the committee on resources of the House of Representatives a report describing all activities.....”**

**Funding is Provided to Governor Designated “Point of Contact”**



## INVENTORY/ASSESSMENT

An extensive point-in-time effort to determine location or condition of a resource, including the presence, class, distribution, and status of biotic and abiotic components to characterize the ecosystem.

Inventories contribute to a statement of resources, which is best described in relation to a standard condition such as the natural or unimpaired state.

## MONITORING

Monitoring differs from inventory in adding the dimension of time, and the general purpose of monitoring is to detect changes or trends in a resource.

**Elzinga et al. (1998) defined monitoring as "The collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective".**



## MONITORING THEMES

### Benthic Parameters



- Cover (live, dead, etc.)
- Abundance
- Condition
- Size class distribution
- Indicator species
- Diversity

### Water Quality Parameters



- Nutrients
- Suspended solids
- Chlorophyll
- Turbidity
- Temperature
- PAR

### Ass. Biol. Parameters



- Abundance & distribution
- Size class distribution
- Indicator species
- Diversity
- Richness
- Evenness

## EXAMPLES

# Standards

**\*\* BASELINE CHARACTERIZATION \*\***

## Design

“Effect” Stratification - Objectives Based Controls

- MPA’s, etc.
- Degradation levels
- Human use areas
- Geographic Zones (Leeward-Windward)

Replication within Strata

- Describe spatial variance structure
- Describe temporal variance structure

Statistically Robust

- Descriptive
- Inference

## Information

Spatial Attributes

- Latitude/Longitude
- Datum (NAD83, WGS84, etc.)

Temporal Attributes

- Time
- Day-Month-Year
- Day/Night

Unique Sample Attributes (concatenations)

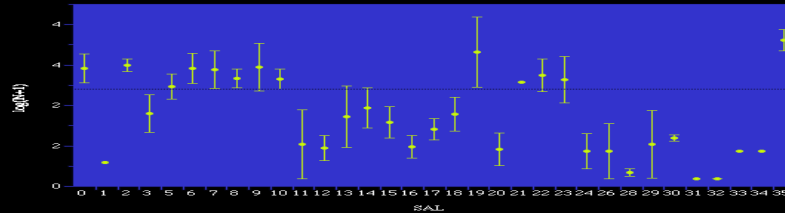
e.g., Station Name : Date : Replicate

General Descriptors

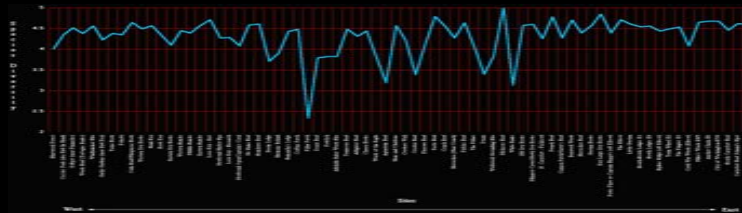
- Habitat Type
- Reef
- Seagrass
- Algae
- Sand
- Mangrove
- Altered



