

# Comprehensive U.S. Caribbean Coral Reef Ecosystem Monitoring Project (C-CCREMP):



A Partnership Project led by  
NOAA's Coral Reef Conservation Program



**Report on the  
Results of C-CCREMP  
FY2006 Workshops**

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**Comprehensive U.S. Caribbean  
Coral Reef Ecosystem Monitoring Project (C-CCREMP):  
Report on the Results of the C-CCREMP FY2006 Workshops**

**About this Document**

*The purpose of this report is to document and convey the results from the National Oceanic and Atmospheric Administration (NOAA) Coral Reef Conservation Program's (CRCP) workshops conducted in late FY2006 on implementing a U.S. Caribbean Comprehensive Coral Reef Ecosystem Monitoring Project (C-CCREMP). C-CCREMP is a new CRCP project that is attempting to expand and integrate current coral reef ecosystem monitoring activities into a comprehensive long-term assessment and monitoring program involving federal agencies, academia, local resource marine management agencies, and other partners in the U.S. Caribbean. An initial C-CCREMP project objective is to determine the need and feasibility of developing a monitoring program for the Caribbean that is similar to the CRCP Pacific Resources Assessment and Monitoring Program (PacRAMP), which uses consistent characterization and assessment methods to monitor U.S.-affiliated islands in the Pacific. The overall goal of the developing project is to improve capabilities to document and understand the condition of marine resources and changes in coral reef ecosystem health within and across Puerto Rico, the U.S. Virgin Islands, and Navassa Island. The workshops were an initial component of the project intended to introduce the project to partners and solicit input from the scientific and management community. In addition, the workshops were designed to obtain feedback on the need and feasibility of developing the C-CCREMP concept in order to provide NOAA and its partners with a comparative assessment and comprehensive coral ecosystem monitoring capability across the U.S. Caribbean. The information presented in this C-CCREMP report summarizes the input from local and regional partners and will be used to guide the direction of the project in FY07 and beyond.*

**Introduction**

Since 2000, NOAA's Coral Reef Conservation Program (CRCP) has made a significant investment in the conservation of coral reef ecosystems of the U.S. Caribbean. The investments made to date further conservation goals outlined in the *National Coral Reef Action Strategy* and the *Coral Reef Conservation Act of 2000* (NCRAS, 2002; CRCA, 16 U.S.C. § 6401 et seq.) by building capacity for local management, initiating research on stressors that threaten coral reef ecosystem health, mapping the types and extents of nearshore habitats, and supporting efforts to monitor and assess the condition of reef resources in Puerto Rico, the U.S. Virgin Islands, and Navassa Island. Assessment and long-term monitoring of US coral reef ecosystems remains a national priority for the U.S. Coral Reef Task Force and NOAA's Coral Reef Conservation Program. Managers of coral reef resources require data that measure and track ecosystem conditions over time. Currently, Federal agencies and their local partners conduct or fund a variety of projects undertaken independently by various Federal, state, local, academic, non-governmental, and private sector partners that monitor ecological, environmental, and socio-economic conditions at specific locations. However, because efforts are not spatially comprehensive (or necessarily representative), and research results are not necessarily comparable, managers may be limited in their abilities to determine the status of coral reef resources region-wide. In 2005 NOAA and its partners published a nationwide report on the status of US coral reef ecosystems, and this report identified

the need for a national assessment capability to compare and contrast results of research and management actions across jurisdictions (Waddell, 2005).

The Comprehensive Caribbean Coral Reef Ecosystem Monitoring Program (C-CCREMP) was initiated in 2006 in an attempt to expand current U.S. Caribbean coral reef ecosystem monitoring studies into a comprehensive long-term assessment and monitoring program involving federal and local partners in the region. Working collaboratively with local resource agencies, academic research institutions, Federal offices, and others, the project seeks to establish monitoring goals and targets, evaluate existing programs and data, identify gaps and shortcomings, modify existing programs through a consensus-based approach, integrate existing projects where practicable, and expand long-term monitoring efforts. Such a capability would benefit the jurisdictions by providing consistent and reliable information to local management agencies while generating a comprehensive data set that allows for cross-jurisdictional comparisons of reef condition, a key input necessary to periodic reporting efforts. In addition, the project aims to extend to the U.S. Caribbean the capacity for consistent regional monitoring that now exists in the Pacific through PacRAMP.

In FY-06 the project focused on organization of two workshops to introduce the project to local partners and initiate the development of a geo-spatial database of existing monitoring activities.

### Workshop Process and Presentations

Two project workshops were convened in September 2006 with the local research and management communities to discuss options for improving the integration of ongoing coral reef ecosystem monitoring activities. Figure 1 displays the workshop approach used to present and capture project information.

