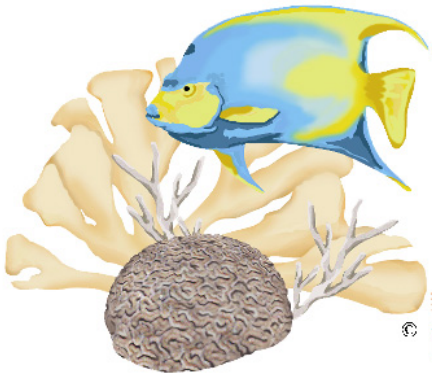
Overview Presentation
NCRI Projects
FY 2004, 2005, & 2006

Drs. Richard Dodge & Bernhard Riegl

Center for Sponsored Coastal Ocean Research

3rd Coral Reef Projects PI Meeting

March 22-24, 2004; Dania Beach, Fla



NCRI

NATIONAL CORAL REEF INSTITUTE

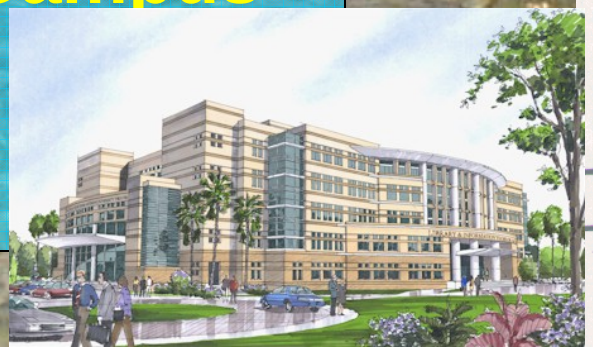
Nova Southeastern University

We go the distance…

NSU

Nova Southeastern University

- 8th Largest Independent University in Nation
- Over 22,000 enrollment
- Largest in Southeast US.
- 15 Divisions
- >$220 million budget.
- 232 acres Main Campus
- Distance Ed
- New Library



Overview: NSU Oceanographic Center

- 10 acres, Ft. Lauderdale
- Port Everglades entrance channel
- access to oceans & reefs
- Broad Phys. and Biol. Oceanography
- Full-time faculty & staff: 31
- MS, Ph.D. programs

The Mission of the Oceanographic Center is to carry out innovative, basic, and applied research and to provide high-quality, graduate and undergraduate education in a broad range of marine-science.

Overview: NSU Oceanographic Center

- **Academics:** **BS**: Biology, Marine Biology, Environmental Science/Studies (with FCAS); **MS**: Coastal Zone Management; Marine Biology; Marine Environmental Sciences; Physical Oceanography; **Ph.D.**:Oceanograph

- **Research:**
  - **Physical Oceanography**
  - **Marine BioGeological Oceanography**
  - **Coral Reefs: Ecology/Monitoring/Assessment**
  - **Fish, Deep Sea, Micro, Molecular, Ballast**
- **Internal Institutes:** **NCRI, GHRI, Coastal Studies**

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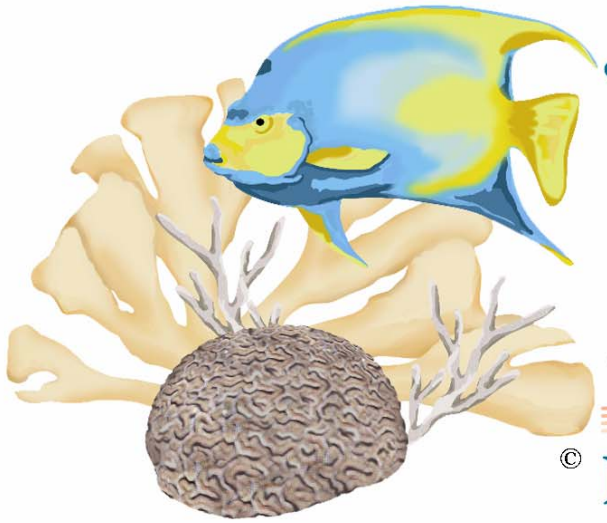
GHRI

CORE Consortium for Oceanographic Research and Education

SFOMC South Florida Ocean Measurement Center

Collaborative History: e.g.,

NOVA SOUTHEASTERN UNIVERSITY
Oceanographic Center, Ft. Lauderdale, FL, announces the formation of



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NCRI: National Coral Reef Institute:
A Center for Coral Reef Assessment, Monitoring, and Restoration

NOVA SOUTHEASTERN UNIVERSITY · OCEANOGRAPHIC CENTER

NSU

NCRI

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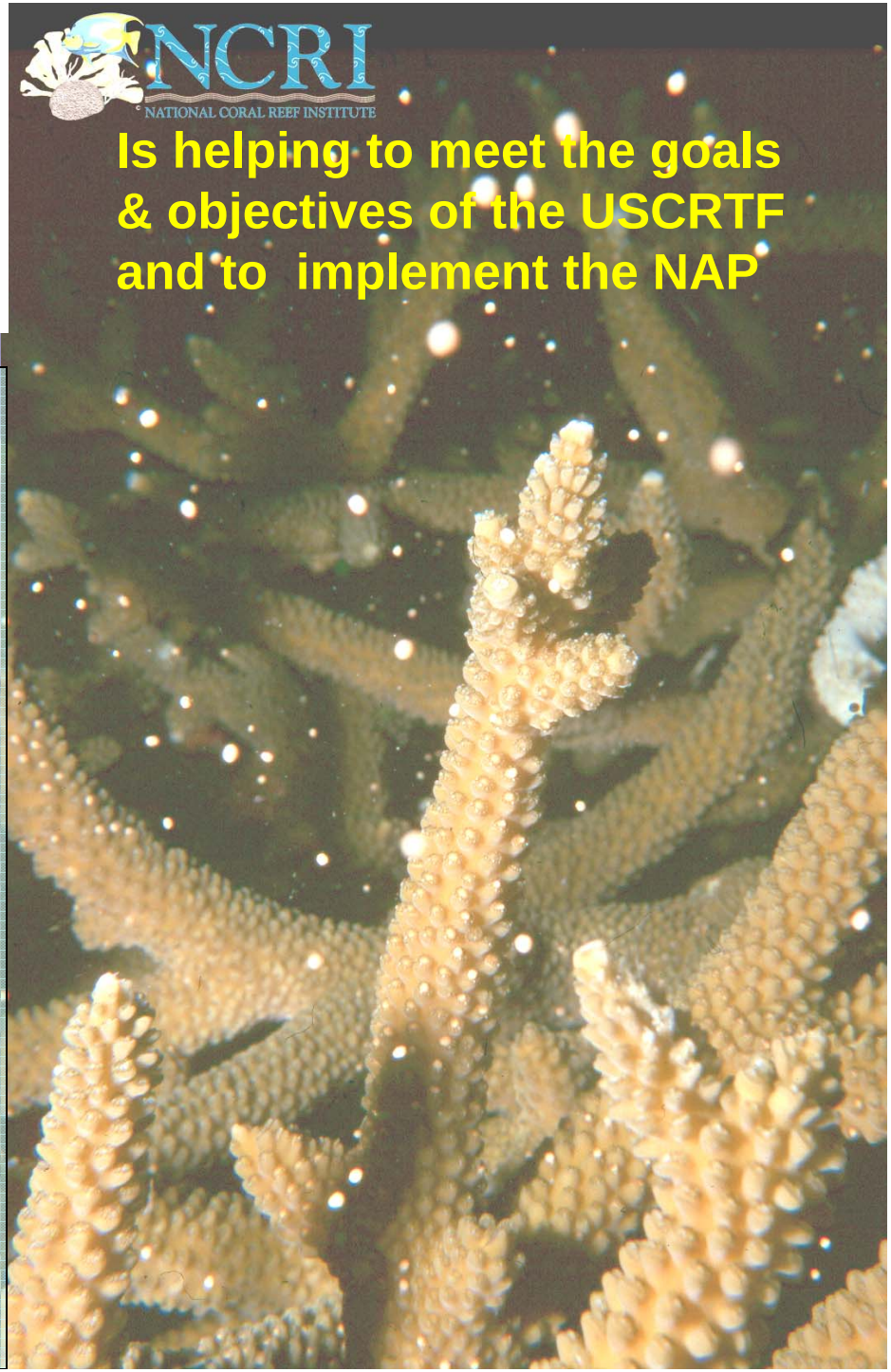
Background: **Congressional Support "for the Establishment of a National Coral Reef Institute to Conduct Research on Coral Reef Assessment, Mitigation, Monitoring, and Restoration."**

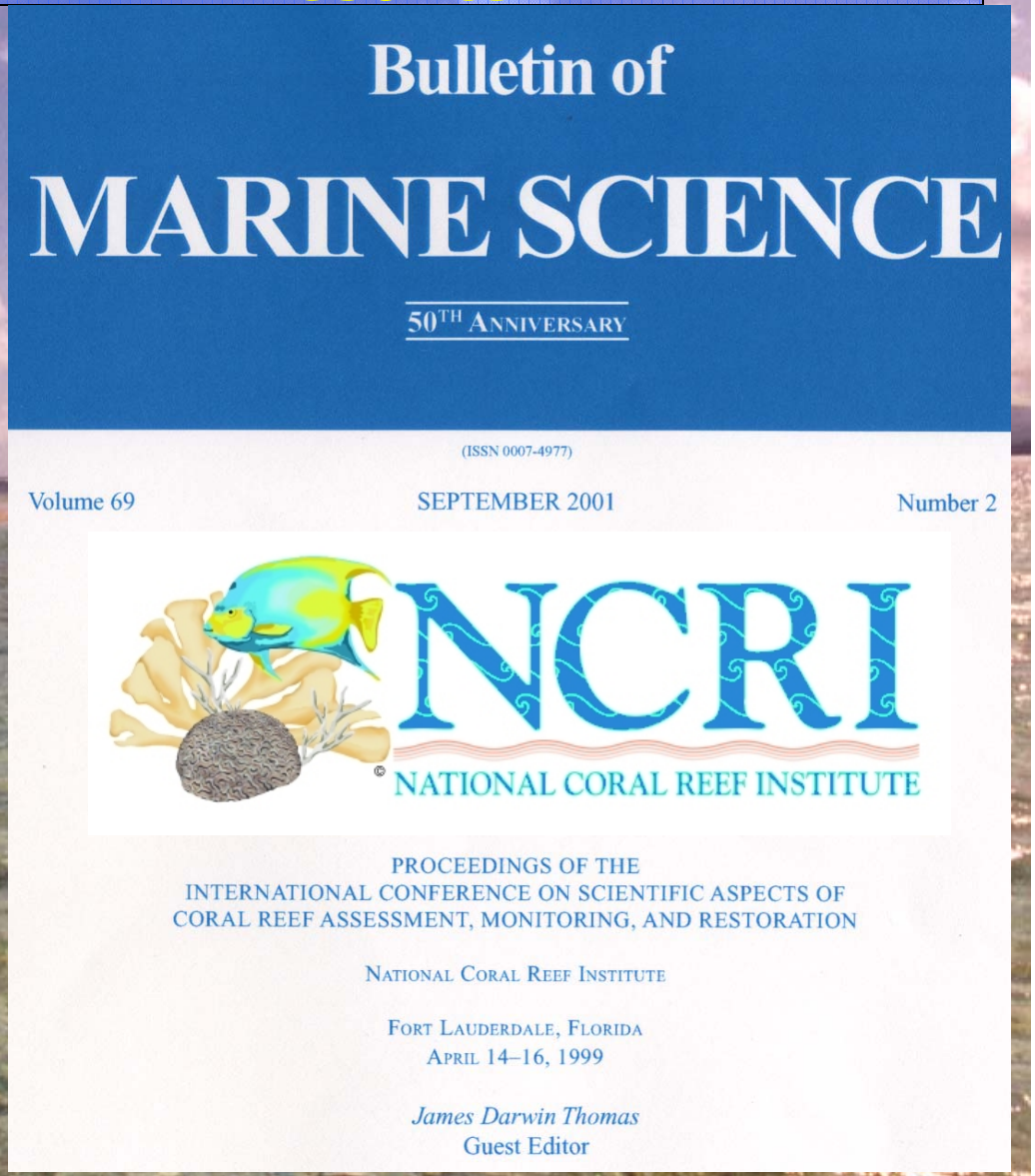
Rationale: **ID Gaps & Constraints in Reef Knowledge, Active Research & Funding; Hypothesis-Based Science Into Emerging Coral Reef Disciplines, Including Reef Restoration.**



International Conference Results

Summary: coral reef research & management
51 papers, 768 pp, 2001 pub.

- **Assessment**
- **Biodiversity and Community Dynamics**
- **Impacts and Stressors**
- **Monitoring**
- **Restoration**
- **foldout comparison of 18 monitoring programs**



11th International Coral Reef Symposium

REEFS FOR THE FUTURE

Ft. Lauderdale, Florida 2008

Coordinated by:
Local Organizing Committee

Endorsed by:

Host Country Endorsement Committee

A U.S. partnership of:

The U.S. Coral Reef Task Force

The State of Florida

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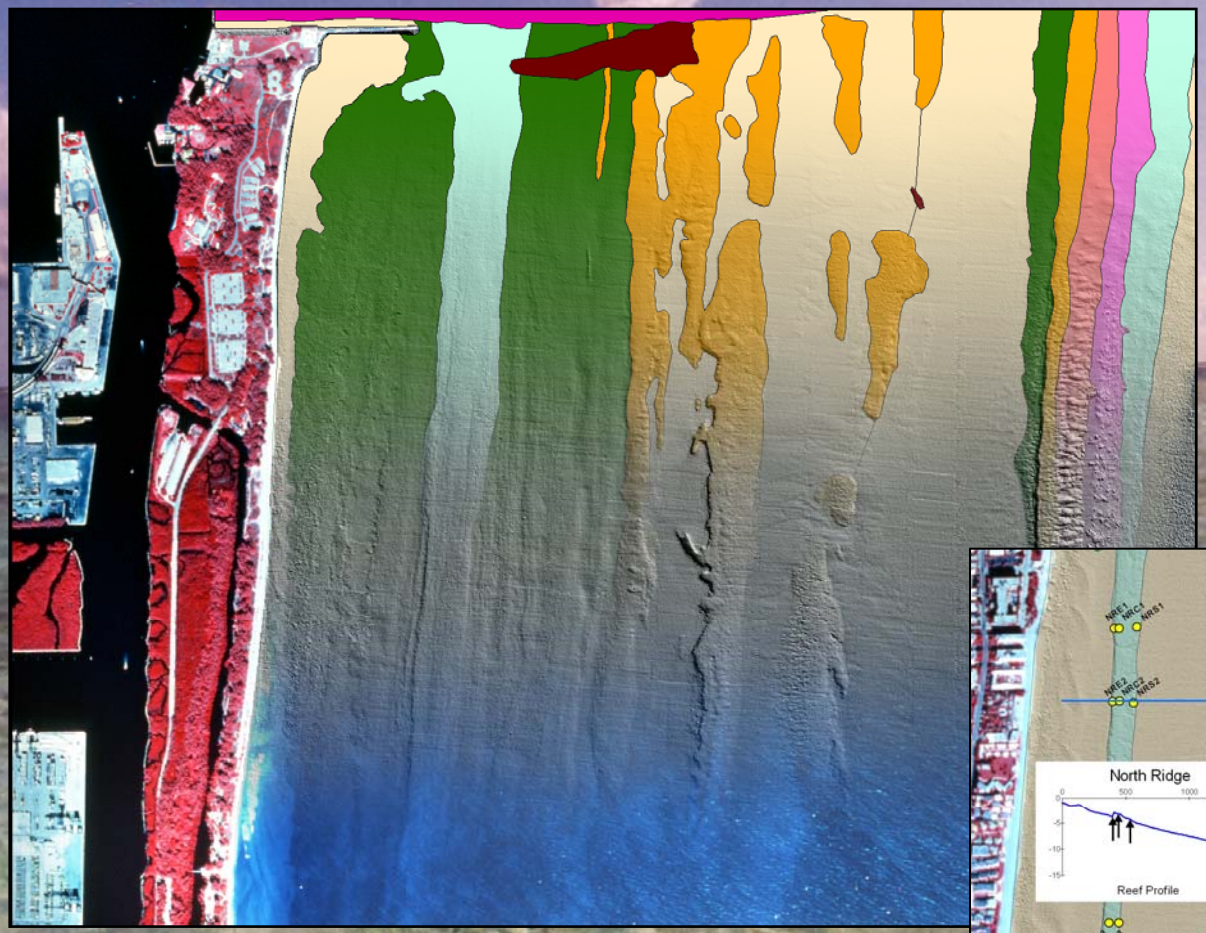
Initiatives:

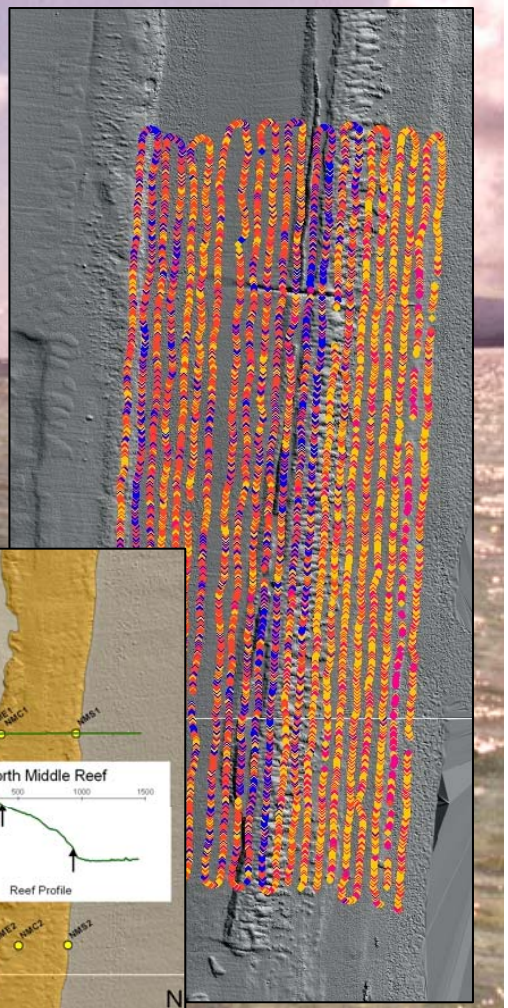
- Conducting Active Research
  - Assessment
  - Monitoring
  - Restoration
- Providing Funding & Program Support
- Establishing Partnerships & Collaborations

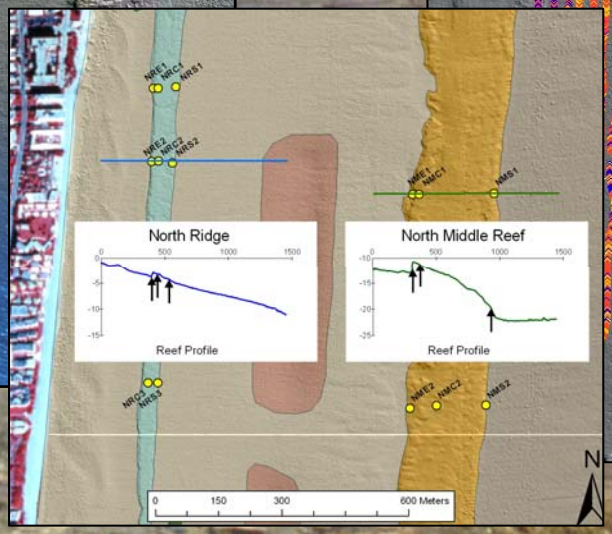
Coral Reef Mapping:

Large-Scale Morphology to Small-Scale Community Patterns

Satellite, Acoustic, & In situ (Collaborative; Continuing)







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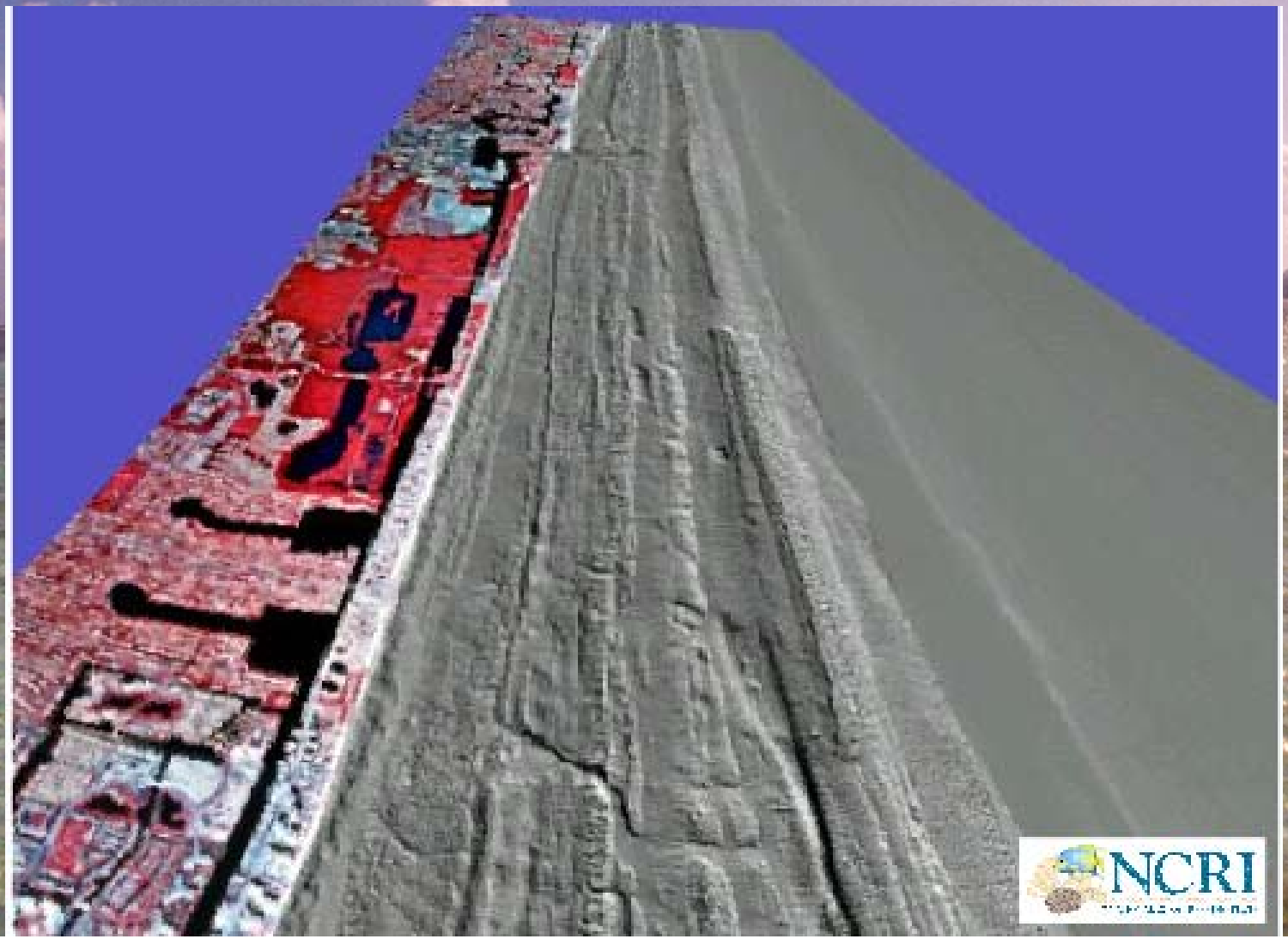
ASSESSMENT

Fly Thru of Southeast Florida Reefs via Laser Bathymetry



•**Ecology, Propagation, & Population Dynamics:*Acropora cervicornis*, Ft Lauderdale, FL (Continuing);**

•**Development of Indicators of Coral Stress from Sedimentation**

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ASSESSMENT

Fish Censuses of Southeast Florida

- **Survey of the Marine Fishes of Southeast Florida** (Collaborative w/NOAA; Continuing)
- **Comparison: vessel-reefs & natural reef fish assemblages** (Collaborative w/FWC; Continuing)
- **Nearshore Hardbottom Fishes of Broward Co.** (Collaboration w/ Broward Co., Continuing)
- **Multivariate Examination of Spatial Patterns of Grunt (Haemulidae) Recruitment** (Continuing)

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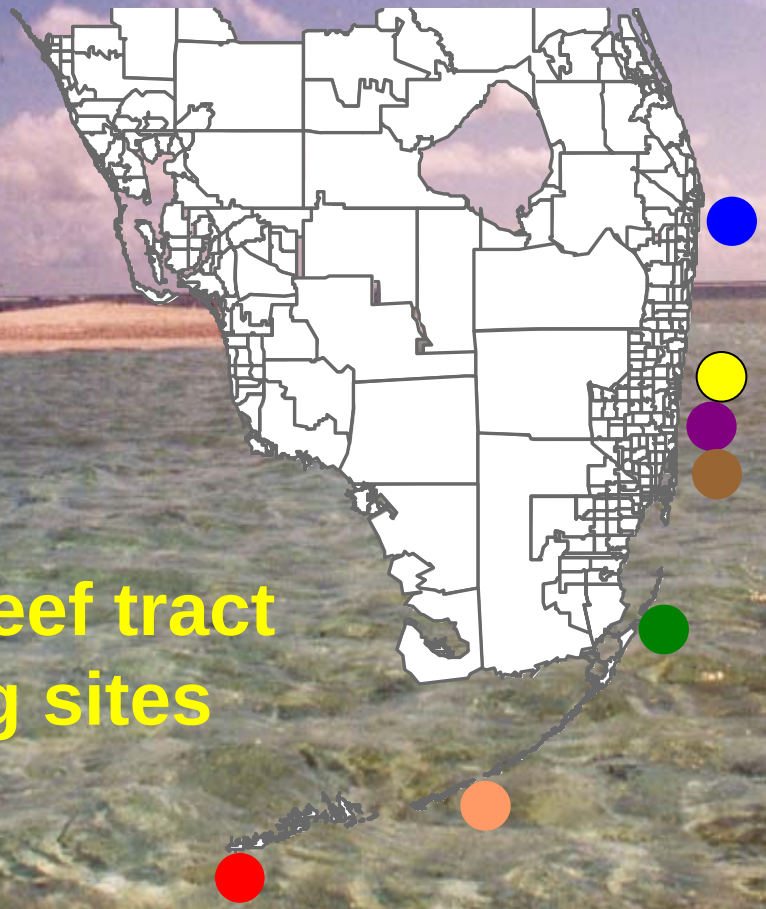
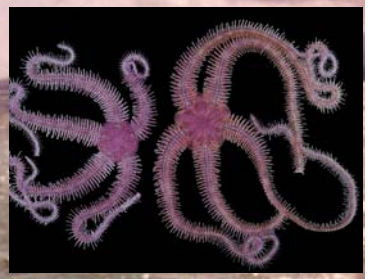
ASSESSMENT

NCRI GENETICS - I

Assessment of Genetic Connectivity in the Florida Reef Tract: Application to MPA Design



Florida reef tract
Sampling sites



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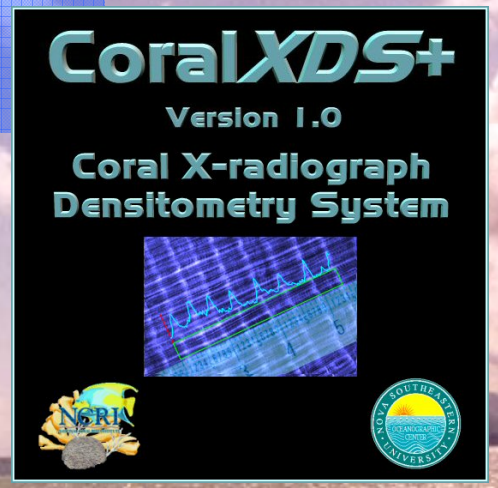
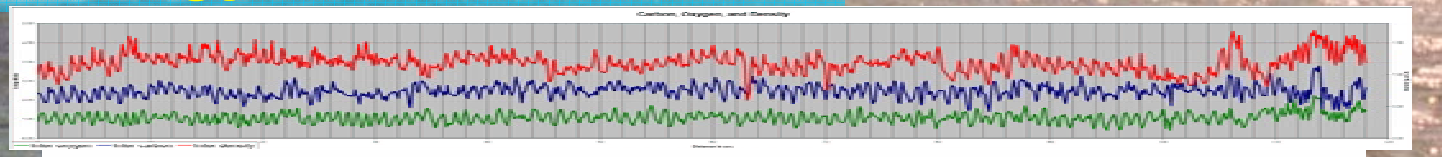
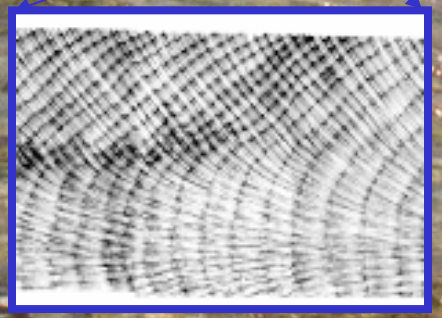
Coral Calcification and Climate Change:

Sclerochronology, Data Extraction & Comparison Tools, Temperature Monitoring, Paleoclimatology







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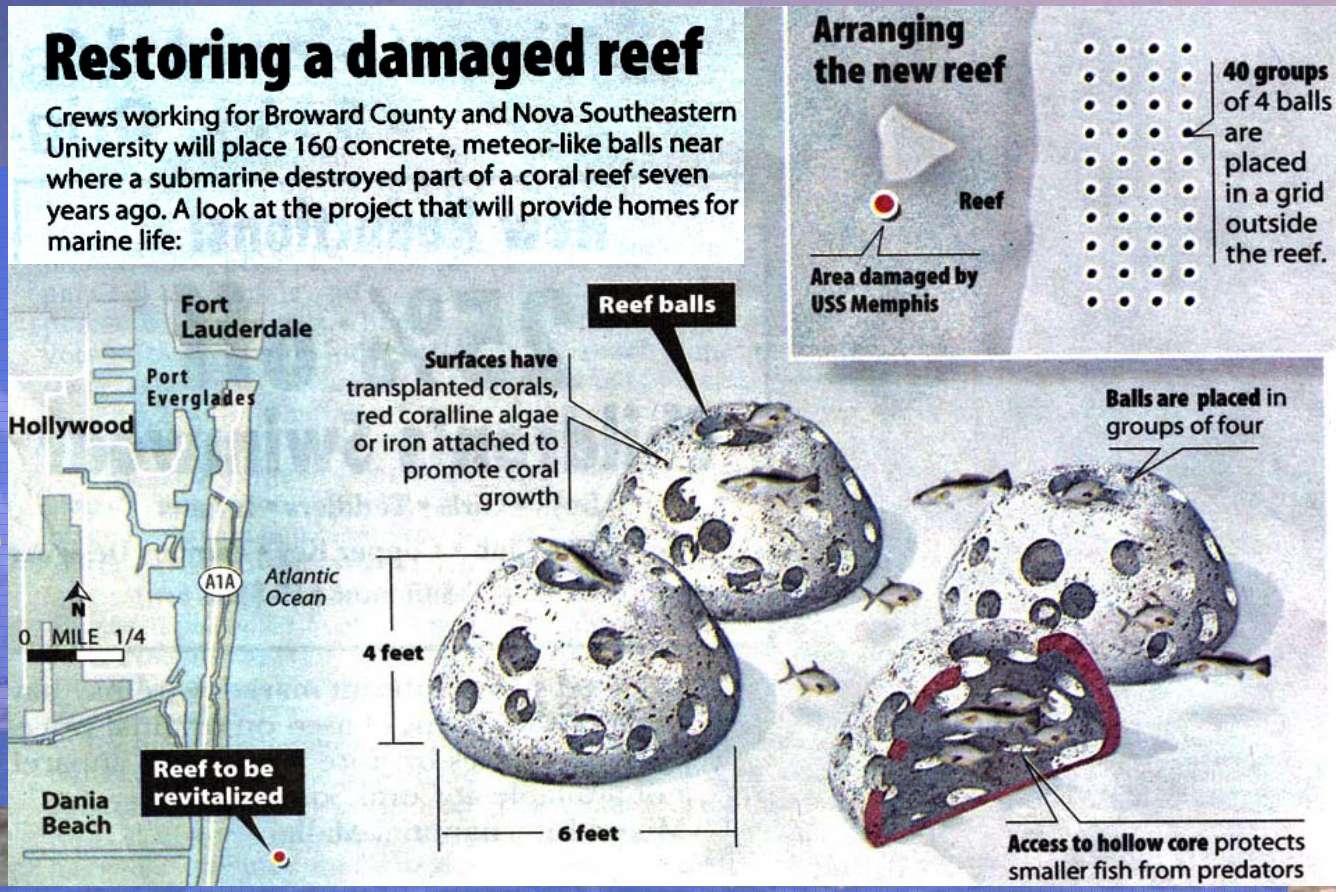
ASSESSMENT

Restoration Design and Monitoring (Collaborative with Broward Co; Cont.)