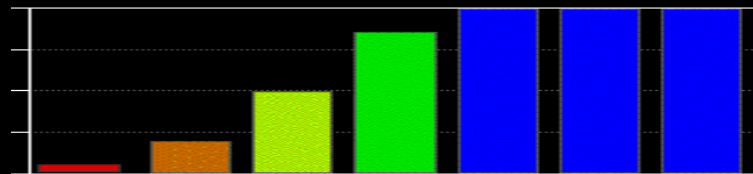
Puerto Rico



US Virgin Islands



Florida



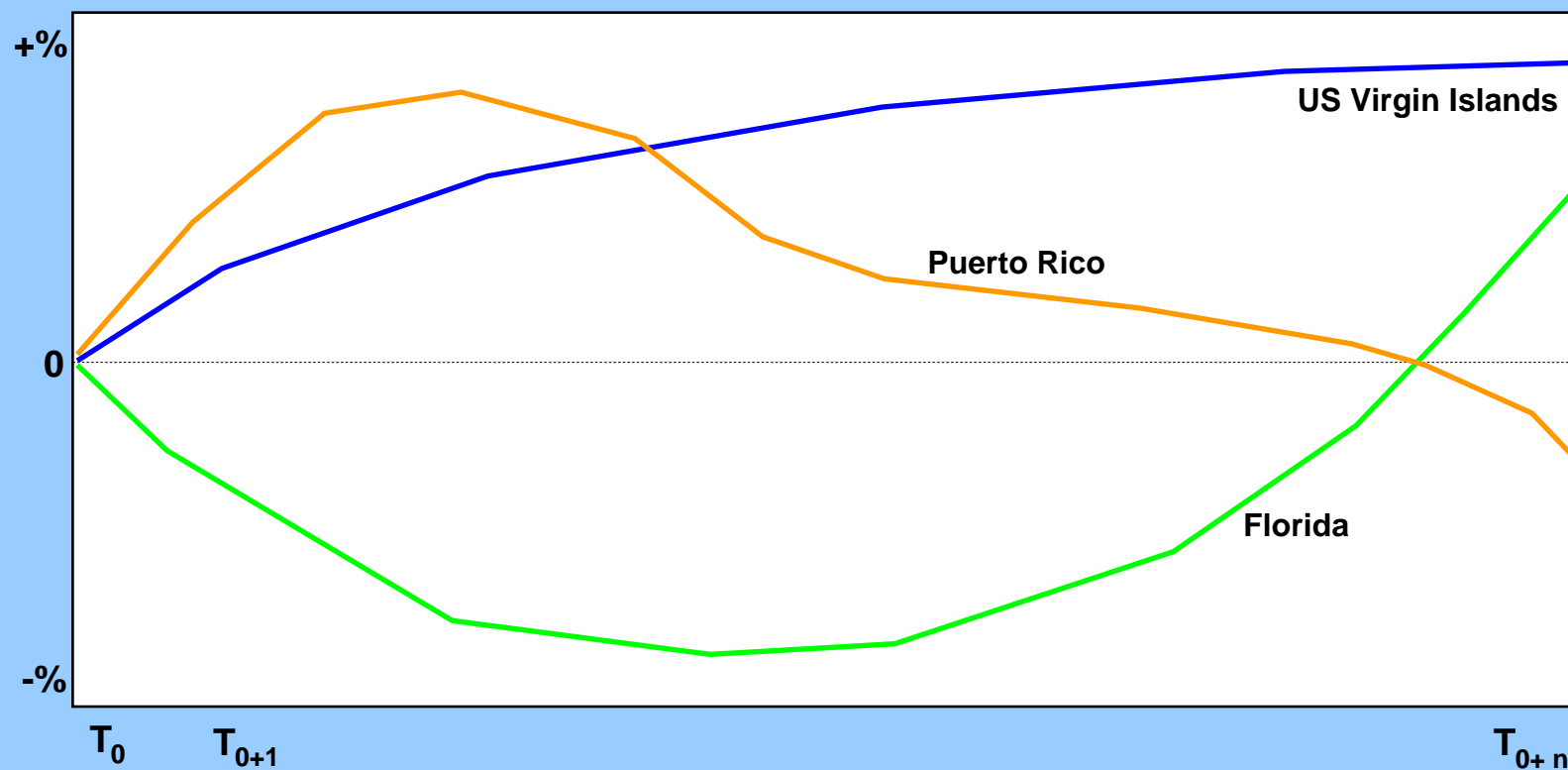
The intent is not to compare monitored estimates **among** territories.

Rather, it is to characterize and compare monitored estimates **within** states, territories, and commonwealths