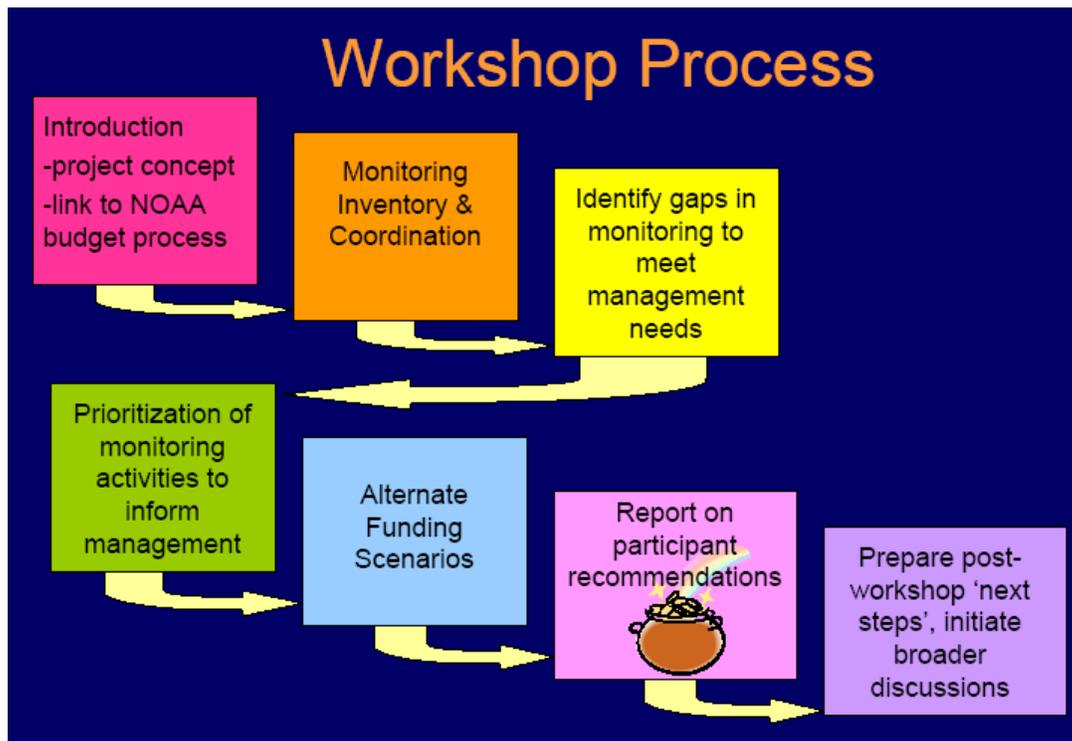


Fig 1. A flow chart of the workshop process used at both locations.

The first workshop, held in La Parguera, Puerto Rico on September 18-19 was attended by 27 individuals representing various organizations involved in coastal monitoring, assessment, and/or management in Puerto Rico. Eleven presentations were made to the group by workshop participants describing current monitoring efforts, identifying information gaps, and providing a common understanding of various ongoing efforts in the region.

The second of the two workshops was held in St. Thomas, USVI on September 21-22 and was attended by 33 individuals from organizations involved in coastal monitoring, assessment, and/or management in the USVI. Eleven presentations by participants were also made in St. Thomas to provide context for the ensuing discussions.

Invited presentations were structured to conform to a standard template and provide a broad overview of ongoing representative monitoring efforts in the region. The presenters were asked to include key pieces of information, such as project title and principal investigators; project framework, purpose, and goals; geographic distribution of survey locations; data collection methods and techniques; data management, storage, analysis, and availability; the intended audience for products; typical project results; temporal trends in data, level of effort, analytical results; plans for the continuation of the project; spatial and temporal gaps and needs that remain; possibilities for future collaboration and anticipated limiting factors.

Presentations confirmed that most of the work conducted to date has concentrated on shallow water areas (<30m) although several projects have focused survey effort in deeper water habitats and there is interest in continuing this trend. The range of target metrics includes both basic/standard parameters such as benthic habitat composition, indicators of coral reef health (e.g., such as coral disease and bleaching), composition of reef fish assemblages, as well as specific in-depth analyses of sediment contaminants and water quality parameters. The full suite of monitoring parameters can be found in Figure 4 on page 8.

At each of the workshops, the presentations were complemented by discussions on the primary goals for the C-CCREMP project and its link to CRCP objectives, the proposed data inventory and GIS system concept, the need for expanded monitoring capacity to support management, other information needed to meet management and reporting objectives, and initial reactions to three potential funding scenarios projected for the FY09-13 budget cycle.

### **Workshop Results**

*Participants at both workshops agreed that a comprehensive monitoring capability that would permit cross-jurisdictional comparisons should be developed, but not at the expense of current on-going activities. Thus, comprehensive periodic (e.g., every 3-5 years) monitoring and/or characterization of US Caribbean ecosystems should be conducted to complement, not replace, existing local monitoring studies. This would mean that the results of the project under a 'no additional funds' scenario would be limited to an increase in integration of current projects and ongoing activities, primarily*

through the continued development of the inventory database and linked GIS project. It is possible that greater coordination could lead in the future to synchronized monitoring with multiple agencies participating in a periodic synoptic monitoring effort.