Increasing Fish Assemblage Richness & Abundance on Concrete Artificial Reefs with a Novel Invertebrate Recruiting Substrate. (New)

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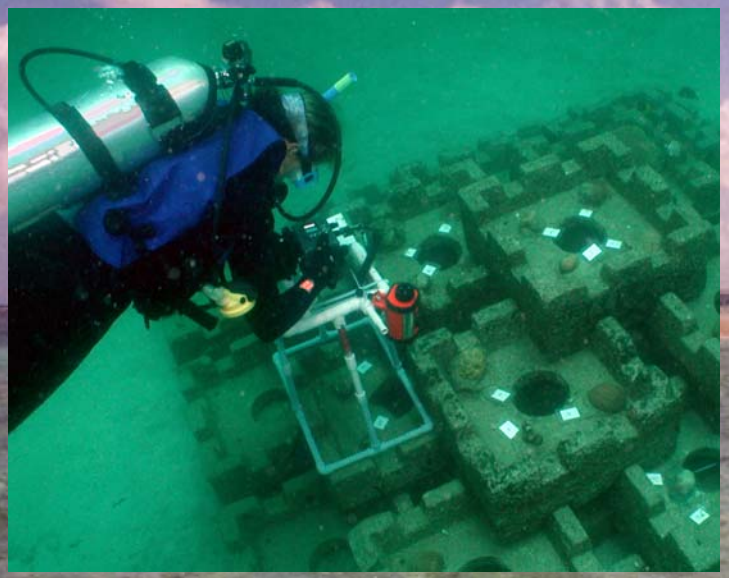
RESTORATION

Establishment and Maintenance of a Coral Nursery (Collaborative w/ Broward Co. DPEP & NFWF; Continuing w/BC DPEP)



Comparison of Fish at Selected Artificial Reefs and Natural Substrate in Southeast Florida (Collaborative with Broward Co. DPEP; Continuing)

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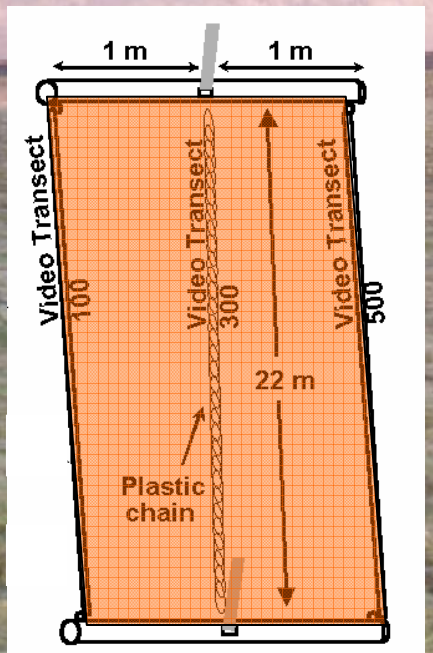
RESTORATION

Expansion of the Coral Reef Evaluation & Monitoring Project (CREMP) to Southeast Florida (Collaborative with Florida DEP, FWC, and FMRI)

Station Layout

Species Inventory



Video Transects

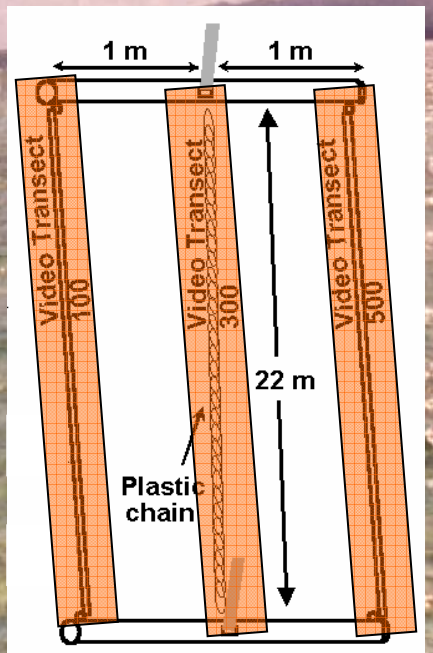


Figure 2. Station layout

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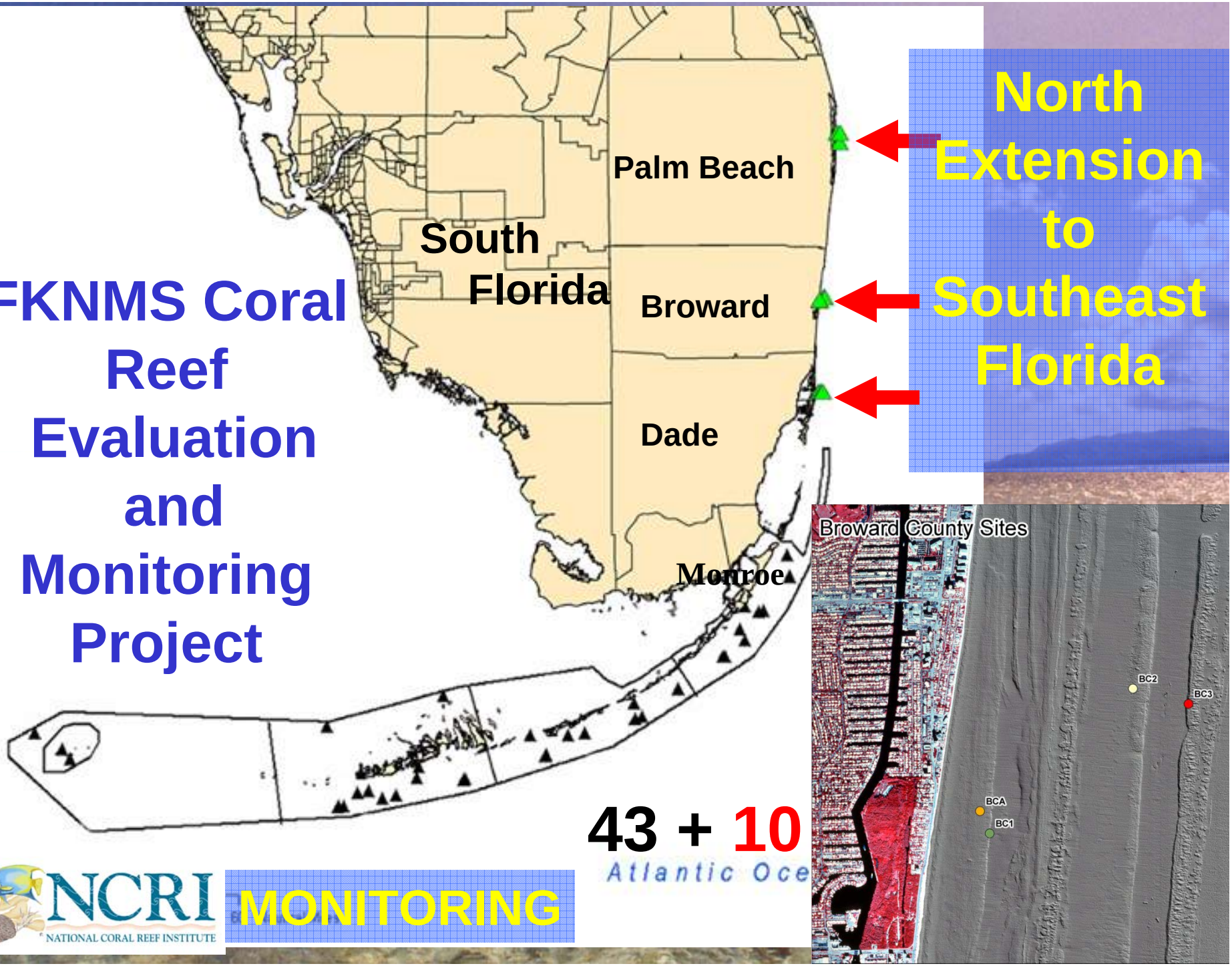
MONITORING

FKNMS Coral Reef Evaluation and Monitoring Project



North Extension to Southeast Florida

43 + 10

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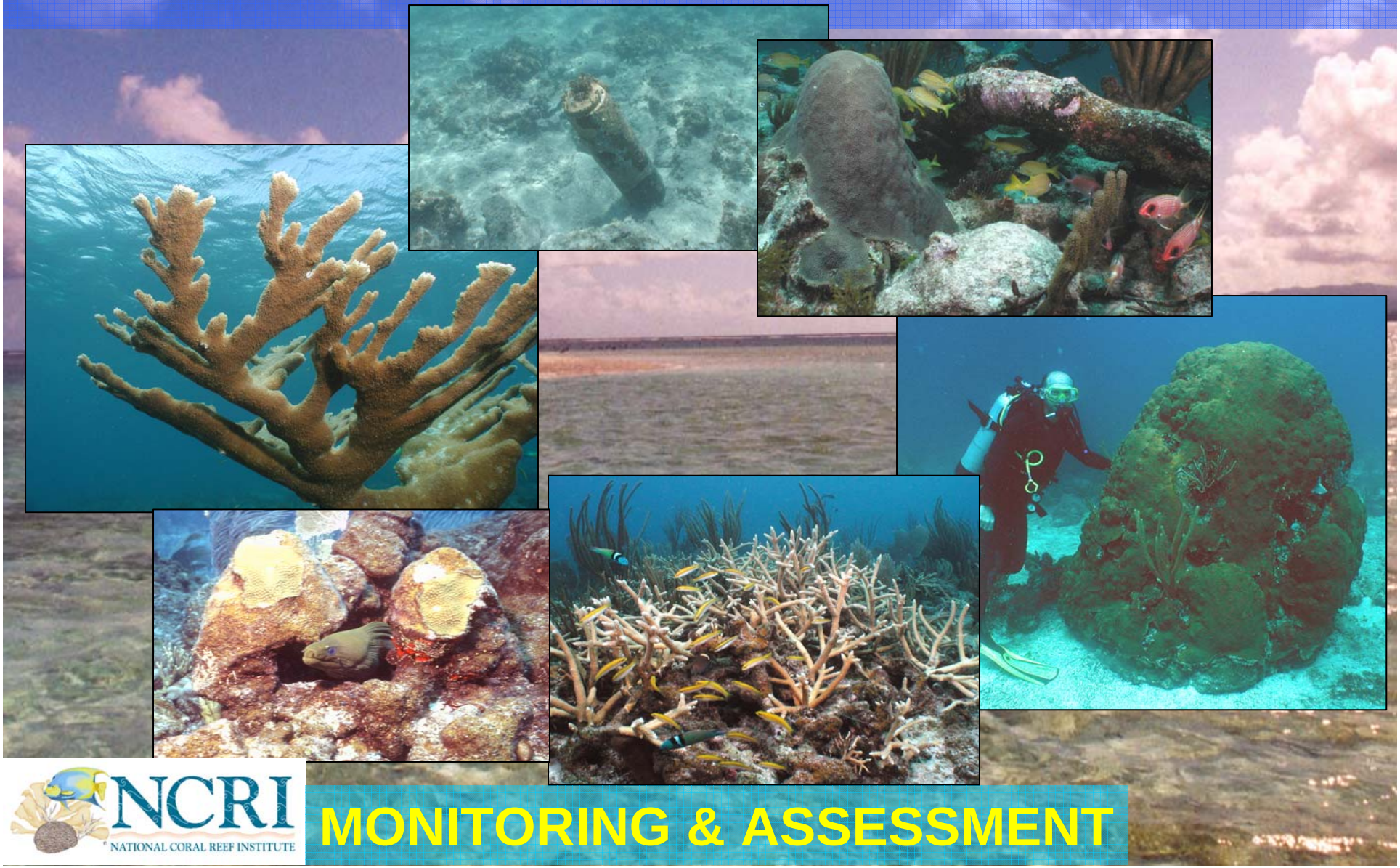
MONITORING

Coral Reef Monitoring & Mapping
Vieques, Puerto Rico & St. Croix, US Virgin Islands



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MONITORING & ASSESSMENT

Coral Reef Monitoring Site Locations

Cuba

Haiti/D.R.

Puerto Rico

Vieques Island

St. Croix, U.S.V. I.

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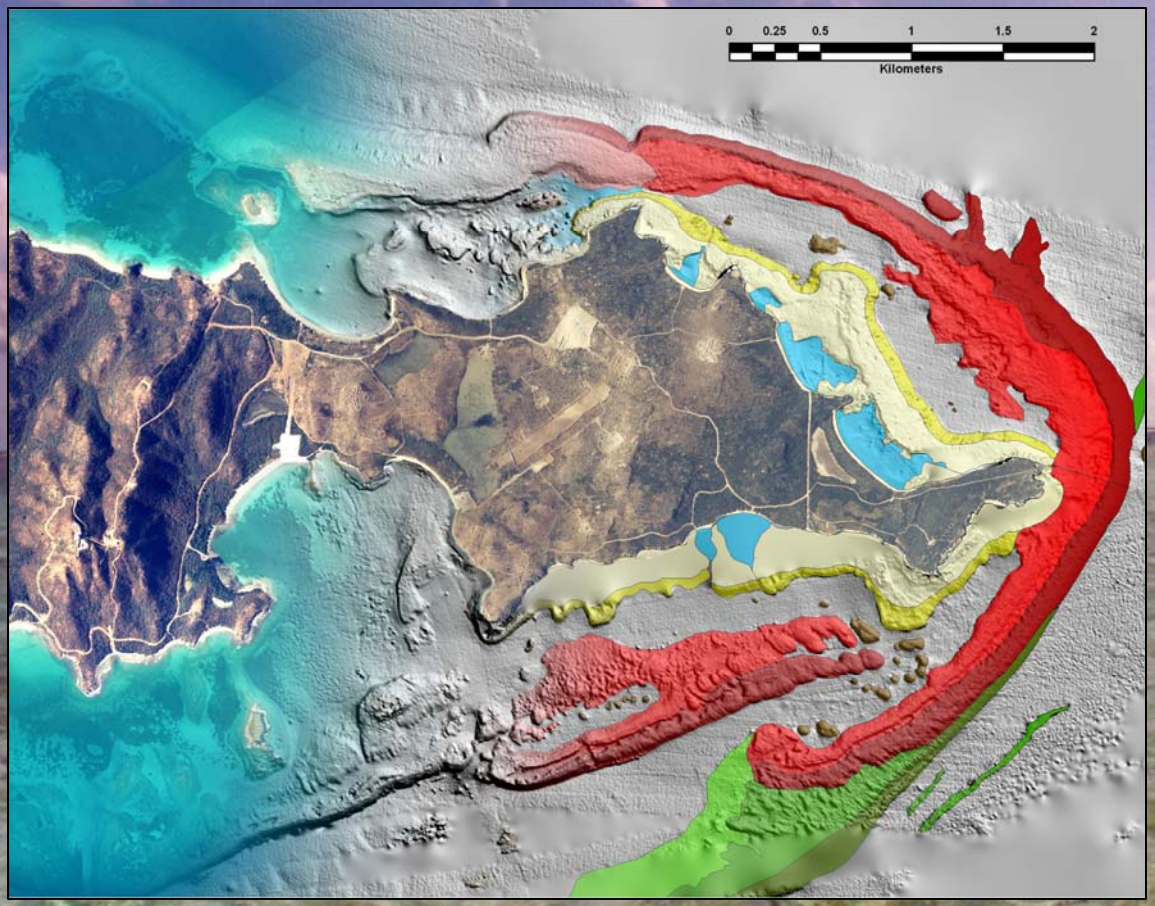
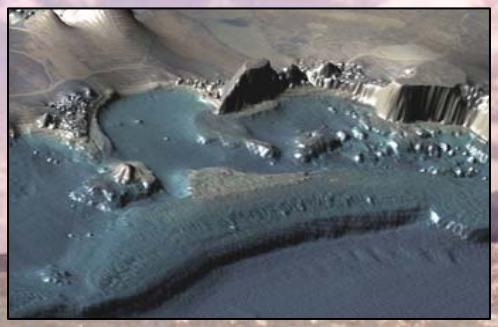
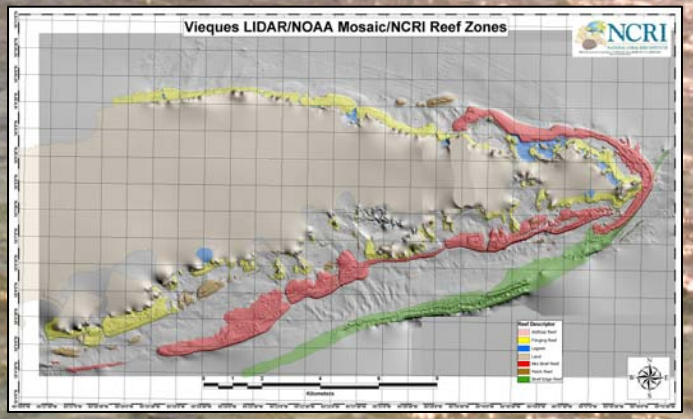
MONITORING & ASSESSMENT