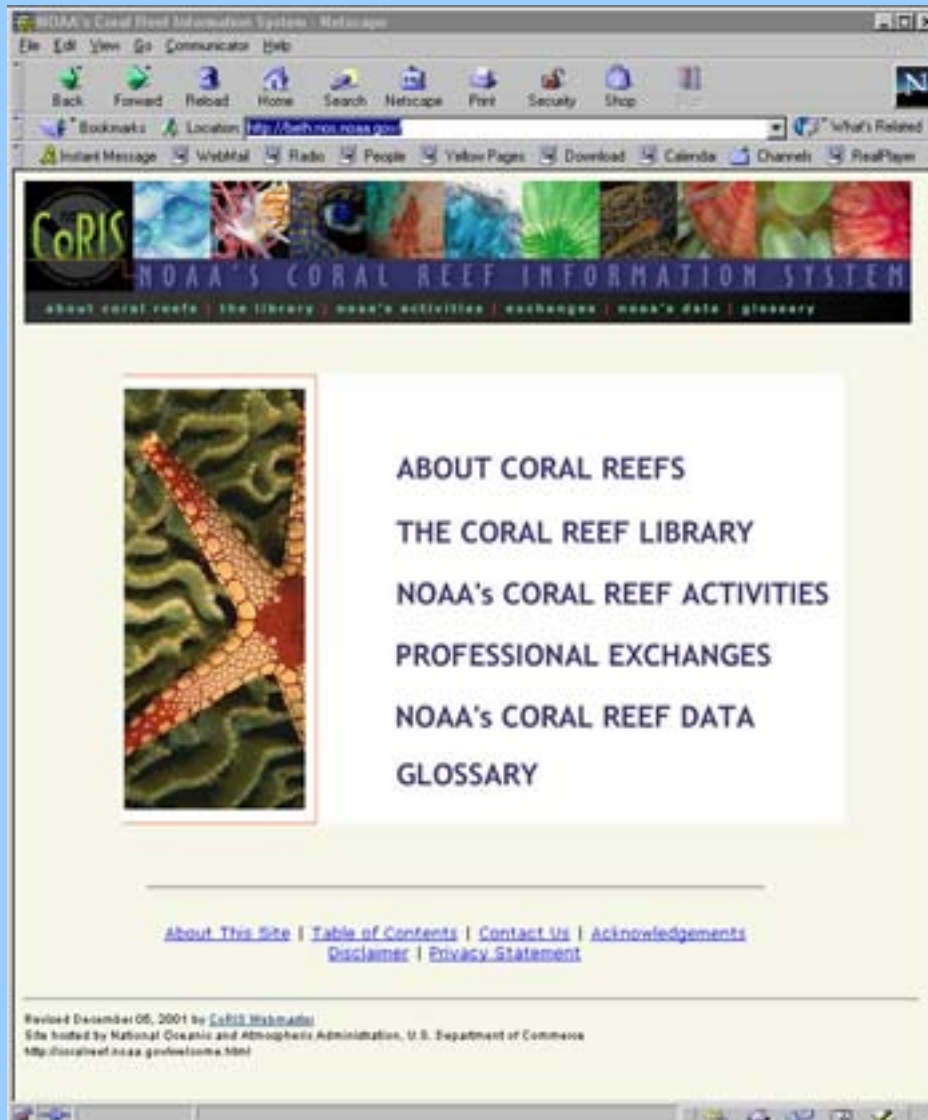
Given an adequate time series, an appropriate design with sufficient power to detect change, and standard protocols used throughout the period of record, we will develop the capacity to **compare RATES OF CHANGE throughout the Atlantic/Caribbean region.**

At present, there will **no attempt to compare “raw” estimates.** We must; however, report to Congress on the relative efficacy of management.

Given sufficient “future” resources, we hope to encourage consistent methods to enable comparisons.