If additional funding were made available in out-years, several topical priorities emerged:

- Participants recognized a need to harmonize monitoring approaches and/or develop more standardized protocols to provide a more comprehensive current baseline of condition. These actions will better support management, allow for identification of trends where there is increase activity in key watersheds, and facilitate evaluations of the efficacy of research projects and conservation activities. Key to this is the importance of co-locating fish and benthic surveys, and water quality where appropriate, as part of a quantitative survey design.
- Virtually all researchers expressed interest in conducting a broad scale characterization of physical oceanographic parameters in the region. A first look at this could involve analysis of SeaWiFs ocean color data. The results of the analysis would provide a starting point for other analyses linking nearshore conditions to watershed processes. This type of activity could potentially be facilitated through the 'Summit to Sea' project. In any case, work on this topic should be coordinated with the ongoing Caribbean Ocean Observing System work at the Department of Marine Science at UPR-Mayaguez.
- Participants also cited a need for better training and capacity building to enable researchers to work together more collaboratively and eliminate obstacles to collaboration that currently exist. Many partnerships are complicated by the significant restrictions related to dive program reciprocity. By harmonizing and/or calibrating methods, data collection efforts can be leveraged and better support decisions made by the management community.
- Several people cited the need for spatially comprehensive assessments of diseases affecting coral reef ecosystems and proposed the development of standardized monitoring methods that provide a more consistent evaluation of coral bleaching.
- Another primary concern raised in the workshops involved the need to focus on cumulative impacts, and the need for scientists to perform directed questions/ research to differentiate impacts caused by a single or primary stressor from multiple and cumulative impacts.
- Especially given the Caribbean bleaching and disease events of 2005, researchers stressed the importance of implementing contingency options to provide for response and mobilization of experts in the case of future catastrophic events.
- Scientists expressed a pressing need for off-site (off-island) data storage to prevent the loss of data in the event of a catastrophic event.
- In USVI, participants felt that the current coverage and frequency of nearshore water quality sampling was adequate, but that more work should be focused on monitoring fish communities. This need was echoed by the Caribbean Fisheries Management Council (CFMC) to supplement existing (insufficient) stock assessment data.

- Participants at both workshops argued for a greater focus on deep (>30m) hermatypic reef communities. Deep reefs could potentially be less impacted by anthropogenic disturbances and may possibly provide a reservoir of recruits that may help rebuild coral and fish communities in the more heavily impacted shallow water areas. They also pointed out the need to quantify the prevalence of bleaching and disease and other impacts to deep hermatypic reef areas, which have been poorly studied to date. A project being conducted by the University of Puerto Rico on behalf of the Caribbean Fisheries Management Council at offshore island sites in western Puerto Rico revealed that bleaching had occurred down to a depth of about 140 feet (42m). It also pointed out that deep reefs have a wider geographic coverage than shallow reefs but that scientists lack an understanding of deeper reefs in terms of basic characterization and their function in sustaining fish stocks and food webs. This is related to the expressed need for cross-shelf sampling that does not neglect offshore areas. Including a full spectrum of inshore/offshore areas may elucidate some of the important links between nearshore and offshore habitats, especially in relation to the movement of fishes.
- In most cases, deep hermatypic reefs also lack detailed bathymetric information and have been insufficiently characterized since they are too deep for scuba-based survey techniques. Managers from both jurisdictions proposed expansion of multibeam mapping coverage and an increase in projects involving ROVs, AUVs or other imaging-based methods, which are really only feasible with involvement of NOAA and other Federal agencies, since major investments in multibeam units and other technologies have already been made by the Federal agencies.
- Participants recognize the need to translate findings to a format that can be easily understood by the public and elected representatives, a factor essential in mobilizing political support for conservation. Identifying even basic, simplistic measures (e.g., a single number or grade) that can be easily understood by local populations remains a priority.
- With regard to funding concerns, the USVI participants inquired whether it would be possible to reprogram a portion of the funding received from other grants (territorial monitoring, CZM grants, other NOAA CRCP funds) every few years to help support a collaborative, comprehensive monitoring effort.
- Participants from both workshops supported appointment of a local project coordinator to help facilitate coordination and collaboration.

Some of the priorities were also expressed through the identification of spatial gaps:

In Puerto Rico, several locations were proposed as priorities for monitoring (Figure 2), largely because they provide habitat for Acroporid corals, include deep reefs, or are known to suffer impacts related to coastal development or declining water quality. These included north shore sites where little is known of the fringing reef communities, but where the island's population and anthropogenic impacts are concentrated, especially with regard to outfalls and sediments. On the eastern shelf that extends to St. Thomas, initial surveys of the seafloor reveal a concentration of cables (referred to as 'cable spaghetti') that may or may not be functional. Given the anticipated increase in cable-laying activities in the region, identification of appropriate areas for cable

installation would be important both ecologically (to reduce damage to benthic habitats) and economically (to reduce costs related to snagged cables and lost equipment).

Additional information is also needed for the offshore islands of Culebra, Vieques, and the islets along the south shore, including Caja de Muertos. In early 2007, the NOS Biogeography and National Status and Trends (NS&T) Programs will conduct a study of Vieques using standard methodologies in order to characterize fish, benthic communities, and contaminant levels in sediments and waters around the island. Further survey or monitoring activities are contingent on availability of future funding for the project. Also on the southeast coast, participants proposed surveys of the Ponce and Yabucoa offshore dredged material disposal sites (ODMDS) which are located in unstudied areas that are believed to contain shelf edge reefs.