Mapping







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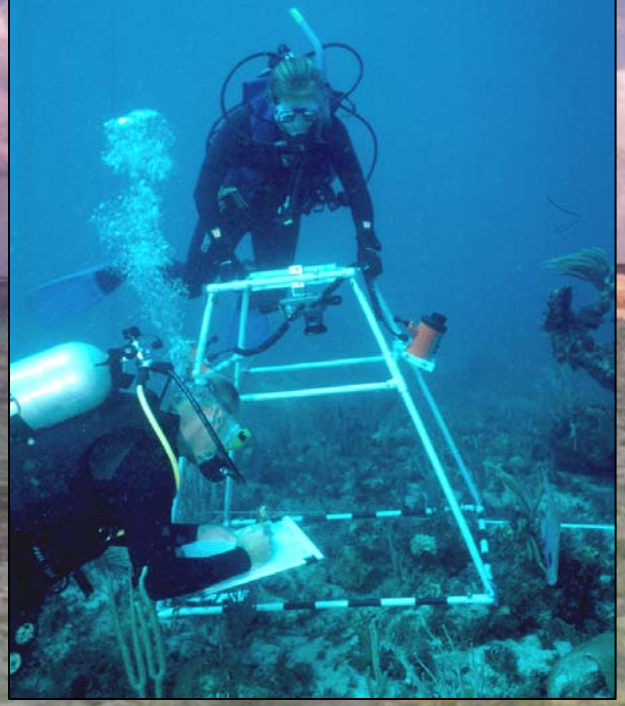
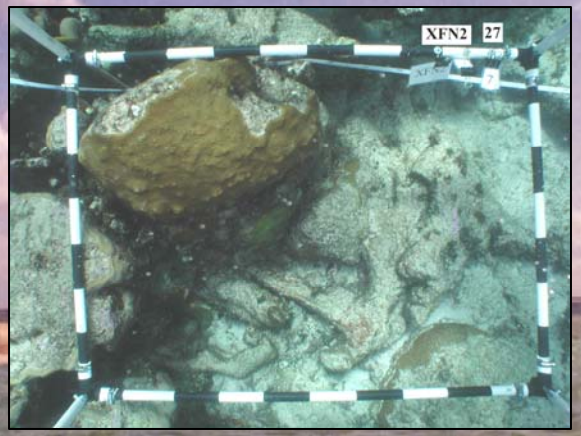
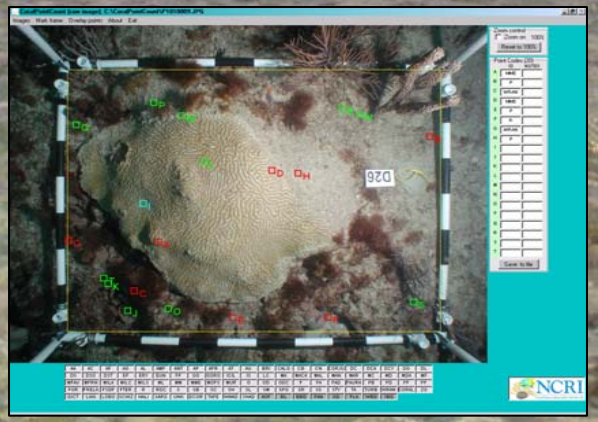
Monitoring

Benthic Habitats

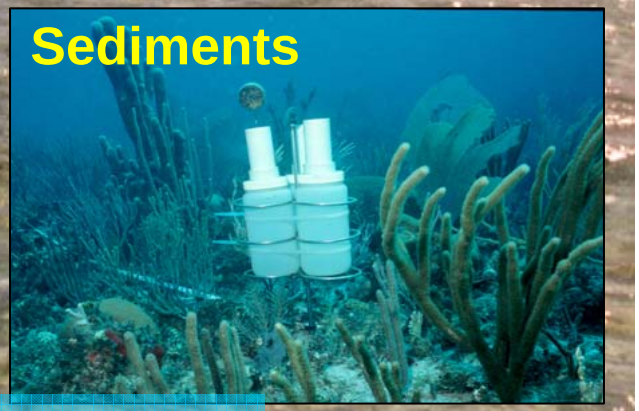






Fish

Sediments



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MONITORING & ASSESSMENT

The NCRI Monitoring Network

"A combined in situ/remotely sensed, long-term, shallow-ocean observatory system, which tracks changes in the ocean's most diverse ecosystem"

took wing in 2004

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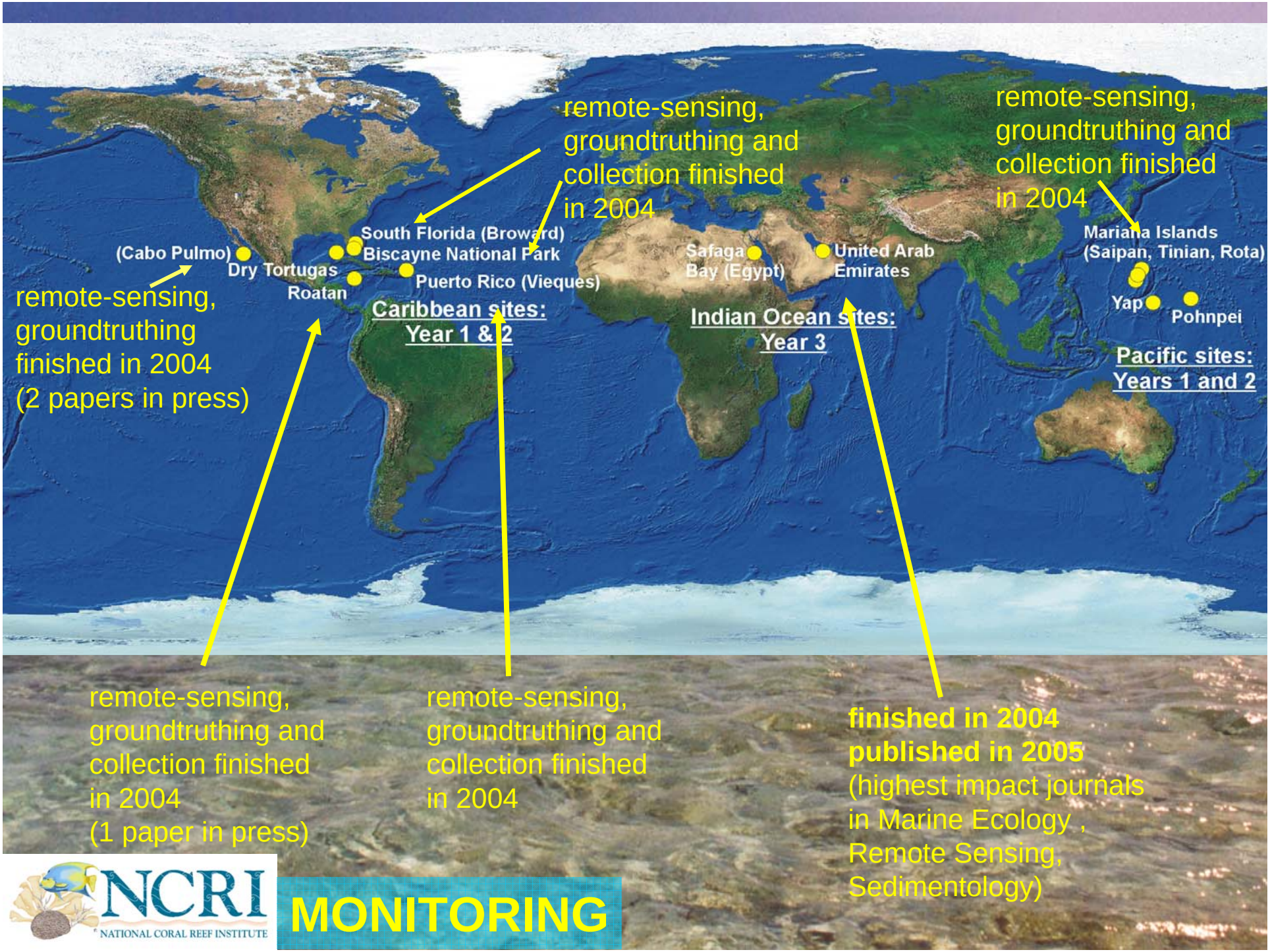
MONITORING



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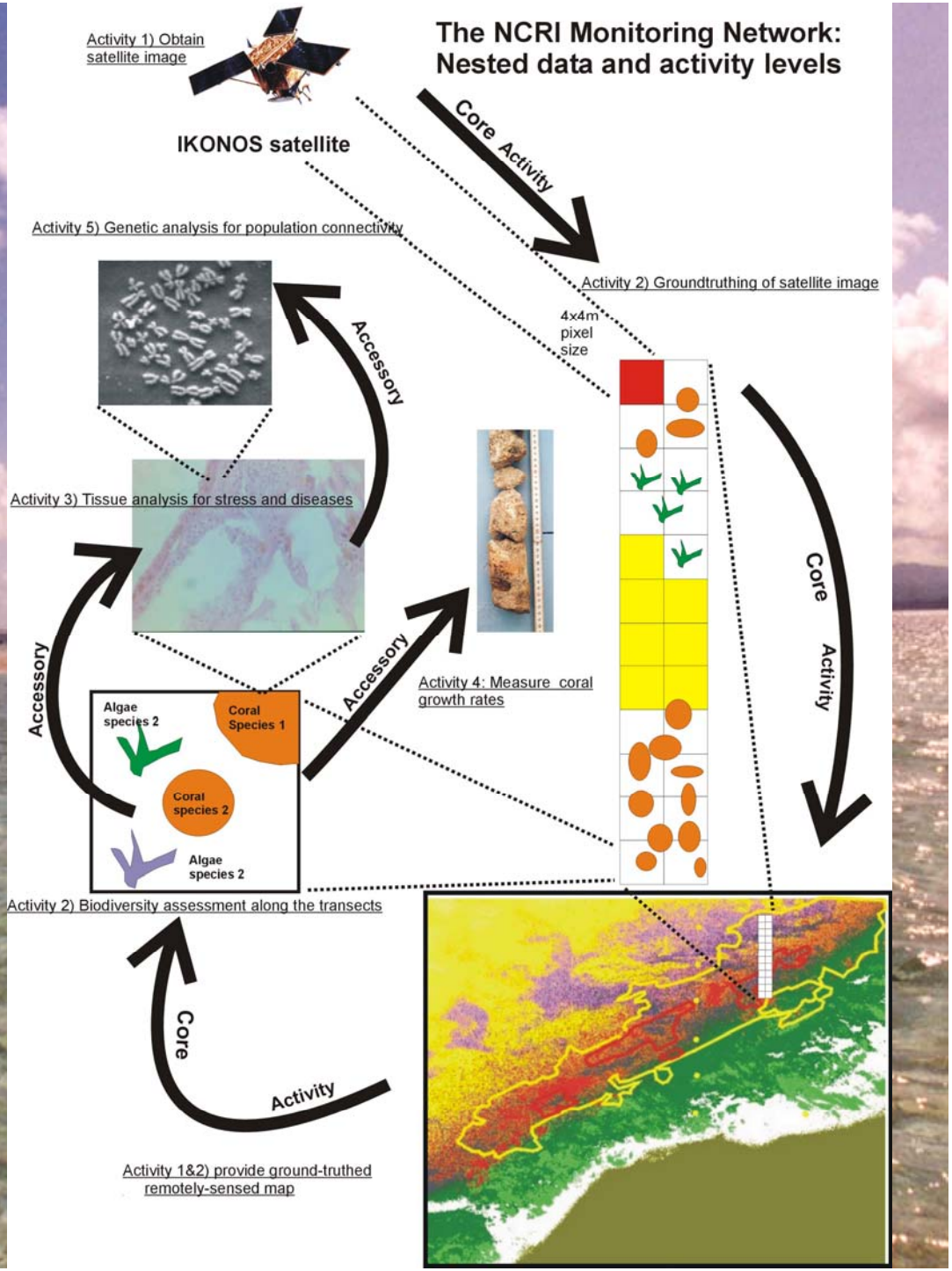
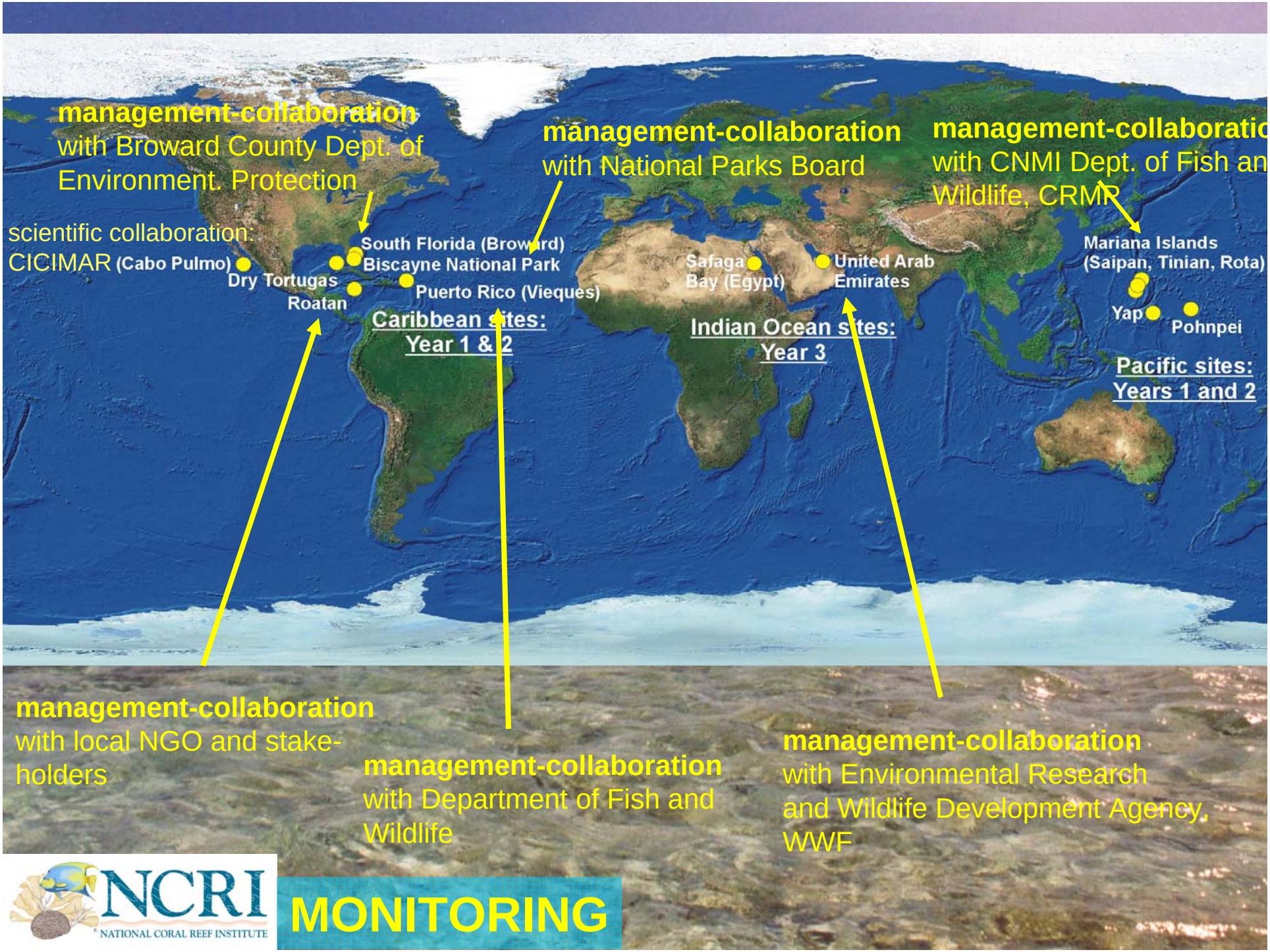
MONITORING

A monitoring network that harnesses new technologies while staying connected and compatible with and drawing from already established methods and programs which allows Minimization of cost but maximization of data!!!!!!!!!!

...and thus can ensure long-term usefulness, durability, and continuity of the programs!




management-collaboration with Broward County Dept. of Environment. Protection
scientific collaboration: CICIMAR (Cabo Pulmo)
Dry Tortugas
Roatan
South Florida (Broward)
Biscayne National Park
Puerto Rico (Vieques)
Caribbean sites: Year 1 & 2
management-collaboration with National Parks Board
Safaga Bay (Egypt)
United Arab Emirates
Indian Ocean sites: Year 3
management-collaboratio with CNMI Dept. of Fish an Wildlife, CRMR
Mariana Islands (Saipan, Tinian, Rota)
Yap
Pohnpei
Pacific sites: Years 1 and 2
management-collaboration with local NGO and stake-holders
management-collaboration with Department of Fish and Wildlife
management-collaboration with Environmental Research and Wildlife Development Agency, WWF
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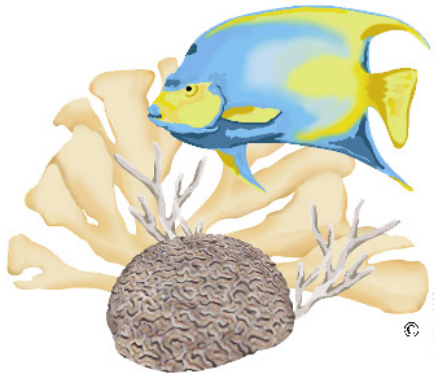
MONITORING

Work-flow of the NCRI monitoring network



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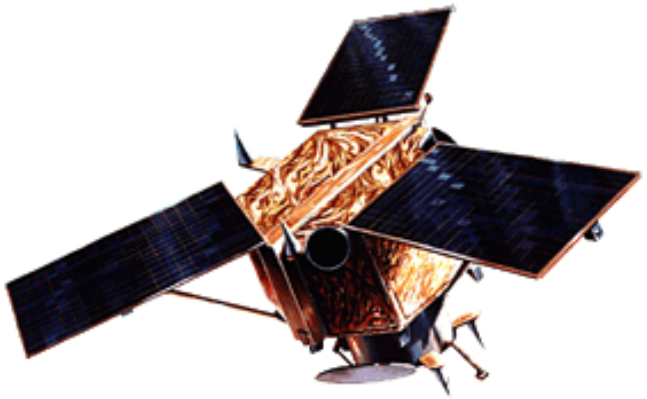

...obtain high-resolution satellite imagery. Perform classification.