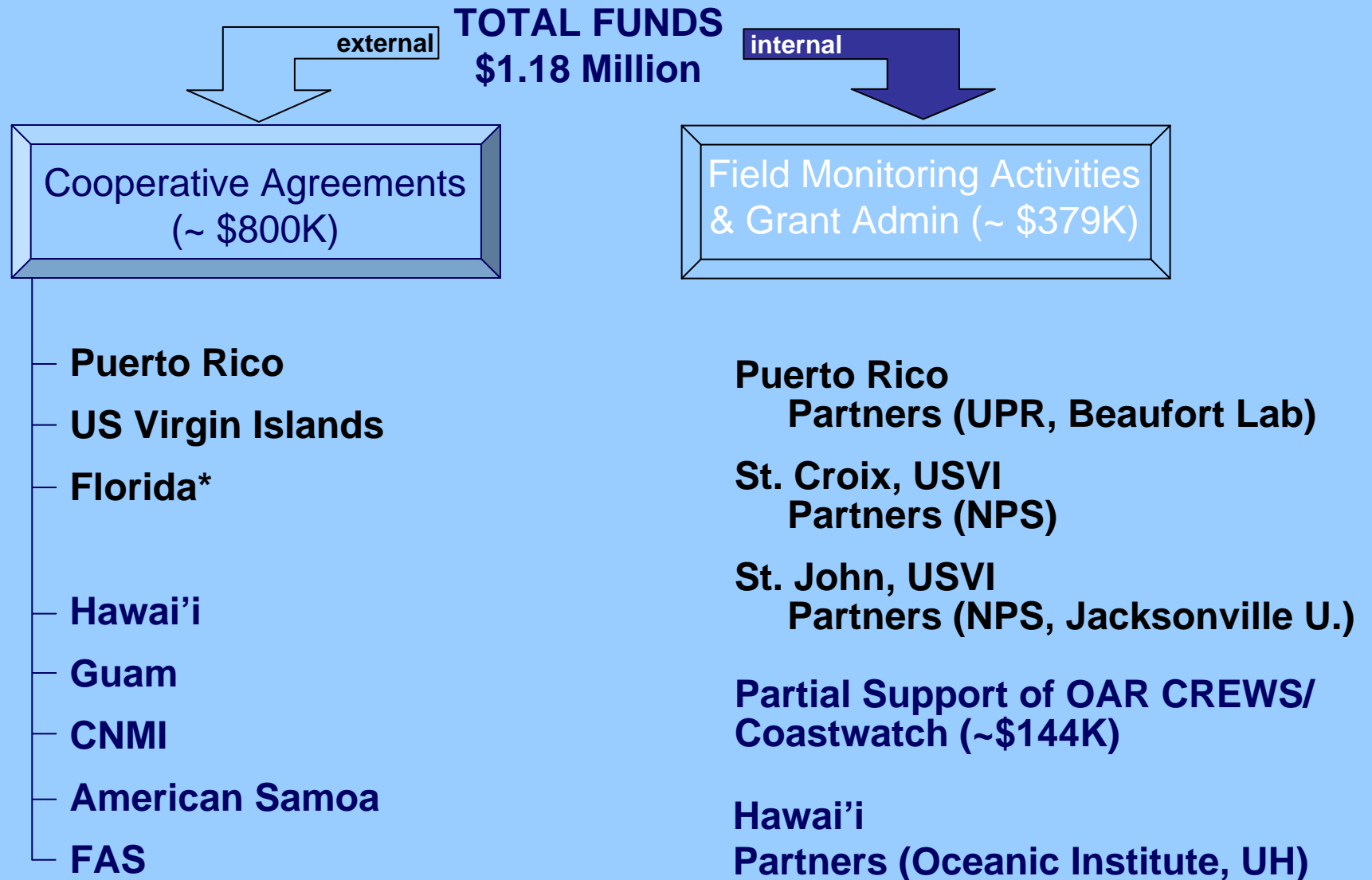


## NOAA's Coral Reef Information System

All data must be transferred in a timely manner to NOAA funding programs.

Funding eligibility is contingent upon agreement to provide monitoring data within 3 months of project completion.

Data will be made available to the general public through this US coral reef data clearinghouse.



## NOAA NOS Biogeography Program Field Activities

To Date, a Total of **1100** Sites have been Surveyed (appx. 350 during FY02) to Develop a Comprehensive Baseline Characterization of Coral Reefs and Associated Biological Communities in and around St. John, St. Croix, and Southwestern Puerto Rico