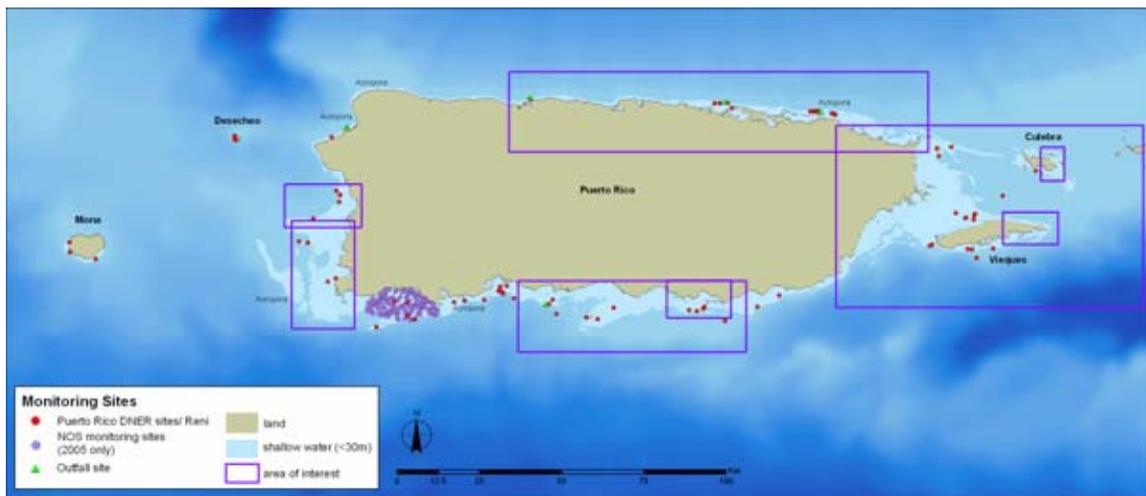


Fig 2. Spatial areas of interest identified by Puerto Rico workshop participants.

Another area of interest for monitoring was off the southwest coast of the island. In 2006, NOAA's Office of Coast Survey collected LIDAR data that covered most of the nearshore area in the SW portion of the island. NOS Biogeography will be conducting a multibeam mapping and characterization cruise in Southwestern Puerto Rico in the Spring of 2007, in order to augment the LIDAR data and provide detailed bathymetry of the area. Collection of high resolution bathymetric data for portions of Mona Island also constitute part of the mission plan. In addition, NOS Biogeography will employ a drop camera system to capture digital photographic imagery.

In the USVI, spatial gaps include the northern, western, and southern shores and shelf areas of St. Thomas, which may serve as important areas for spawning aggregations and provide other habitat linkages for ecologically and/or commercially important fish populations (Figure 3). The western shelf region was also of primary interest to the Puerto Rico workshop participants. Similarly, areas of Lang Bank off the east end of St. Croix are thought to be important for fish populations in St. Croix. In St. Croix, participants also noted the need to include very shallow areas and exposed shorelines on the SE part of the island that are difficult to access due to swell, etc.