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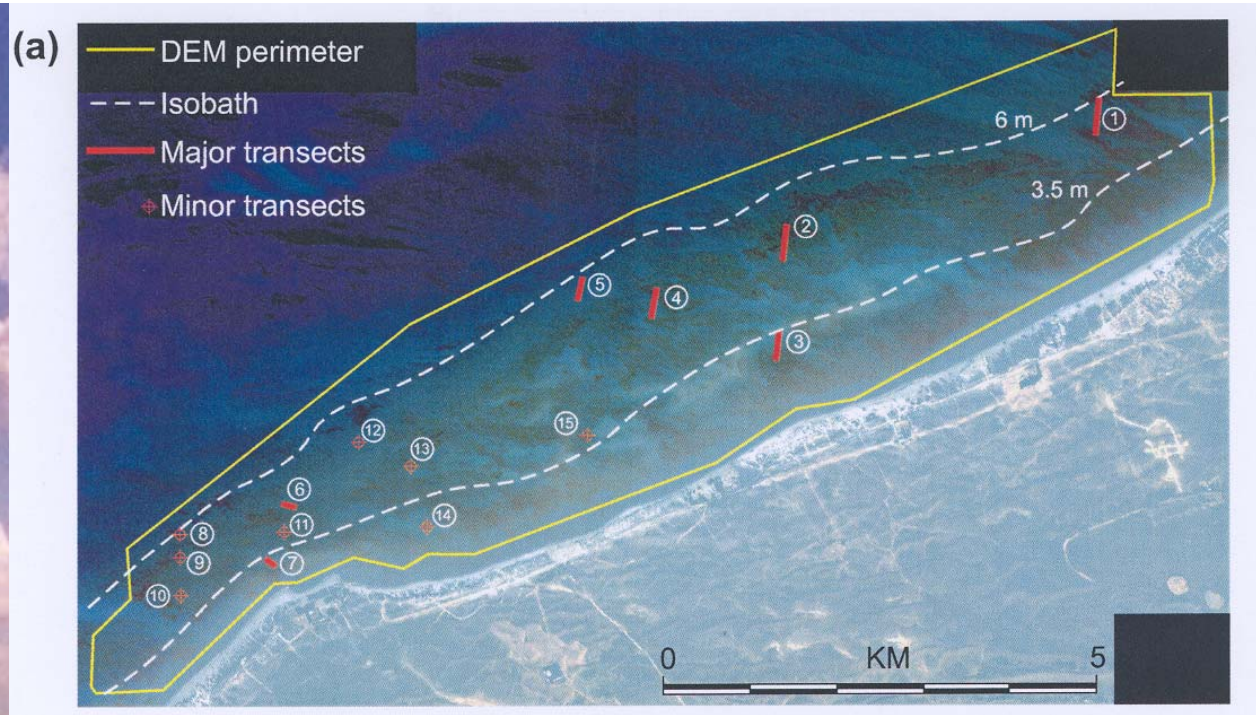
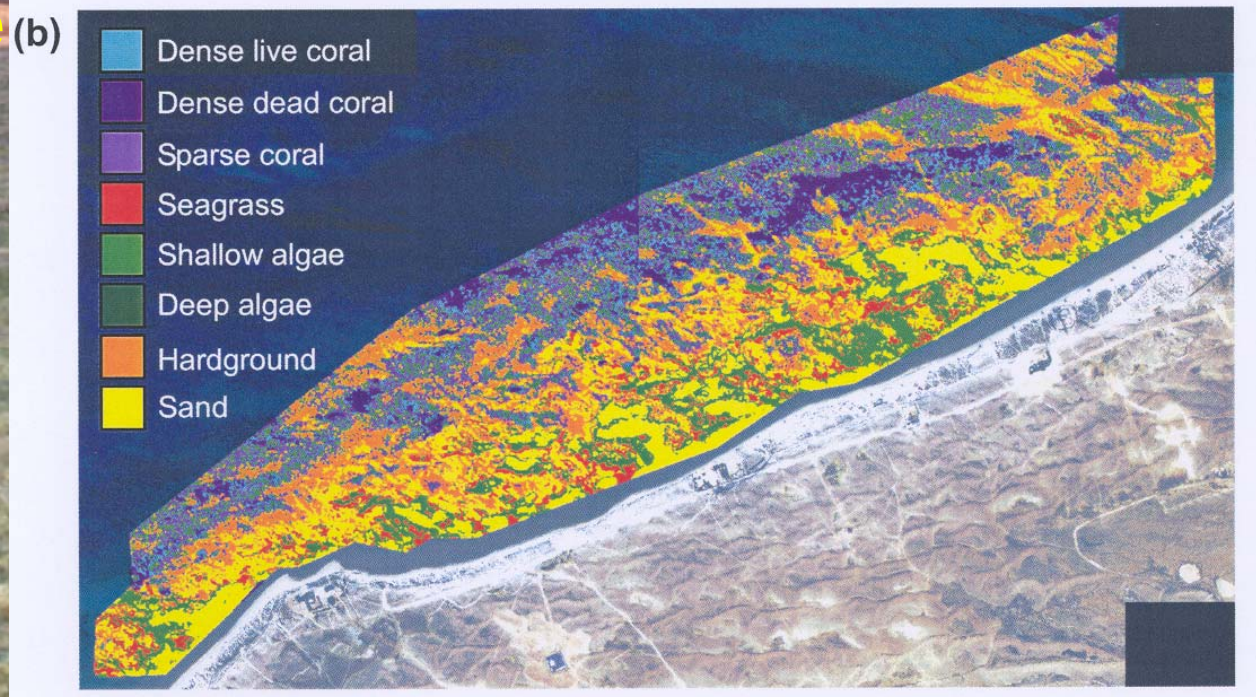
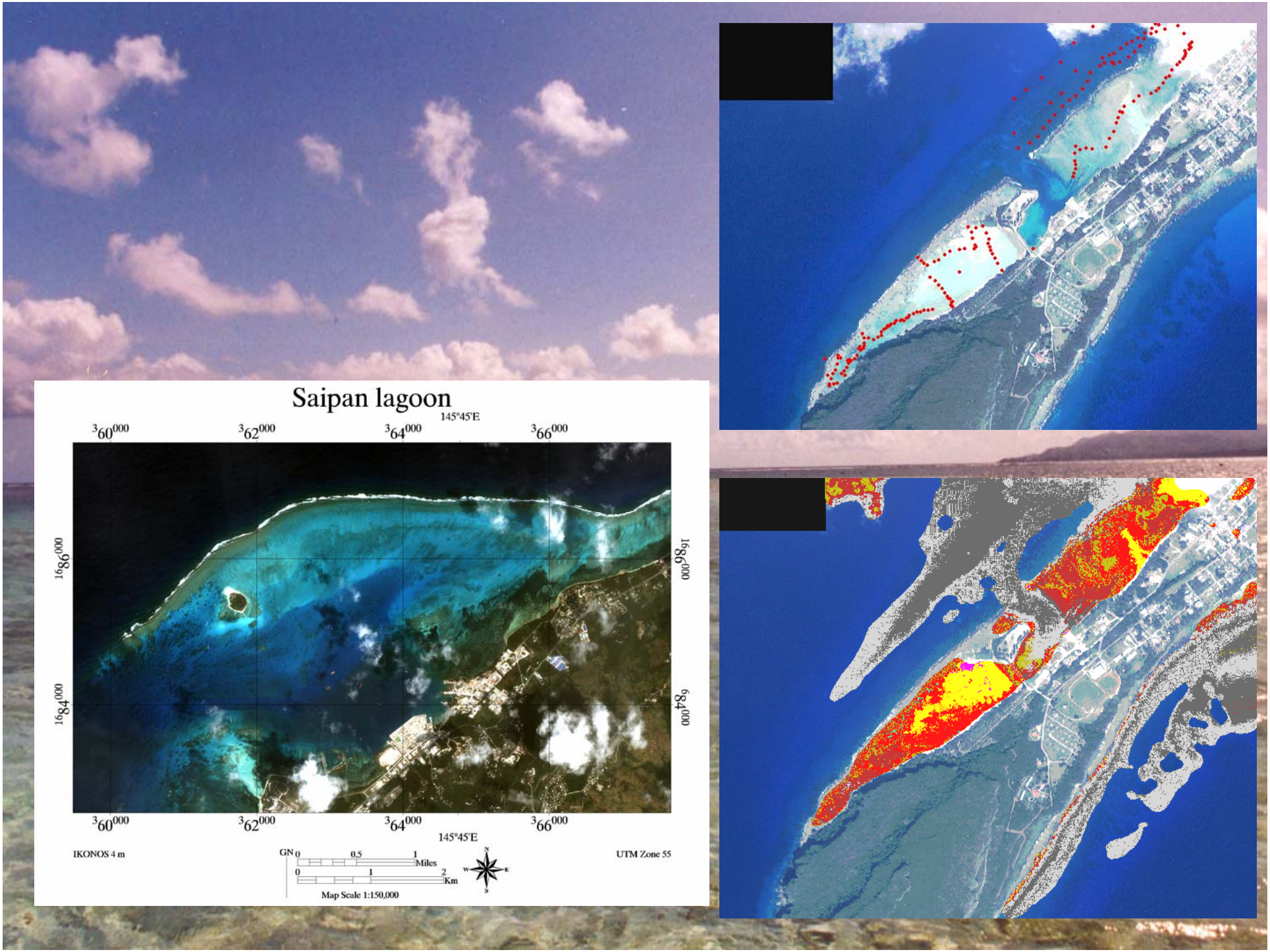
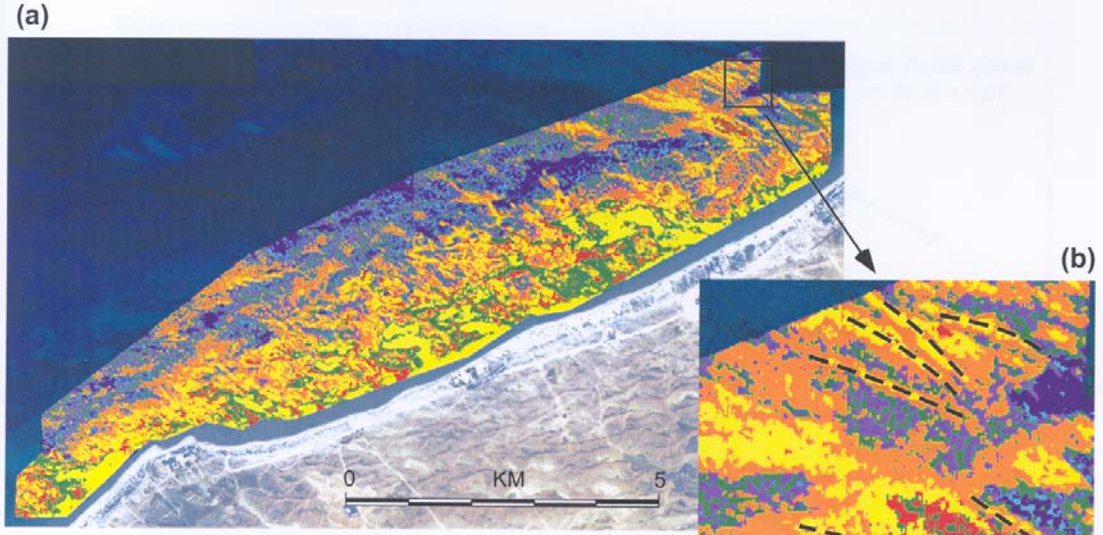
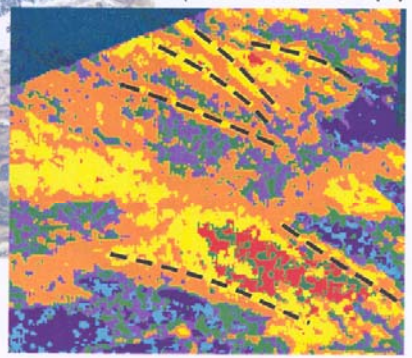
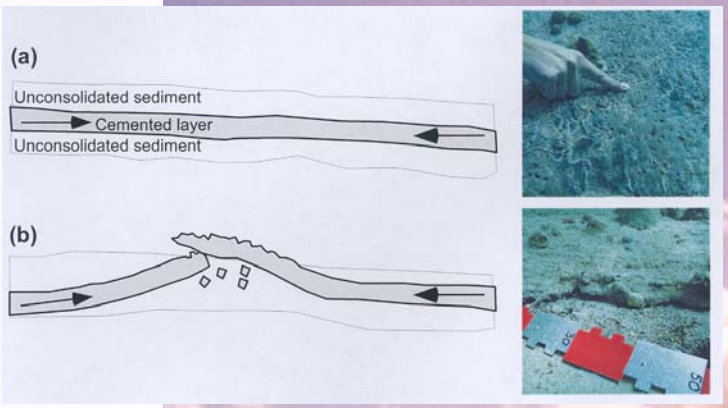


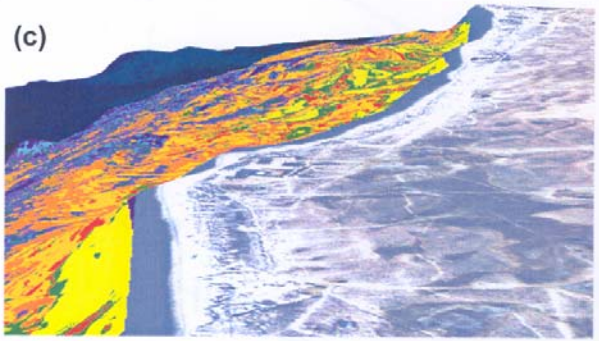


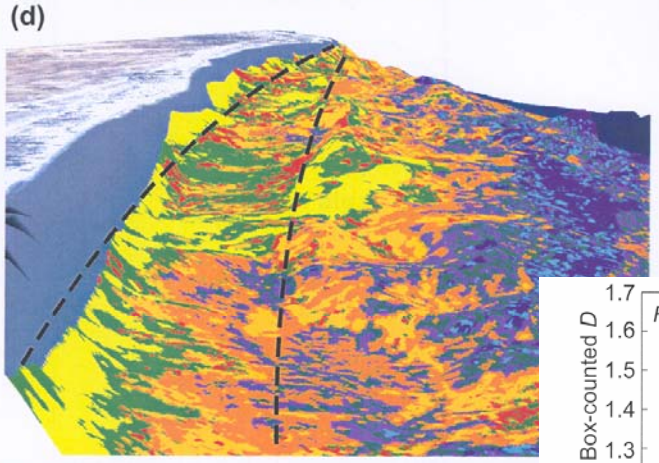

Saipan lagoon
145°45'E
360000
362000
364000
366000
1686000
1684000
IKONOS 4 m
GN
0
0.5
1
Miles
0
1
2
Km
Map Scale 1:150,000
UTM Zone 55