## NOAA NOS Biogeography Program Field Activities

### Reef Fish Monitoring & Assessment

- 300 Dives

Objective - Quantify Effects of  
MPA Boundary Closure

**St. John**



**SW Puerto Rico**

Objective - Ecologically-relevant  
Marine Protected Areas

- 400 Dives

**Buck Island, St. Croix**

Objective - Monitor Fish  
Abundance & Distribution within MPA

- 400 Dives

## **NOAA NOS Biogeography Program Field Activities**

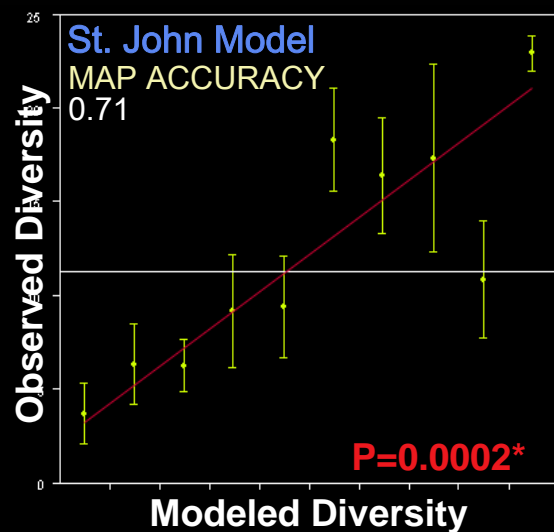
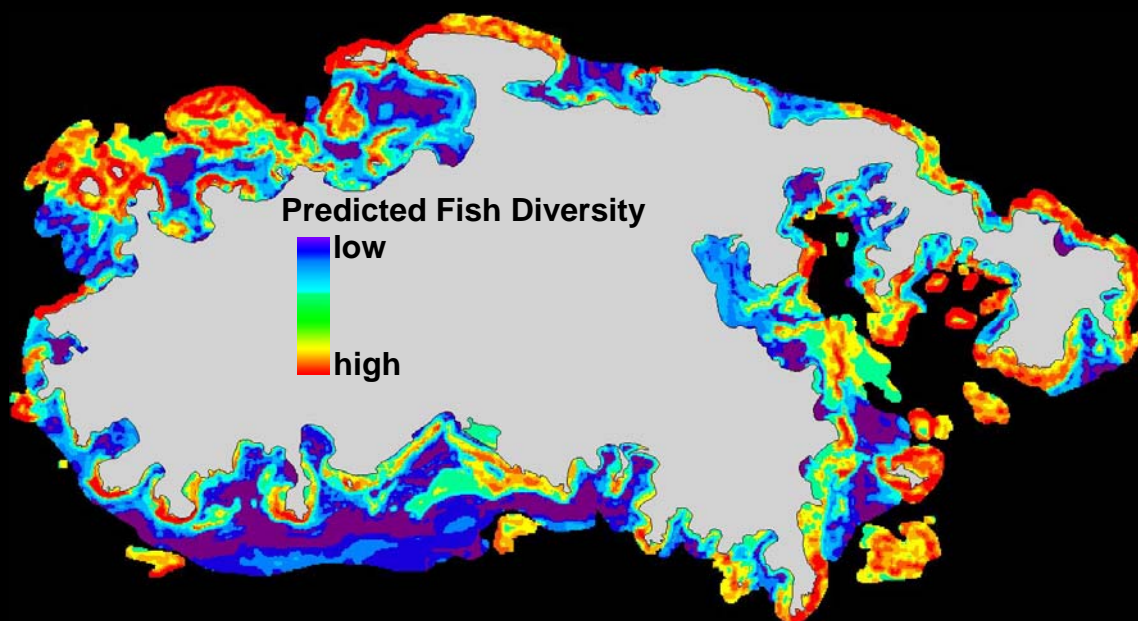
**All of these Activities use NOS Mapping Products as the Backdrop For Sample Design (Stratification). The Benthic Maps also Provide a Consistent Spatial Framework for Subsequent Analyses.**

**During FY02, a Total of 4 Publications have been Generated from This Body of Work:**

- 1 in Marine Biology,
- 1 in Environmental Biology of Fishes,
- 1 in Gulf and Caribbean Science, and
- 1 in Aquatic Botany.

**During FY02, Results from these Activities have been Presented at the:**

- 2002 American Fisheries Society Symposium, Session Host
- 2002 Backreef Conference, and the
- 54th Gulf and Caribbean Fisheries Institute Symposium.
- 2002 US Coral Reef Task Force Meeting