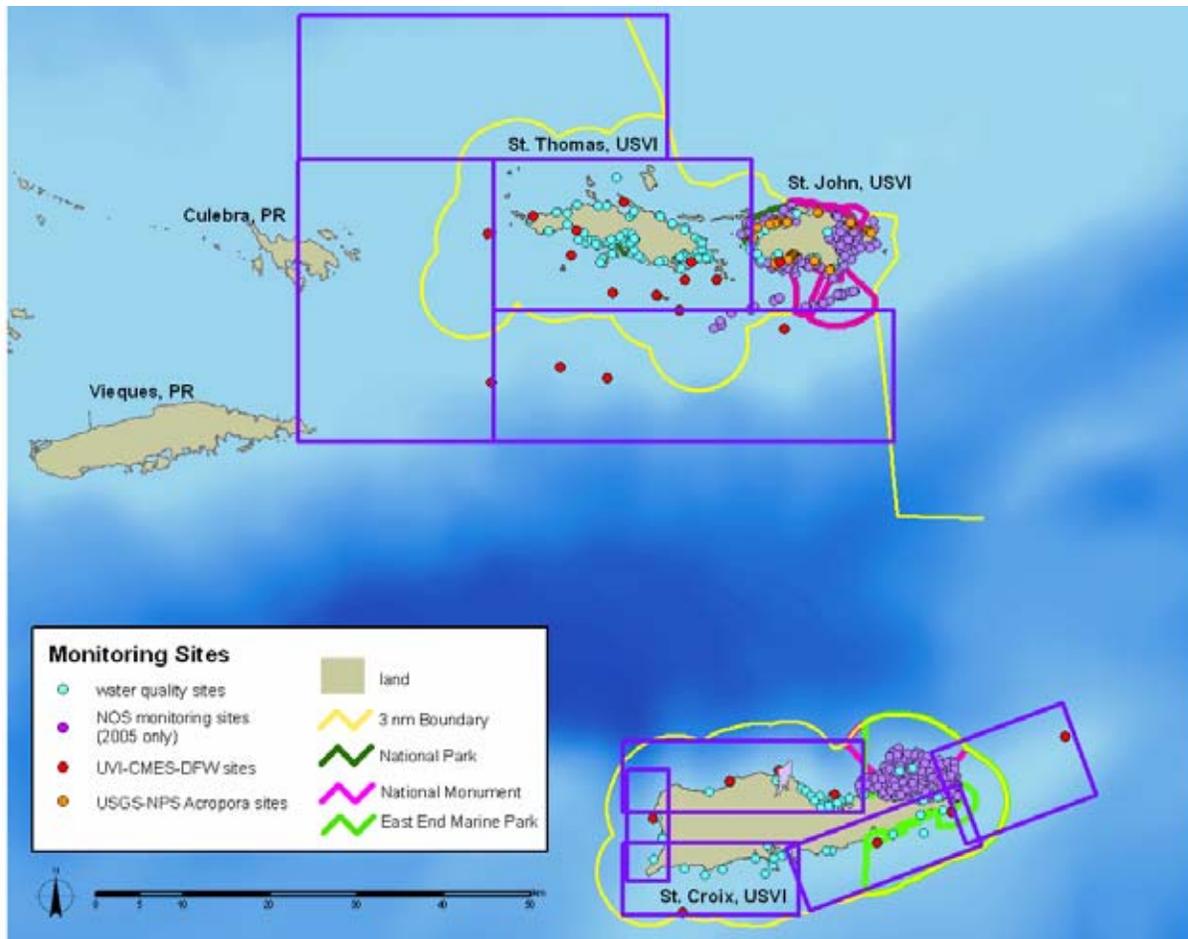


Fig 3. Spatial areas of interest identified by USVI workshop participants.

### C-CCREMP Database and GIS Link

As part of the C-CCREMP project, NOS Biogeography and NMFS SEFSC-Galveston have developed a system for inventorying the current monitoring and assessment activities conducted in coral reef ecosystems in the U.S. Caribbean and serving that information back out to the community. The team devised a web-based user interface where scientists and managers in the region can submit and query basic information about projects, including information about target metrics being measured, frequency of sampling, and sampling methods (e.g., the use of permanent vs. random sites; Figure 4). Each project and its associated data will be accompanied by a FGDC-compliant metadata file, which NOS/NMFS will help to create if one does not exist. In addition, users will be asked to provide a simplified data file that includes the coordinates for each sampling location visited.

### US Caribbean Comprehensive Coral Reef Ecosystem Monitoring Program Inventory Database

**Project Code**

**Project Title**

**Project Location**

**Project Manager**

**Agency**

**Principal Investigator**

**Co-PI**

**Goals**

**Methods**

**Funding Source**

**Funding Type**

**Funding Amount**

**Project Start**

**Project End**

**Frequency of Sampling**

**Type of Site**  Permanent  Random

**Link to Project Web Site**

**NOAA Coral Reef Conservation Program Funded?**  Yes  No

**Metadata File**

**Select Add Project Area**

Project Title	Project Manager	Project PI	Metadata Link	Project Web Link
Coral Reef Database	Mark Monaco	Jenny Waddell	Metadata	<a href="http://coma.nos.noaa.gov">http://coma.nos.noaa.gov</a>

**Monitoring Targets**

- Benthic Habitats**
  - Coral
  - Coral Bleaching
  - Coral Disease
  - Algae
  - Turf Algae
  - Sponges
  - Abiotic Components
  - Debris
- Associated Biological Communities**
  - Invertebrates
  - Fish
  - Sea Turtles
  - Seabirds
  - Marine Mammals
  - Microbiology
  - Non-Coral Disease
- Water Quality**
  - Turbidity
  - Salinity
  - Nutrients
  - Sediment
  - Dissolved Oxygen
  - Temperature
  - Contaminants
  - Toxicology
  - pH
- Physical/Oceanographic**
  - Bathymetry
  - Currents
  - Imagery
  - Seawifs
  - Other Sensors
- Social Science**
  - Economic Information
  - Social Information
  - Anthropological Information
  - Political Information

Fig. 4 Database inventory user interface screen for project data entry.

Information contained in the database will link to a modified mapping system that will be accessible via a password protected website for project participants (Figure 5). Such a system allows users to query the database based on specific characteristics and display the query results in a map format. For example, it will enable managers to visually identify all the sites in each of 12 subregions that have been surveyed for coral diseases. This capability is important not only because of the actual data it yields to managers, but also because it helps identify spatial concentrations and gaps in monitoring efforts. This type of information provides numerous advantages to participants and decision-makers by identifying temporal and spatial gaps in existing monitoring programs, linking researchers to one another based on location, metrics, methods, etc., establishing a framework for prioritizing monitoring activities to meet current and anticipated management needs, and providing a scientifically-based justification for expanding monitoring efforts to undersampled locations. Equipped with this type of contextual information, researchers can collaborate more effectively to expand the comprehensiveness of monitoring programs in the region and more effectively compete for future funding of multi-disciplinary projects that address multiple ecosystem components. It will also allow project leaders to determine the need and feasibility of developing a program for the Caribbean that is similar to the CRCP's Pacific Resources Assessment Monitoring Program (PacRAMP), which uses consistent characterization and assessment methods to monitor U.S.-affiliated archipelagos in the Pacific.