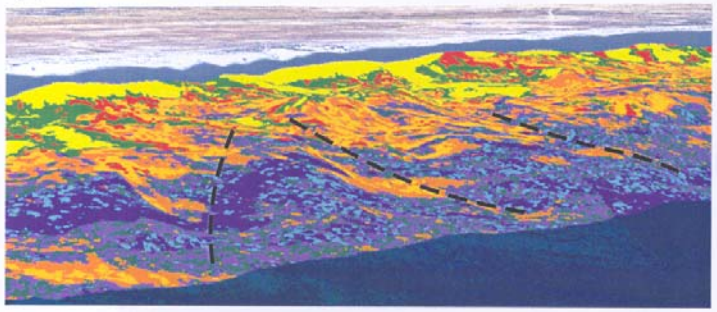






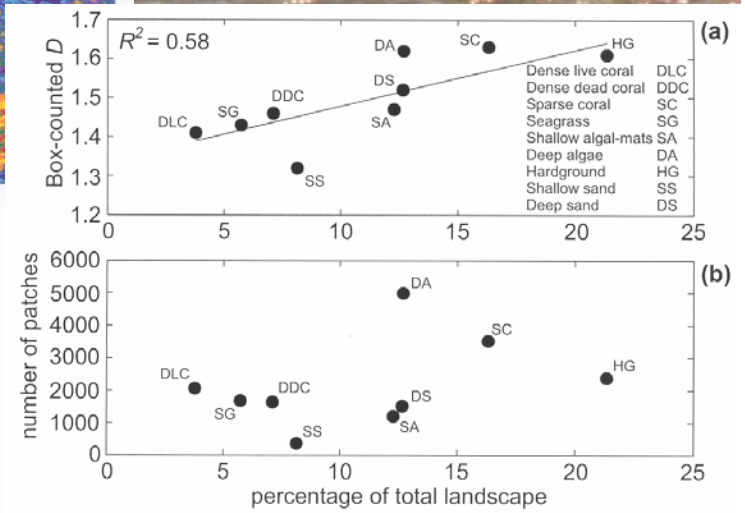


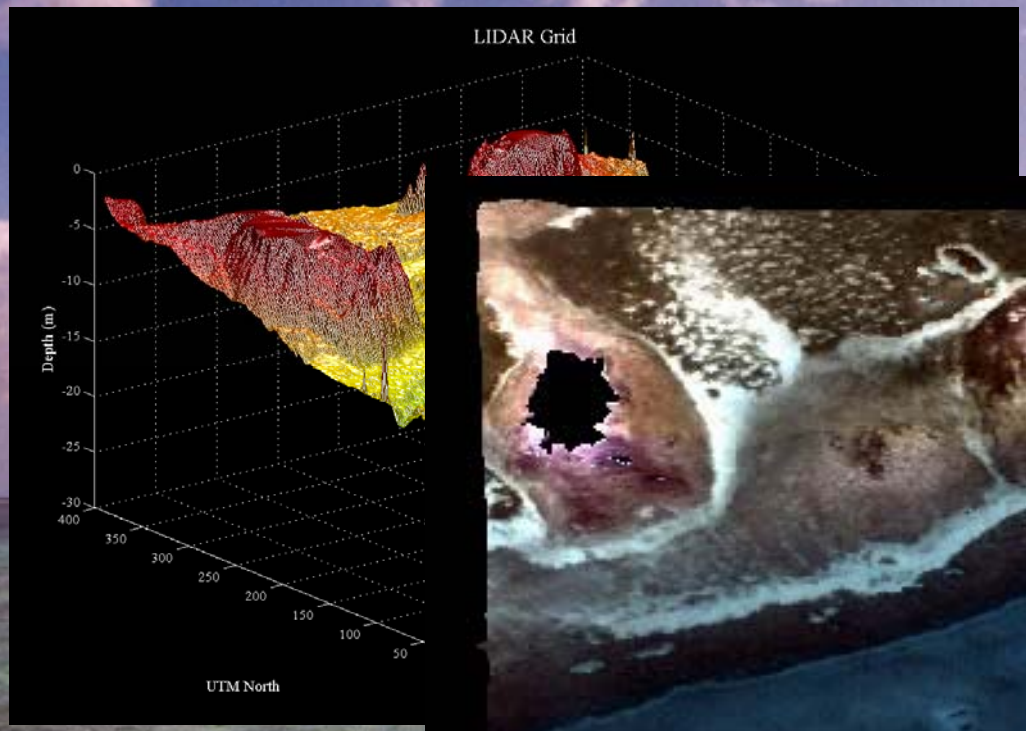


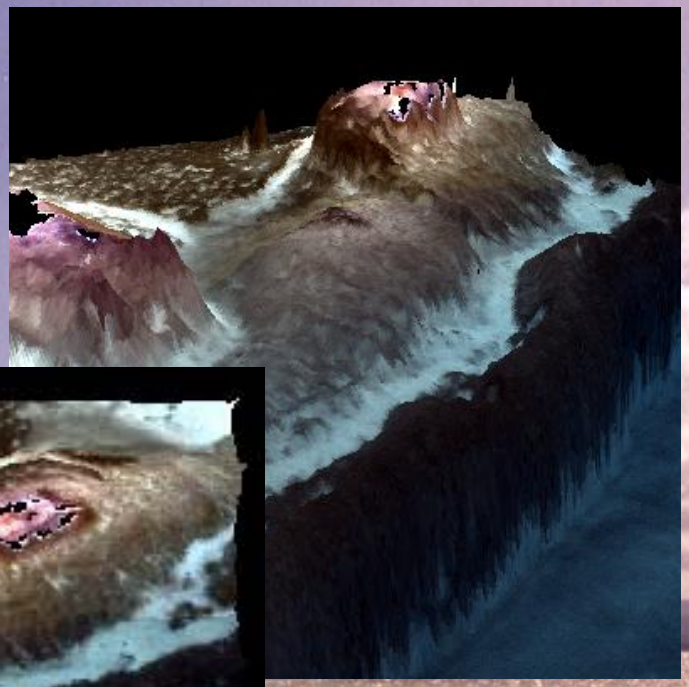


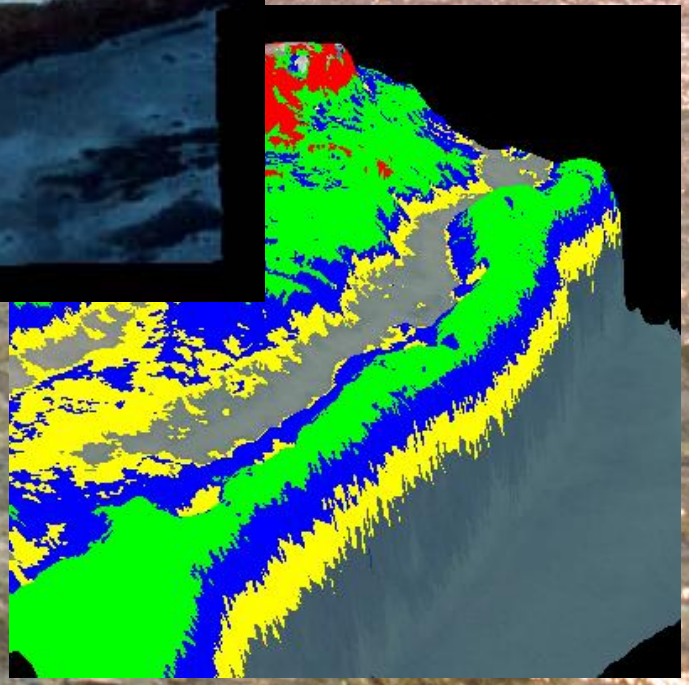
Dense live coral
Dense dead coral
Sparse coral
Seagrass
Shallow algae
Deep algae
Hardground
Sand

... Interpretation of spatial dynamics of habitat pattern.

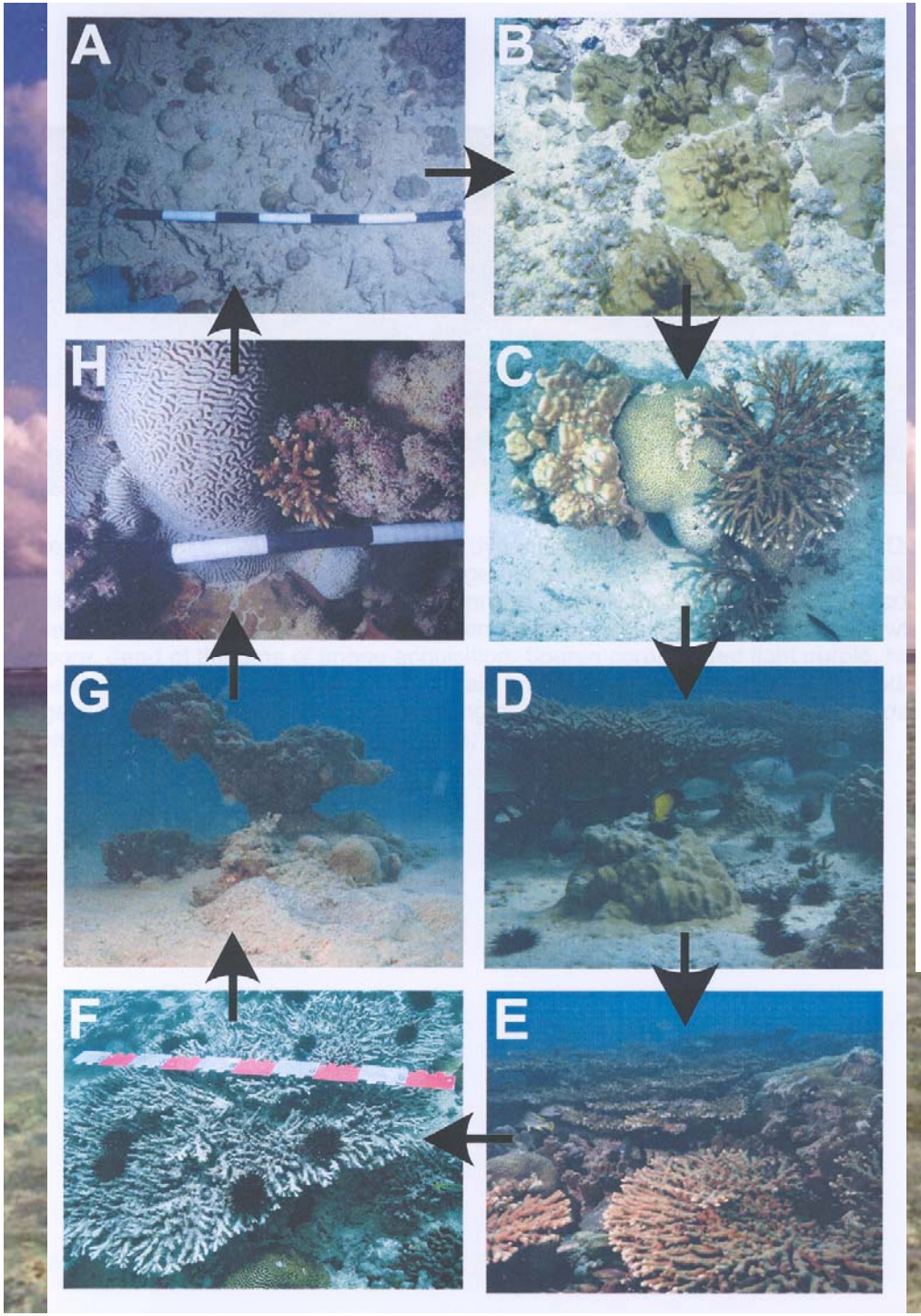


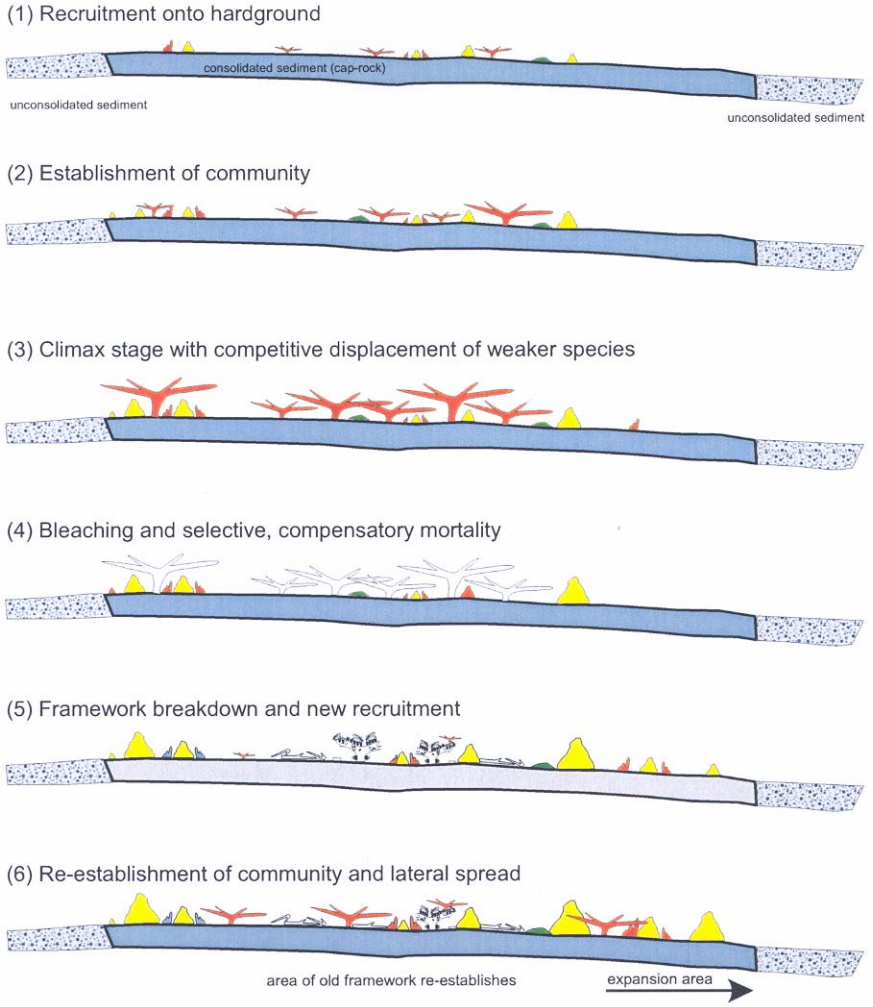




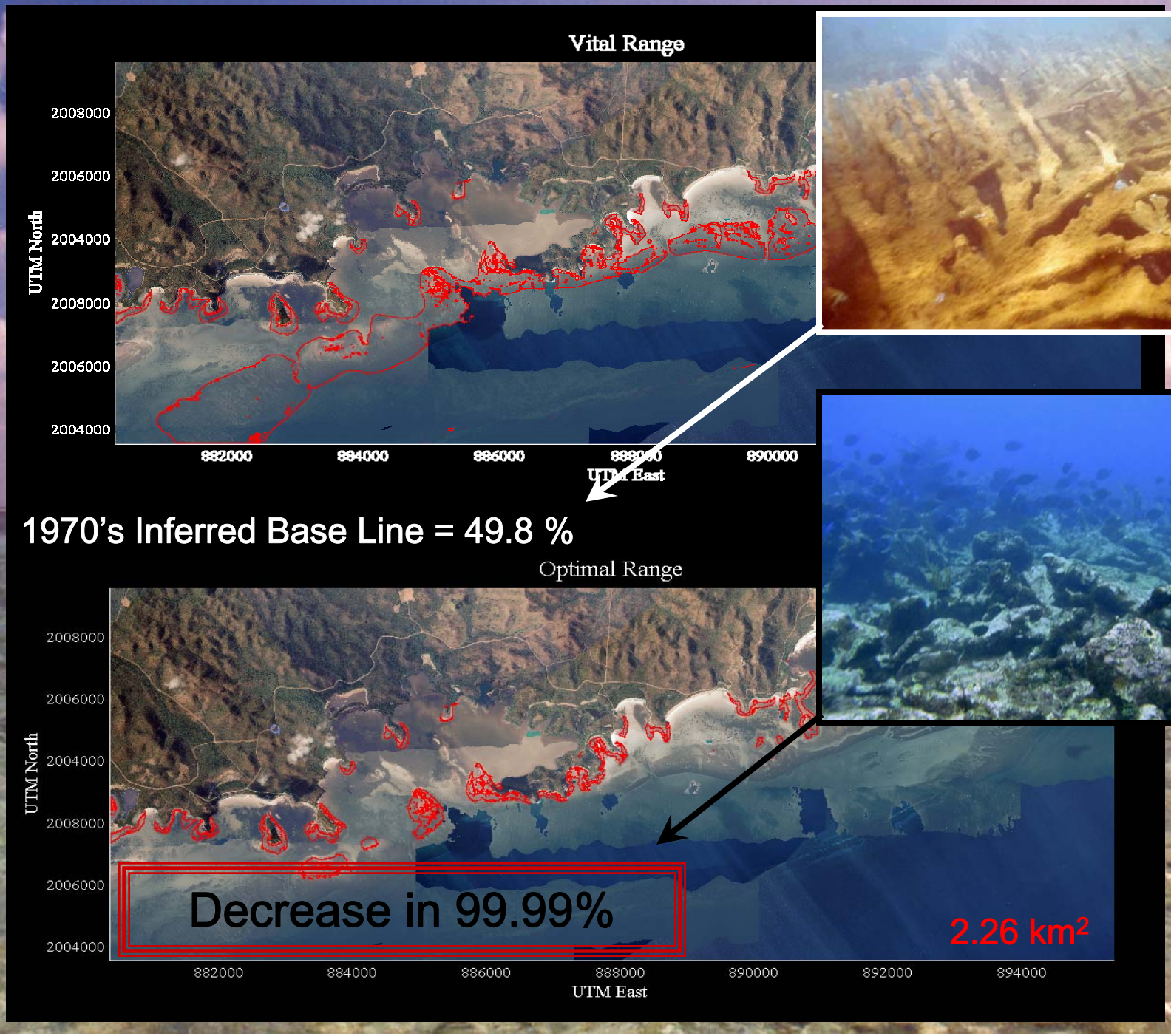


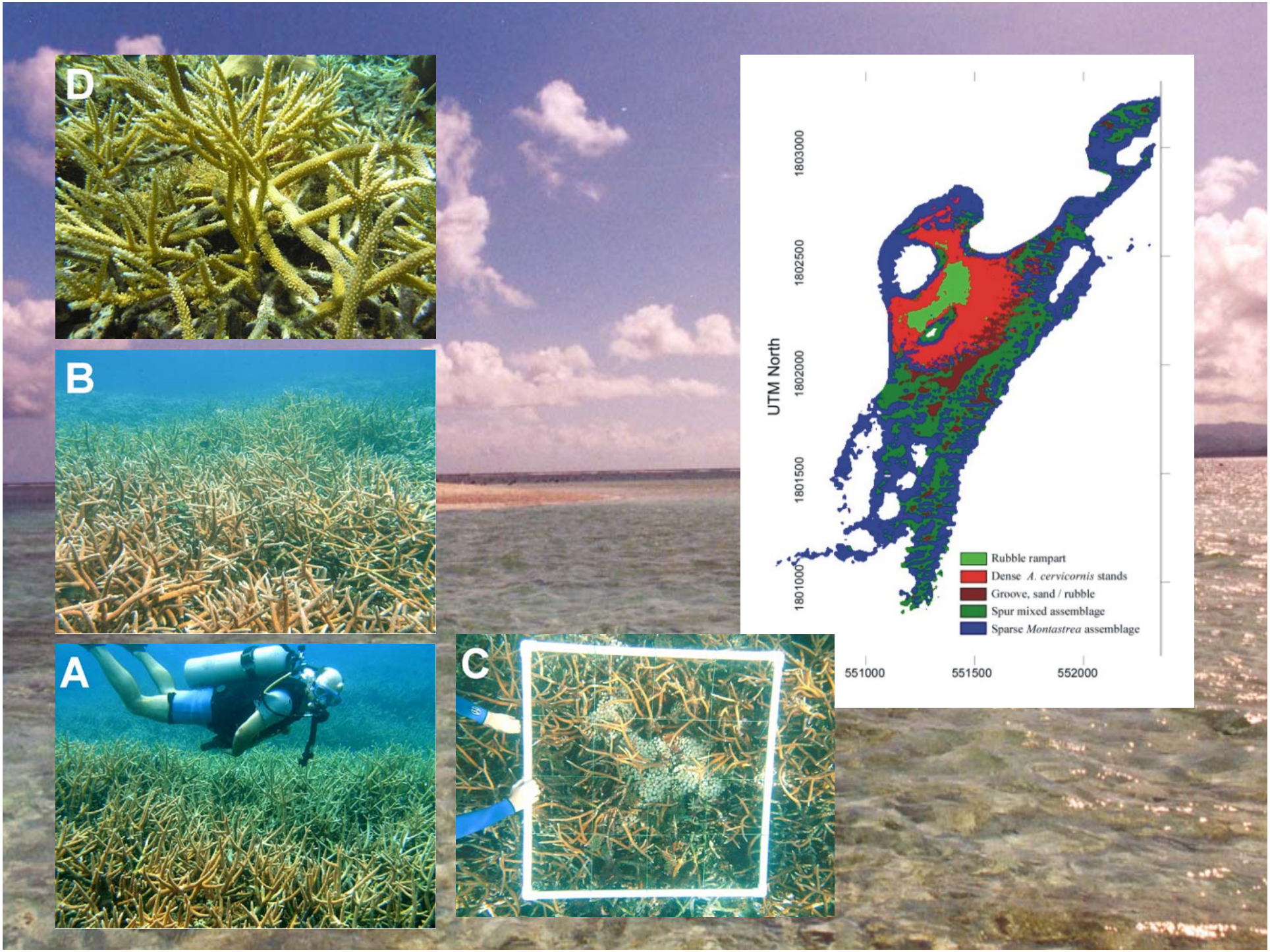
Vieques
one thesis, one talk at ASLO
two publications in prep.
by Luz Raquel Hernández-Cruz