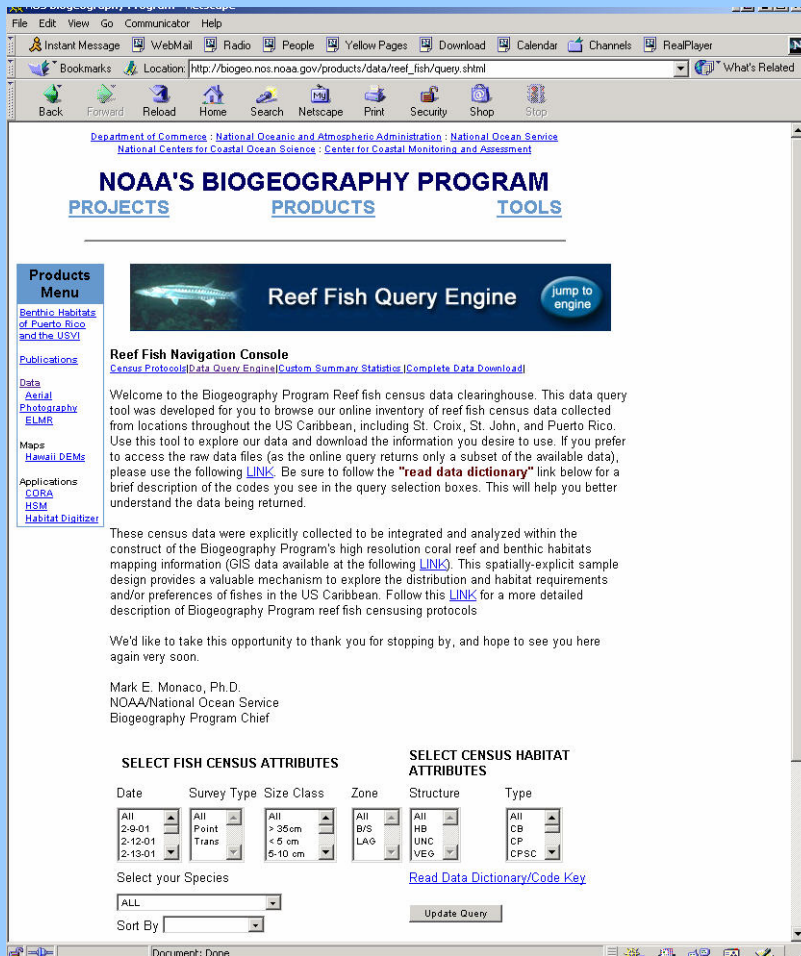
NCCOS Scientists Have Been Asked by the US National Park Service (NPS) to help in the Development of Reef Fish Monitoring Protocols for the Buck Island Reef National Monument, and the Virgin Islands National Park.

Furthermore, All data are Being Shared with NPS, and are being Analyzed by NOS Monitoring Program Personnel to test for Post Closure Results on Fish Abundance, Distribution, and Diversity.

In this Example (Presented at AFS02) Monitoring Data were Used to Develop Spatially-explicit Models of Predicted Fish Diversity. NCCOS Scientists are exploring this technique to identify areas most suitable for MPA's.

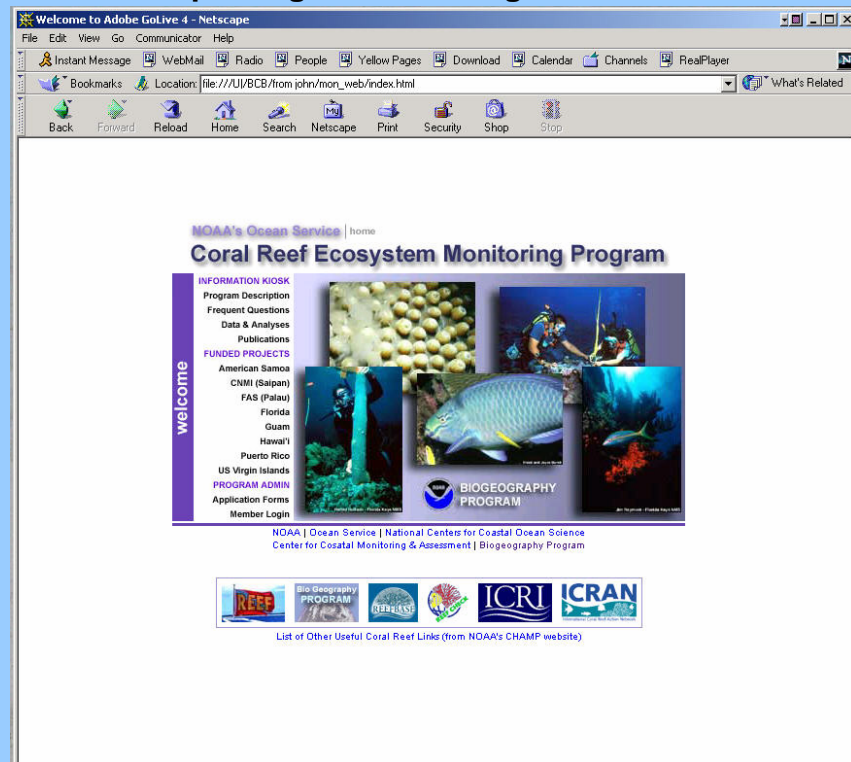
# Coral Reef Monitoring Program Websites

[http://biogeo.nos.noaa.gov/products/data/reef\\_fish/](http://biogeo.nos.noaa.gov/products/data/reef_fish/)



All 'Internal' Data Have Been Made Accessible  
 Reef Fish  
 Benthic Characterizations


[http://biogeo.nos.noaa.gov/mon\\_web/](http://biogeo.nos.noaa.gov/mon_web/)