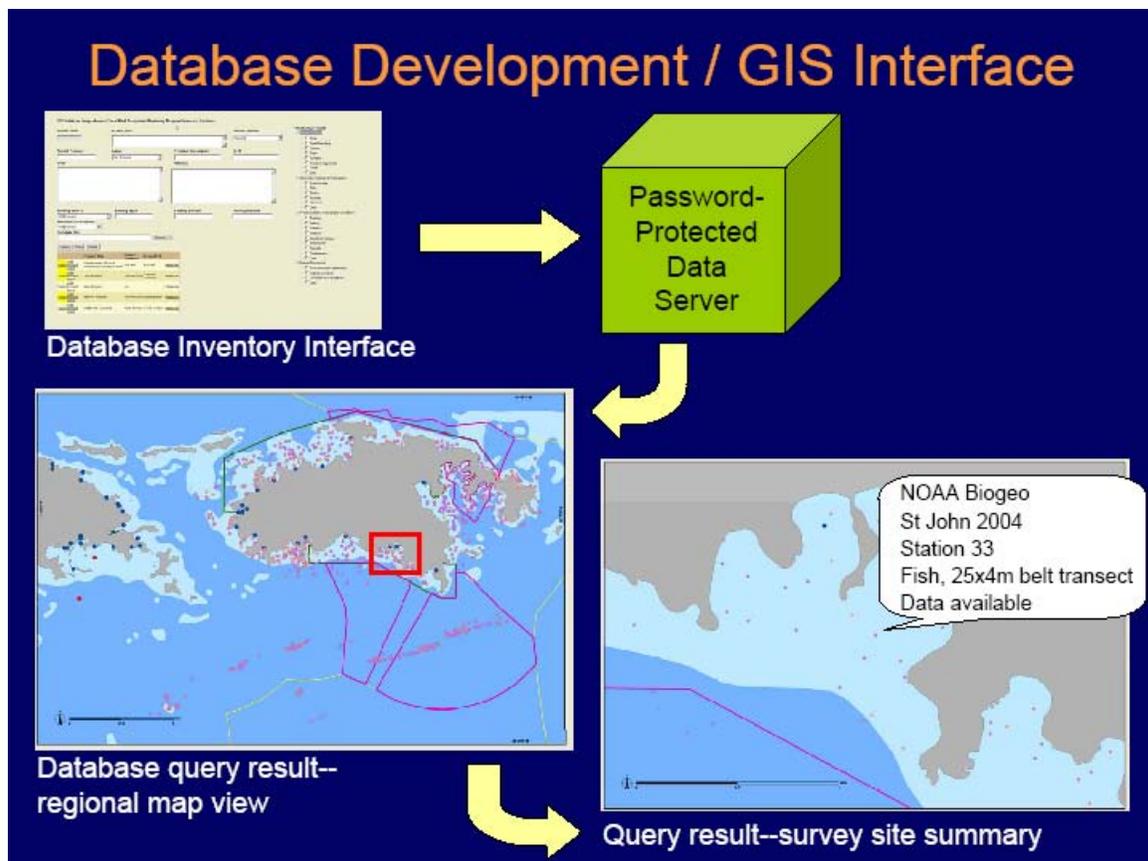


Fig. 5 Flow chart and query examples showing linkages between database and mapping system.

All expected participant comments have been received and incorporated into the database graphical user interface (GUI). Once the system becomes operational,

workshop participants and other key individuals from CRCP and the U.S. Caribbean region will be notified of its availability so that Version 1.0 of the database can be populated with existing projects. Further refinement of the system is expected to occur as needed.

The database system also benefits efforts to produce periodic assessments of the condition of coral reef ecosystems in the U.S. Caribbean, such as the "State of the Reef" reports. With the approach of the publication of the next National State of the Reef report in 2008, such a system will enable authors to verify that relevant and accessible data products have been incorporated into chapter development in order to provide the most robust assessment of ecosystem condition possible. Other uses of the system, particularly by CRCP personnel, are anticipated, e.g., to help manage NOAA's overall investments in coral reef ecosystem monitoring.

### **Next Steps**

The next step in the C-CCREMP project will be to release and populate the database inventory. Once local partners have had an opportunity to enter spatial and temporal information about current monitoring activities into the database inventory, project managers will synthesize the information and develop an implementation plan for the project. The implementation plan will provide details on spatial, temporal, and topical gaps, suggest a plan of action for expanding monitoring of various key parameters, and estimate the resources required to successfully implement the project at different levels of monitoring effort.

In 2007, the C-CCREMP project team plans to convene additional meetings to provide an opportunity for local partners to discuss the results of the database inventory and provide input on various implementation options under consideration.