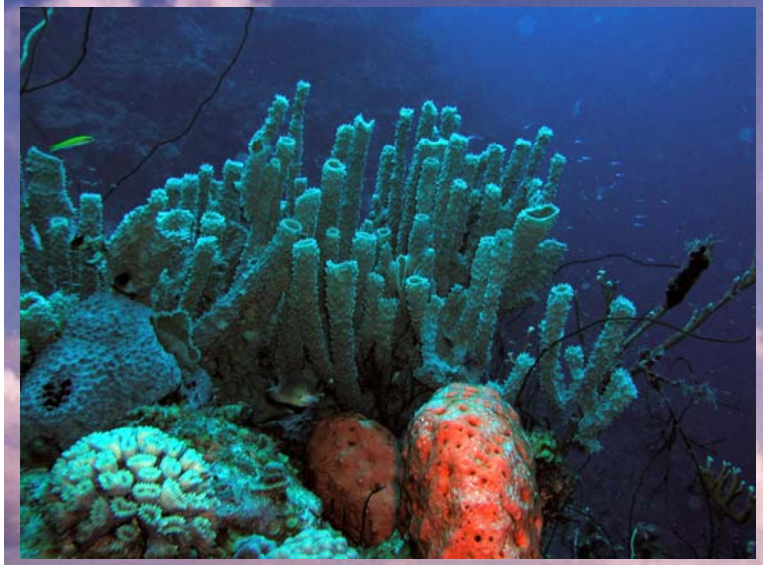


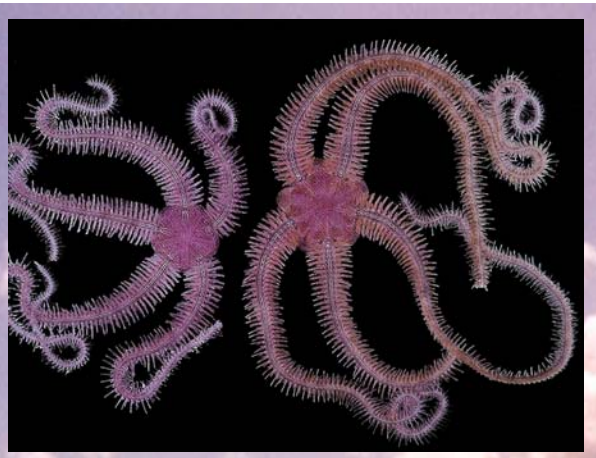


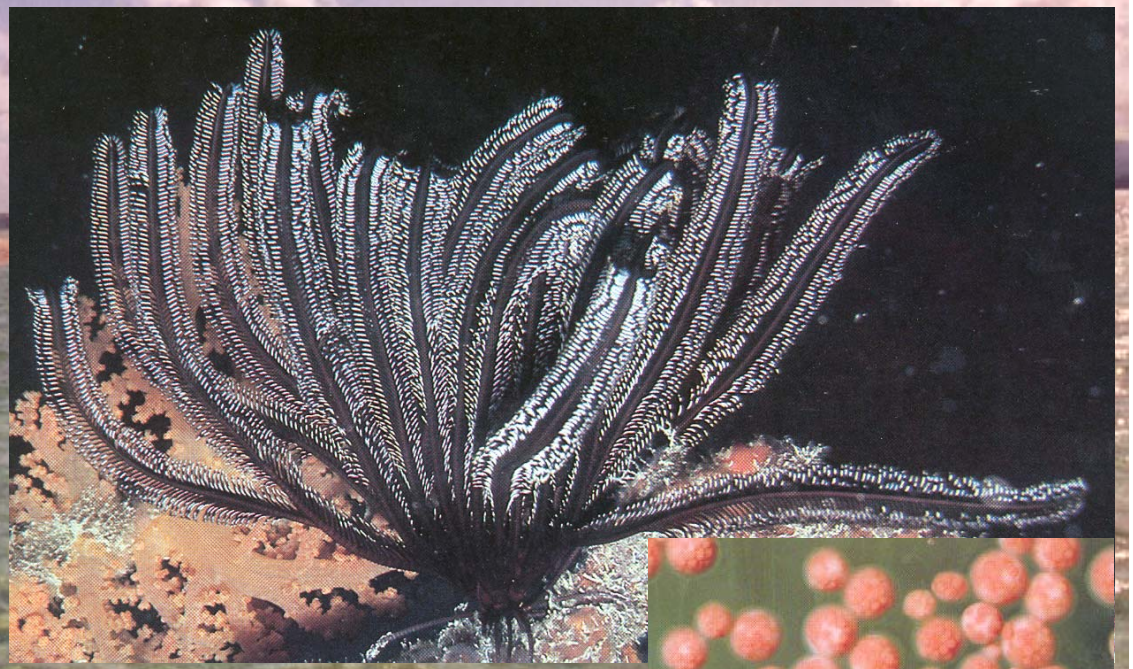
...Groundtruth biology and evaluate biodiversity and ecological dynamics.


Vital Range
2008000
2006000
2004000
2008000
2006000
2004000
UTM North
882000
884000
886000
890000
UTM East
1970's Inferred Base Line = 49.8 %
Optimal Range
2008000
2006000
2004000
2008000
2006000
2004000
UTM North
Decrease in 99.99%
2.26 km²
882000
884000
886000
888000
890000
892000
894000
UTM East


D
B
A
C
UTM North
1803000
1802500
1802000
1801500
1801000
551000
551500
552000
Rubble rampart
Dense A. cervicornis stands
Groove, sand / rubble
Spur mixed assemblage
Sparse Montastrea assemblage







…Evaluate genetic connectivity within and among sites

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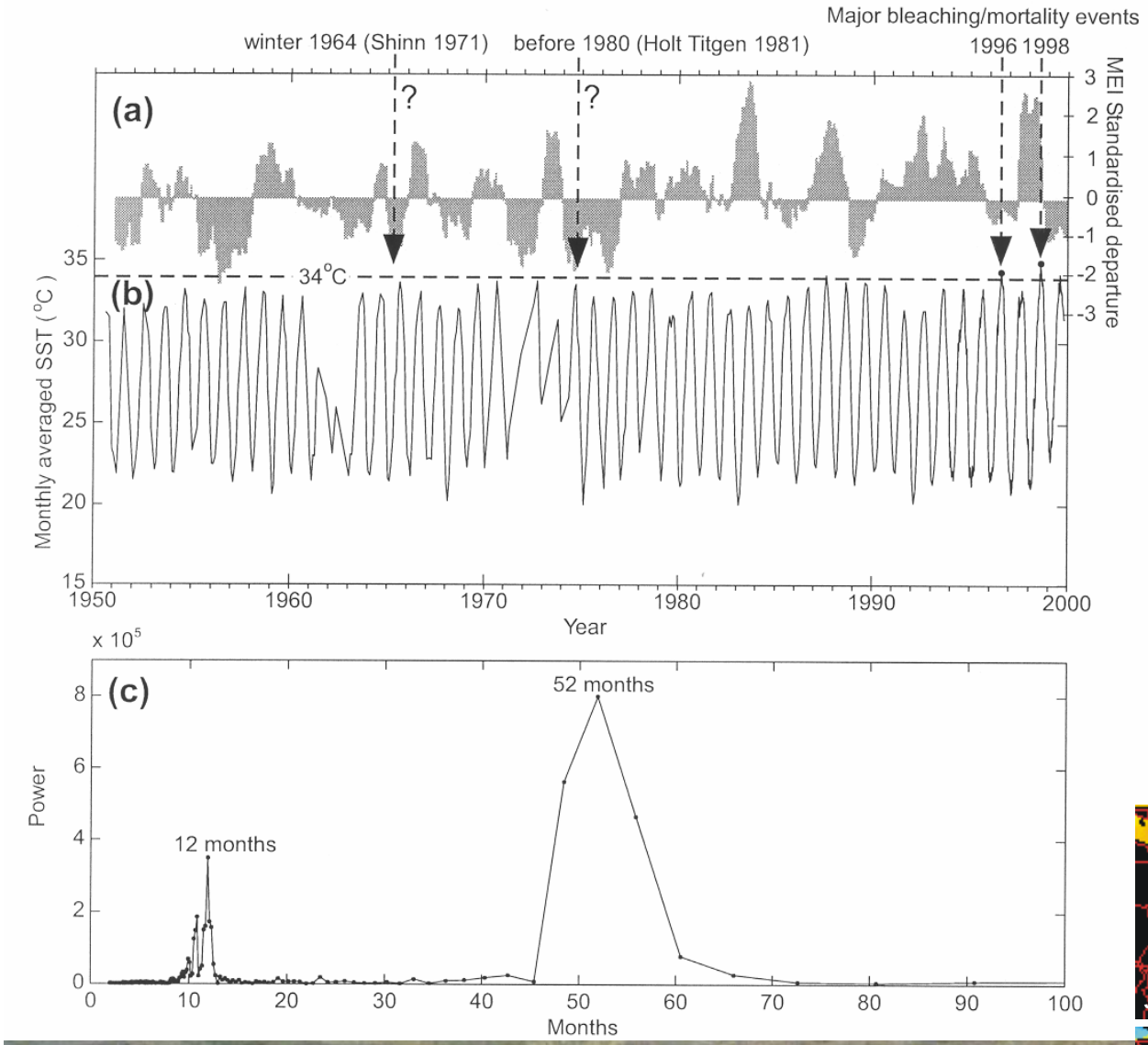
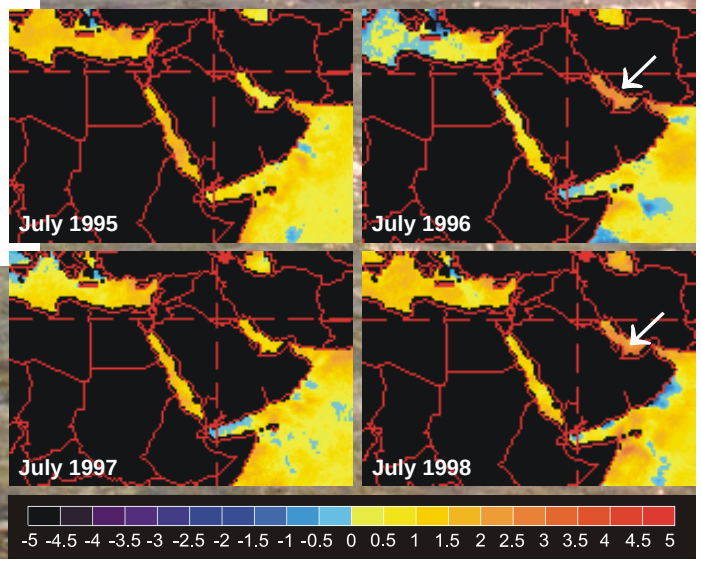
John Miller



... couple with environmental time-series data, to understand community history and development models of future.



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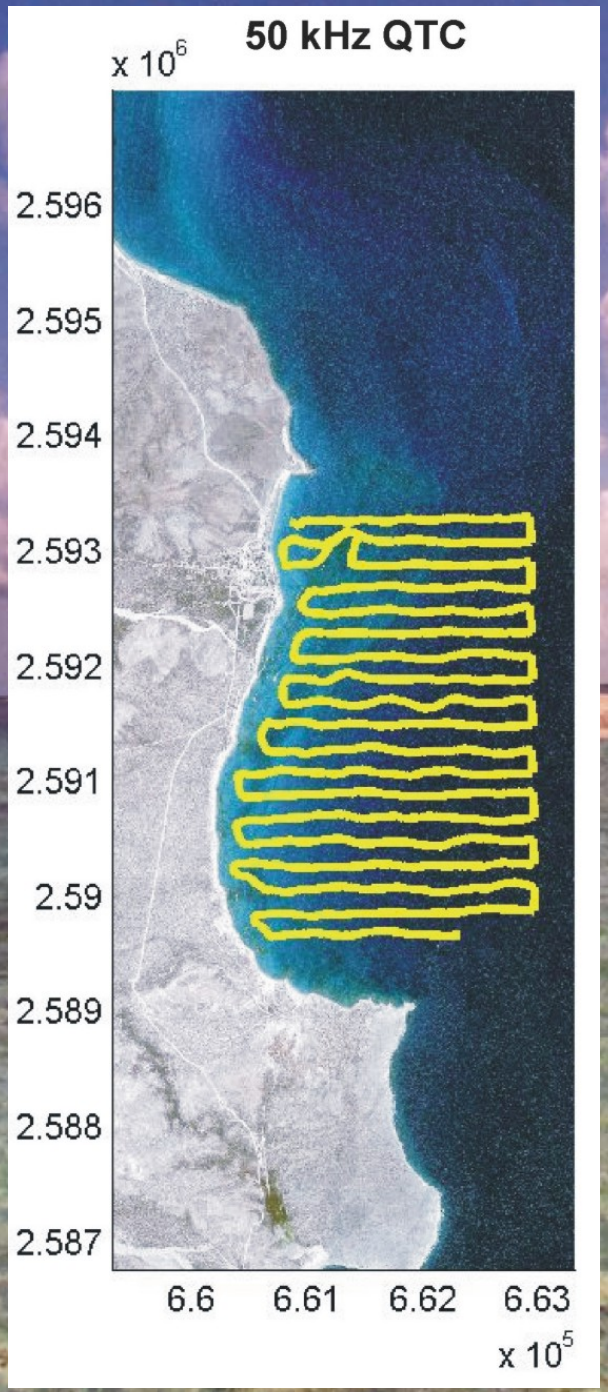
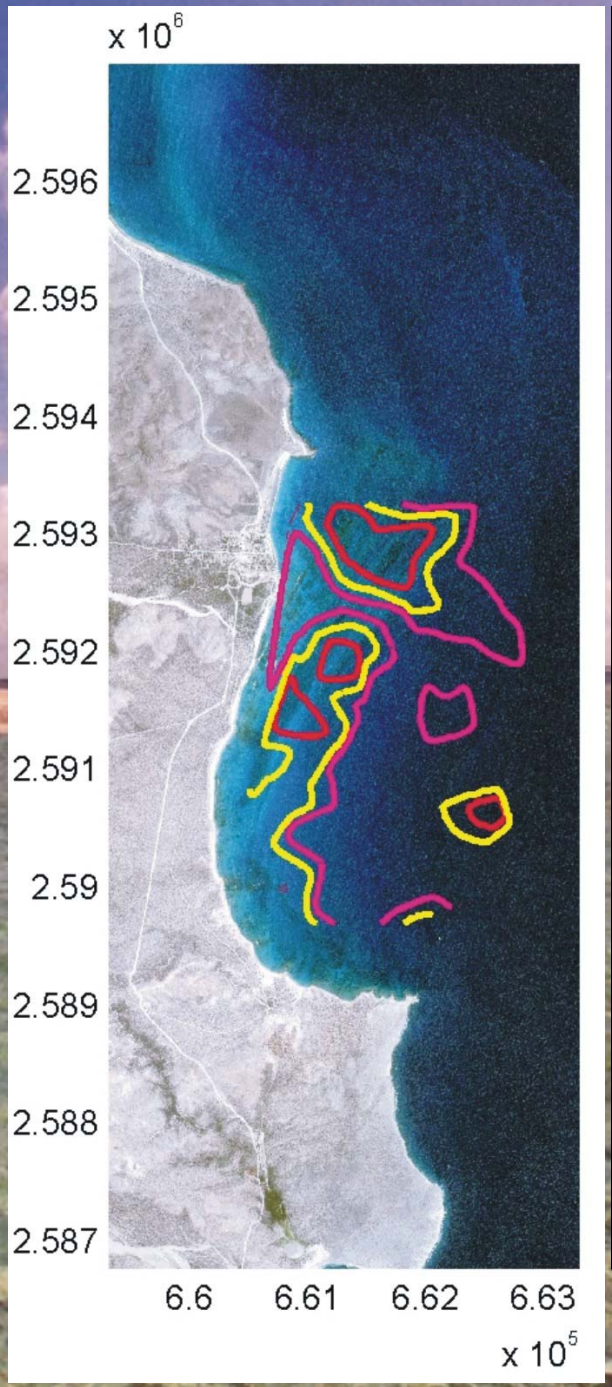