Project Information for  
 'External' Monitoring Activities  
 has Been Made Accessible

Budgets  
 Project Descriptions  
 Data  
 Reports

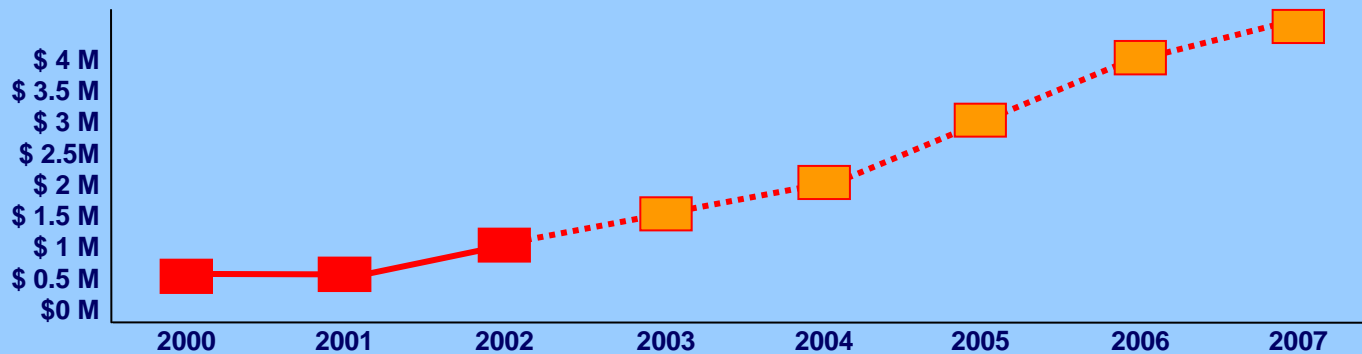
## Coral Reef Monitoring Program Performance Metrics



	2000			2001			2002			2003			2004			2005			2006			2007		
	Water Quality	Habitat	Biological	Water Quality	Habitat	Biological	Water Quality	Habitat	Biological	Water Quality	Habitat	Biological	Water Quality	Habitat	Biological	Water Quality	Habitat	Biological	Water Quality	Habitat	Biological	Water Quality	Habitat	Biological
American Samoa						●		●	●										●	●	●			
CNMI			●		●	●		●	●										●	●	●			
Guam	●			●			●	●											●	●	●			
Hawai'i		●	●		●	●		●	●										●	●	●			
Freely Associated States									●										●	●	●			
Florida								●	●										●	●	●			
Puerto Rico		●	●		●	●		●	●										●	●	●			
USVI		●	●		●	●		●	●										●	●	●			

TOTAL FUNDS                      \$444,000    \$560,790    \$790,000    \$1.5M    \$2M    \$2.5M    \$3.5M    \$4M

**Total Actual Funds/Year (FY00-02) and Projected (FY03-07) Funds/Year Required to Meet FY2007 Goals**







**The State of Coral Reef  
Ecosystems of the United  
States and Pacific Freely  
Associated States**  
*DRAFT 2004 Report Outline*



This outline is not for general consumption, and should only be used by contributing authors for planning development of the FY04 report

## **FY2004 State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States Report**

### **§ 208(b) - Effectiveness Reports**

**“Not later than 2 years after the date on which the Administrator publishes the National coral reef strategy under §203, and every 2 years thereafter, the administrator shall submit to the committee on commerce, science, and transportation of the Senate and the committee on resources of the House of Representatives a report describing all activities.....”**

## STRESSORS

- Global Warming/ Coral Bleaching,
- Diseases,
- Tropical Storms,
- Coastal Development and Runoff,
- Coastal Pollution,
- Tourism and Recreation,
- Fishing,
- Trade in Coral and Live Reef Species,
- Ships, Boats and Groundings,
- Marine Debris,
- Alien Species,
- Security Training Activities,
- Offshore Oil and Gas Exploration, and
- Other.

## REPORTING “THEMES”

- Water quality (e.g., point and non-point pollutants, DO, nutrients, turbidity, etc.)
- Benthic habitats (e.g., coral cover, coral richness, algal cover, etc.)
- Associated Biological Communities (e.g., fish abundance, invertebrate richness, etc.)



### The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States *DRAFT 2004 Report Outline*



This outline is not for general consumption, and should only be used by contributing authors for planning development of the FY04 report