### **Literature Cited**

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## Appendices

### A. C-CCREMP Overview

#### US Caribbean Comprehensive Coral Reef Ecosystem Assessment and Monitoring Project (C-CCREMP)

NOAA Coral Reef Conservation Program

PIs: Mark Monaco (NOAA's Ocean Service) and Ron Hill (NOAA's Fisheries Service)

**Overview:** This project proposes to expand current coral reef ecosystem monitoring studies into a comprehensive long-term assessment and monitoring program involving federal and local partners in the US Caribbean. Working collaboratively with local resource agencies, academic research institutions, Federal offices, we seek the following achievements: establish monitoring goals and targets, evaluate existing programs and data, identify gaps and shortcomings, modify (consensus-based) existing programs, integrate existing projects where practicable, and expand long-term monitoring efforts. In FY-06 the project focused on two workshops to introduce the proposed project to local partners and initiate this development of a geo-spatial database of monitoring projects.

**Background:** Assessment and long-term monitoring of US coral reef ecosystems remains a national priority for the US Coral Reef Task Force and NOAA's Coral Reef Conservation Program. Managers of coral reef resources require data that measure and track ecosystem conditions over time. Currently, NOAA and its local partners conduct or fund a variety of projects that monitor ecological, environmental, and socio-economic conditions at specific locations, but because efforts are not spatially comprehensive (or necessarily representative), managers may be limited in their abilities to assess the status of coral reef resources region-wide. In 2005 NOAA and its partners published a nationwide report on the status of US coral reef ecosystems and this report identified the need for a national assessment capability to compare and contrast results of research and management actions across jurisdictions.

**The Concept:** The project's overarching goal is to improve capabilities to document and understand resource conditions and changes in coral reef ecosystems across the US Caribbean by integrating the monitoring efforts of local, federal, academic, and private sector partners. Beyond integration the investigation seeks to implement additional monitoring efforts in critical areas that are not currently studied. Currently, across the US Caribbean a suite of projects quantify abundance and distribution of reef fishes, lobster, and conch, evaluate habitat utilization patterns of reef fishes throughout ontogeny, quantify and track changes in benthic habitats (e.g., stony corals, seagrasses, algal densities), monitor water quality and sedimentation rates, assess the extent and impact of coral disease and coral bleaching, quantify and track coral recruitment, and document trends in reef resource use and its impact on fishing communities. However, only a modest level of coordination occurs among these projects across multiple spatial scales. The C-CCREMP plans to include continuous site-specific (local scale) monitoring augmented by periodic synoptic (regional scale) monitoring across Puerto Rico, USVI, and Navassa to compile information needed to improve local, regional and federal management decisions across multiple geographic scales.

The preferred approach plans to phase in various project elements so the investigation grows over time into an integrated program. Plans are to integrate and leverage existing coral reef ecosystem monitoring studies into the project, and thus are not designed to replace or dramatically change current local monitoring efforts. The project will move forward based on the comments and results from the initial workshops and analysis of the information on the nature and extent of monitoring projects throughout the US Caribbean that are being identified in the C-CCREMP data inventory and GIS. This information will be organized into a project implementation plan and depending on fiscal resources the study will continue in FY07 and beyond.

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## **C. Puerto Rico Meeting Agenda, September 18-19, 2006**

### *Day 1 September 18, 2006*

- 10:00-10:30am Continental Breakfast and Discussion  
10:30-11:00 Objectives of Workshop and Introductions  
11:00-11:30 Linkage to NOAA's CRCP and FY09-FY13 Caribbean Initiative  
11:30-12:00 Introduction to C-CCREMP GIS and Data Inventory System  
12:00-1:00 Invited Presentations on Caribbean Ecosystem Monitoring Studies  
10 min presentations/ 5 min for Qs  
- Ernesto Weil  
- Aida Rosario  
- Graciela Garcia-Moliner  
- Mark Monaco
- 1:00-2:00 LUNCH
- 2:00-3:45 Invited Presentations on Caribbean Ecosystem Monitoring Studies  
10 min presentations/ 5 min for Qs  
- Edwin Hernandez  
- Reni Garcia  
- Rich Appeldoorn  
- Ernesto Diaz  
- Andy Bruckner/ Ron Hill  
- Roy Armstrong  
- Roy Watlington/ Nasseer Idrisi
- 3:45-4:00 BREAK
- 4:00-5:00 Discussion on Management Needs and Capacity Building in the U.S. Caribbean  
5:00-5:15pm Summary of Day 1 and Plan for Day 2

### *Day 2 September 19, 2006*

- 9:00-9:30am Continental Breakfast and Discussion  
9:30-10:00 Summary of Revised Database on Monitoring Projects  
10:00-10:30 Identifying gaps in monitoring at various spatial & temporal scales. Where can we better integrate existing efforts?  
10:30-11:00 Discussion on Prioritizing Monitoring Projects to Support Management Needs and U.S. State of the Reef Report  
11:00-11:15 BREAK  
11:15-12:30 Discussion on 3 Potential Funding Scenarios:  
1) no new funds but better integration and sharing of existing resources  
2) moderate new funding to support projects,  
3) significant new funding to support projects
- 12:30-1:00 Summary of Workshop Results and Final Discussions  
1:00pm Adjourn