50 kHz QTC
x 10^6
2.596
2.595
2.594
2.593
2.592
2.591
2.59
2.589
2.588
2.587
6.6
6.61
6.62
6.63
x 10^5


x 10^6
2.596
2.595
2.594
2.593
2.592
2.591
2.59
2.589
2.588
2.587
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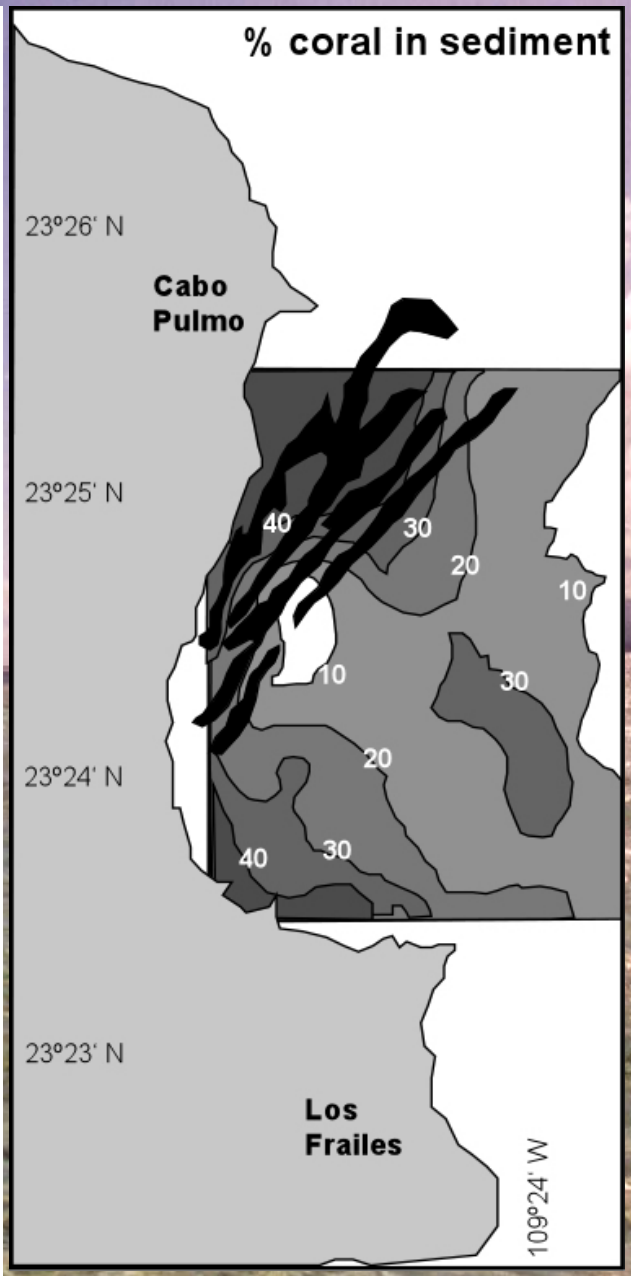
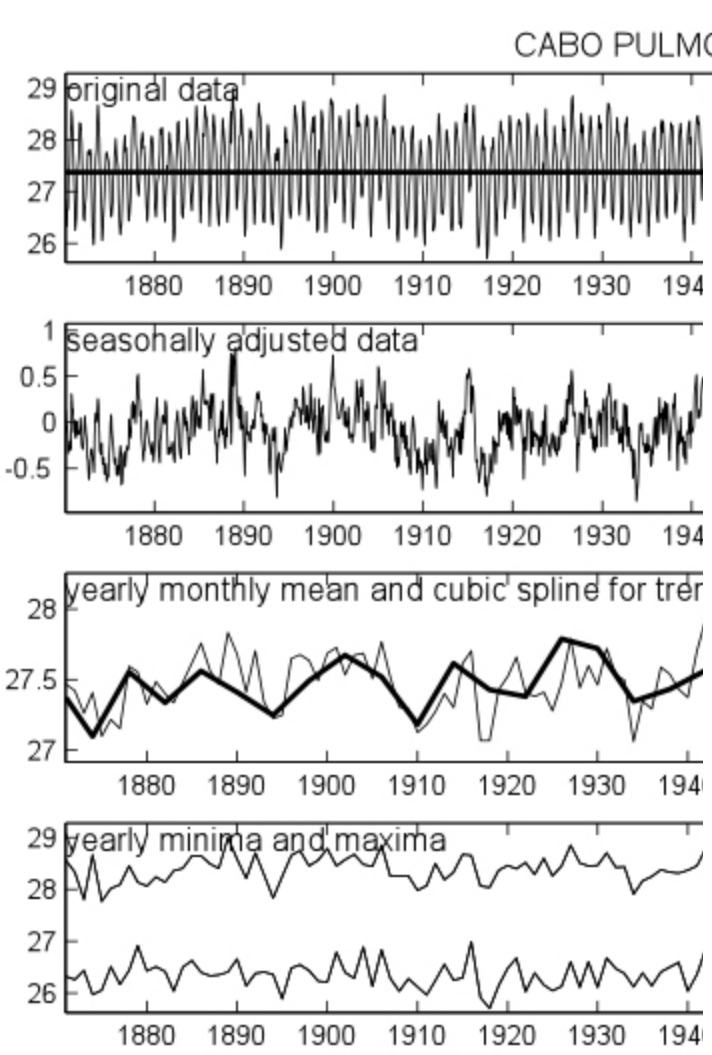
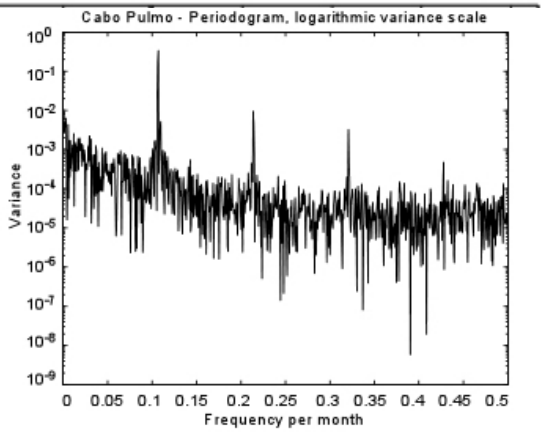
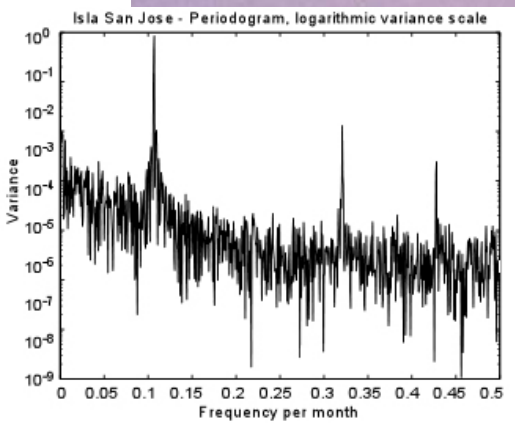
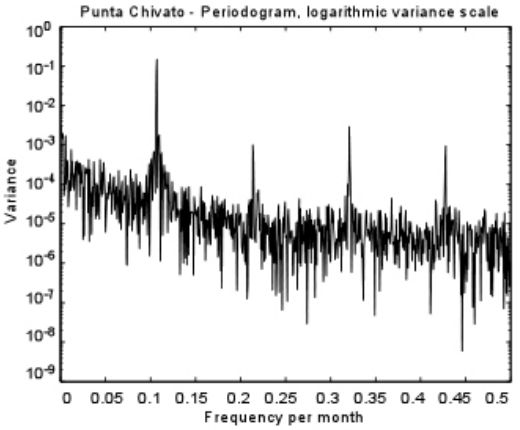
6.61
6.62
6.63
x 10^5

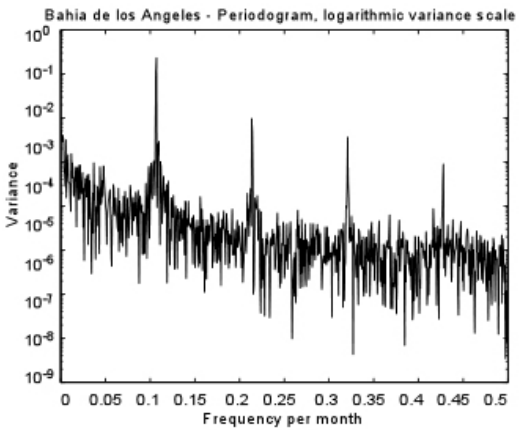

% coral in sediment
23°26' N
Cabo
Pulmo
23°25' N
23°24' N
23°23' N
Los
Frailes
109°24' W
40
30
20
10
10
30
20
40
30

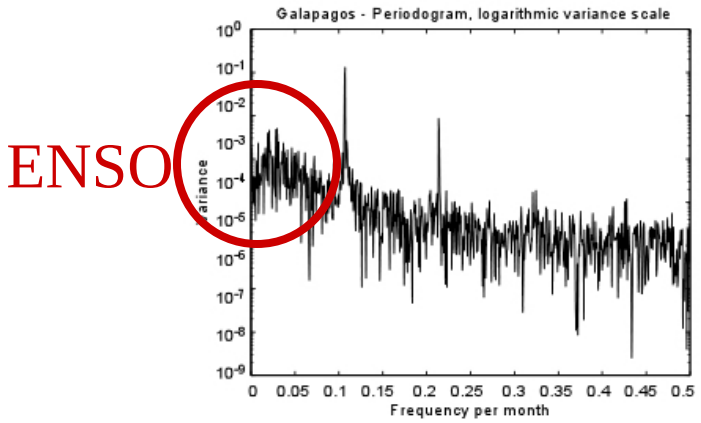

CABO PULMO
original data
seasonally adjusted data
yearly monthly mean and cubic spline for trer
yearly minima and maxima
1880 1890 1900 1910 1920 1930


Cabo Pulmo - Periodogram, logarithmic variance scale
Variance
Frequency per month


Isla San Jose - Periodogram, logarithmic variance scale
Variance
Frequency per month


Punta Chivato - Periodogram, logarithmic variance scale
Variance
Frequency per month


Bahia de los Angeles - Periodogram, logarithmic variance scale
Variance
Frequency per month


Galapagos - Periodogram, logarithmic variance scale
ENSO
Variance
Frequency per month

work outside US entirely
funded by leveraged sources

Interdisciplinarity, collaboration, and relevance as a recipe for success!

USGS science for a changing world

BROWARD COUNTY FLORIDA

NASA

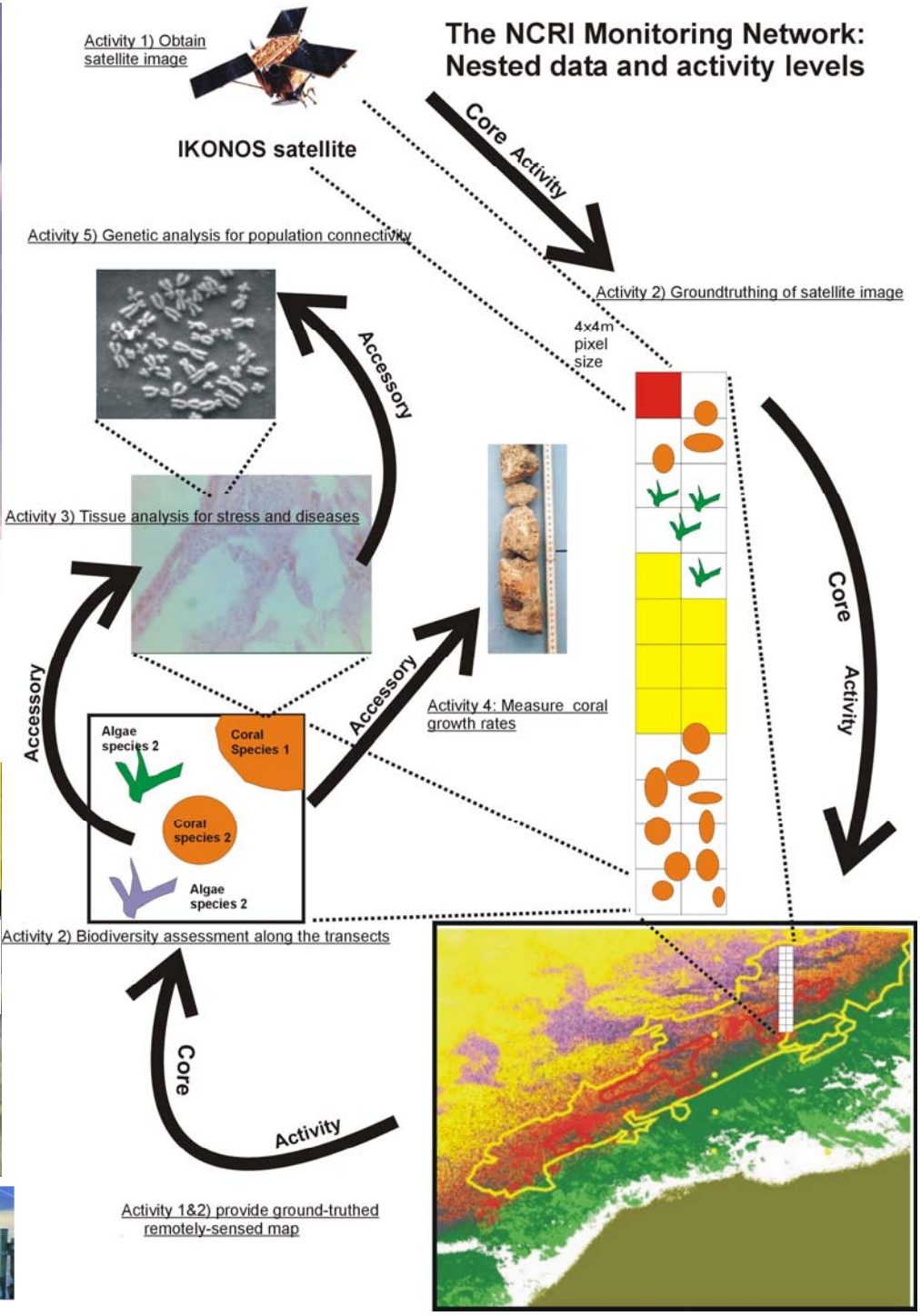
KZN

UNI GRAZ

The Nature Conservancy SAVING THE LAST GREAT PLACES ON EARTH

NCRI

National Oceanic and Atmospheric Administration



Making Information resulting from NCRI programs available to Managers

- Projects and partnerships with Broward County & other counties of SE Florida
- Support & participate in SEFAST, LAS
- Partner & collaborate with State of Florida DEP/FMRI
- Partner & collaborate with federal agencies including USGS, NOAA, NMFS, DOI
- Conference & meeting sponsorships
- REPORTS & SCIENTIFIC PUBLICATIONS

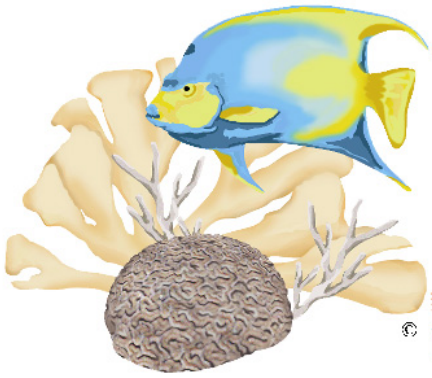
Overview Presentation
NCRI Projects
FY 2004, 2005, & 2006

Drs. Richard Dodge & Bernhard Riegl

Center for Sponsored Coastal Ocean Research

3rd Coral Reef Projects PI Meeting

March 22-24, 2004; Dania Beach, Fla



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