## **St. Thomas Meeting Agenda, September 21-22, 2006**

### *Day 1 September 21, 2006*

- 8:30-9:00 Continental Breakfast and Discussion  
9:00-9:30 Objectives of Workshop and Introductions  
9:30-10:00 Linkage to NOAA's CRCP and FY09-FY13 Caribbean Initiative
- 10:00-10:15 BREAK
- 10:15-10:45 Introduction to C-CCREMP GIS and Data Inventory System  
10:45-12:00 Invited Presentations on Caribbean Ecosystem Monitoring Studies  
10 min presentation/ 5 min for Qs
- Paige Rothenberger
  - Aaron Hutchins
  - Chris Jeffrey
  - Rick Nemeth
  - Ron Hill
- 12:00-1:30 LUNCH
- 1:30-3:00 Invited Presentations on Caribbean Ecosystem Monitoring Studies  
10 min presentation/ 5 min for Qs
- Caroline Rogers
  - Toby Tobias
  - Zandy Hillis-Starr
  - Mark Monaco
  - Bill Fisher
  - Roy Watlington
- 3:00-3:15 BREAK
- 3:15-4:15 Discussion on Management Needs and Capacity Building  
4:15-4:30 Summary of Day 1 and Plan for Day 2

### *Day 2 September 22, 2006*

- 8:00-8:30am Continental Breakfast and Discussion  
8:30-9:00 Summary of Revised Database on Monitoring Projects  
9:00-9:30 Identifying gaps in monitoring at various spatial & temporal scales. Where can we better integrate existing efforts?  
9:30-10:00 Discussion on Prioritizing Monitoring Projects to Support Management Needs and US State of the Reef Report
- 10:00-10:15 BREAK
- 10:15-11:30 Discussion on 3 Potential Funding Scenarios for High Priority Projects:
- 1) no new funds but better integration and sharing of existing resources
  - 2) moderate new funds to support projects,
  - 3) significant new funding to support projects
- 11:30-12:00 Summary of Workshop Results and Final Discussions  
12:00 Adjourn

## **D. MONITORING PRESENTATIONS**

### **La Parguera, PR—Presenters and Presentation Titles**

**Ernesto Weil**, *Coral Reef Targeted Research and Capacity Building, Coral Disease Working Group*

**Aida Rosario**, *Puerto Rico SEAMAP Program*

**Mark Monaco**, *Caribbean MPA Assessment: Integrated Coral Ecosystem Mapping and Monitoring*

**Edwin Hernandez**, *Caribbean Coral Reef Research Institute, Coral Reef Long-term Monitoring Program*

**Reni Garcia**, *Monitoring of Coral Reef Communities in Natural Reserves of Puerto Rico*

**Reni Garcia**, *Research Program on Deep Reefs of Puerto Rico and the USVI*

**Rich Appeldoorn**, *Research and Monitoring for Coral Reef Ecosystem Studies (CRES) at the Caribbean Coral Reef Institute*

**Andy Bruckner**, *Prevalence and Impact of Coral Disease in Remote Locations*

**Ron Hill**, *Recovery of Reef Fish Assemblages at the Fortuna Reefer Grounding Site at Mona Island, Puerto Rico*

**Roy Armstrong**, *Multi-platform Remote Sensing for Coral Reef Community Assessment*

**Chris Jeffrey**, *NOAA's U.S. Caribbean Coral Reef Ecosystem Monitoring Program*

### **St. Thomas, USVI—Presenters and Presentation Titles**

**Paige Rothenberger**, *Monitoring Activities within the St. Croix East End Marine Park*

**Aaron Hutchins**, *U.S. Virgin Islands Ambient Water Quality Monitoring Program*

**Chris Jeffrey**, *NOAA's U.S. Caribbean Coral Reef Ecosystem Monitoring Program*

**Tyler Smith**, *The USVI Territorial Coral Reef Monitoring Program*

**Andy Bruckner**, *Prevalence and Impact of Coral Disease in Remote Locations*

**Ron Hill**, *Recovery of Reef Fish Assemblages at the Fortuna Reefer Grounding Site at Mona Island, Puerto Rico*

**Caroline Rogers**, *Elkhorn coral (*Acropora palmata*) in St. John, VI: Recovering or not?*

**Caroline Rogers**, *National Park Service Long-term Monitoring of Coral Reefs in the Virgin Islands and Florida*

**Wes Toller**, U.S. Virgin Islands Division of Fish and Wildlife, Coral Reef Fisheries Monitoring

**Zandy Hillis-Starr**, Buck Island Reef National Monument Coral Reef Research and Monitoring Program

**Mark Monaco**, Caribbean MPA Assessment: Integrated Coral Ecosystem Mapping and Monitoring

**Bill Fisher**, Bioassessment Tools for Development of Biocriteria

**Roy Watlington**, Caribbean Regional Association for Integrated Coastal Ocean Observations (CaRA)