Florida Reef Resilience Program

Adapting and coping strategies for climate change impacts

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The Florida Reef Resilience Program

A Regional Partnership

Benefits of Coral Reefs

Biodiversity

Food

Recreation

Tourism

Coastal Protection

Medicine

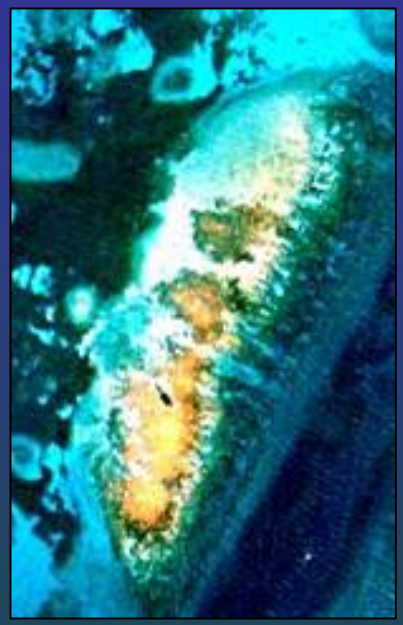
Livelihood

Economic value of FL coral reefs is $ billion annually

The “Coral Reef Crisis”

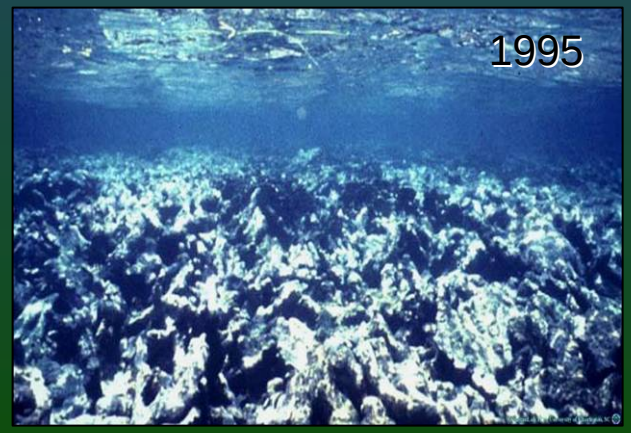
- Global degradation of reefs
- Values of reefs increasing
- Altered disturbance regimes
- Erosion of resilience
- Synergies & Surprise

The Florida Reef tract

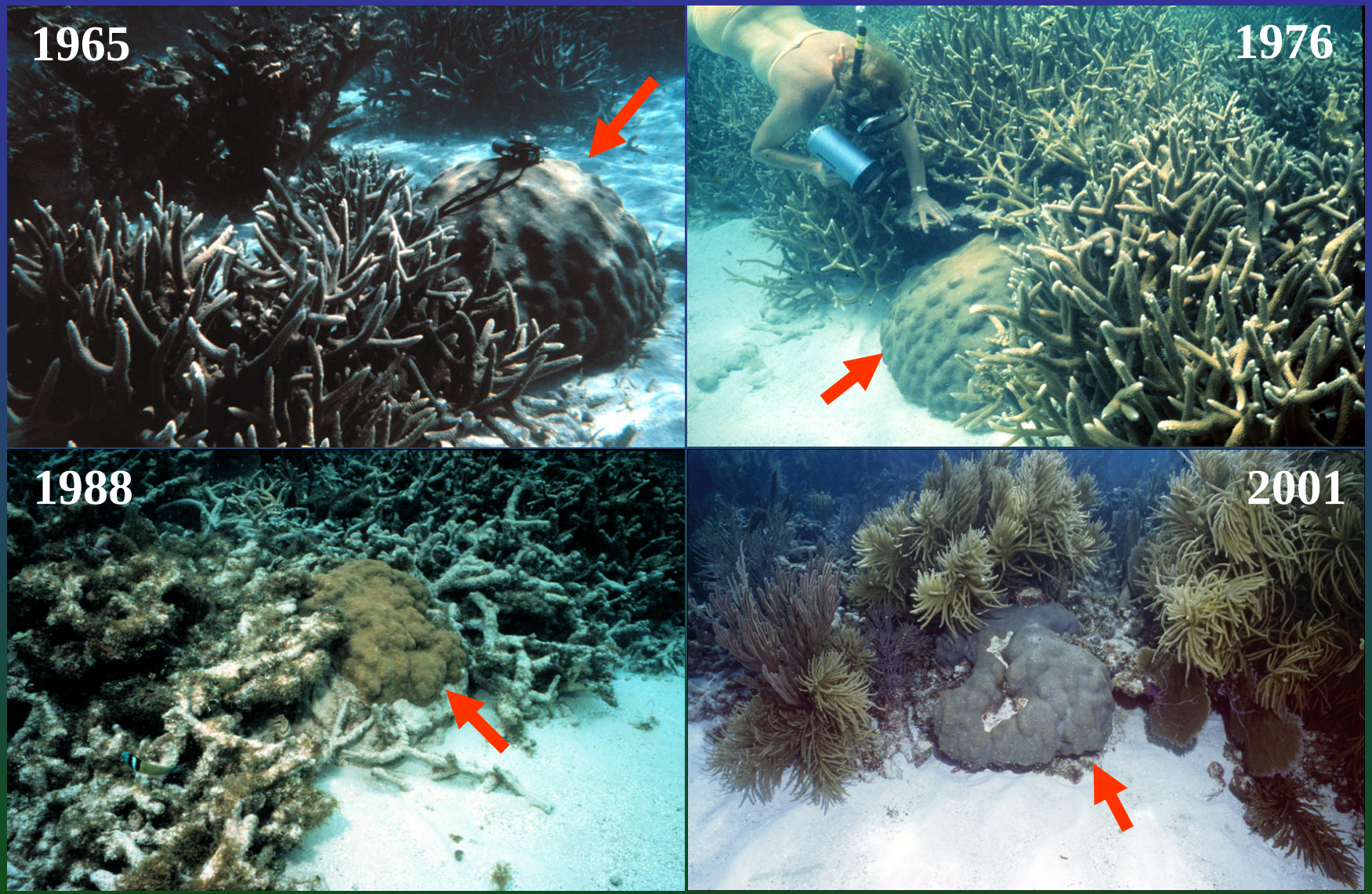


Carysfort Reef

- Several published studies stating massive decline in coral cover

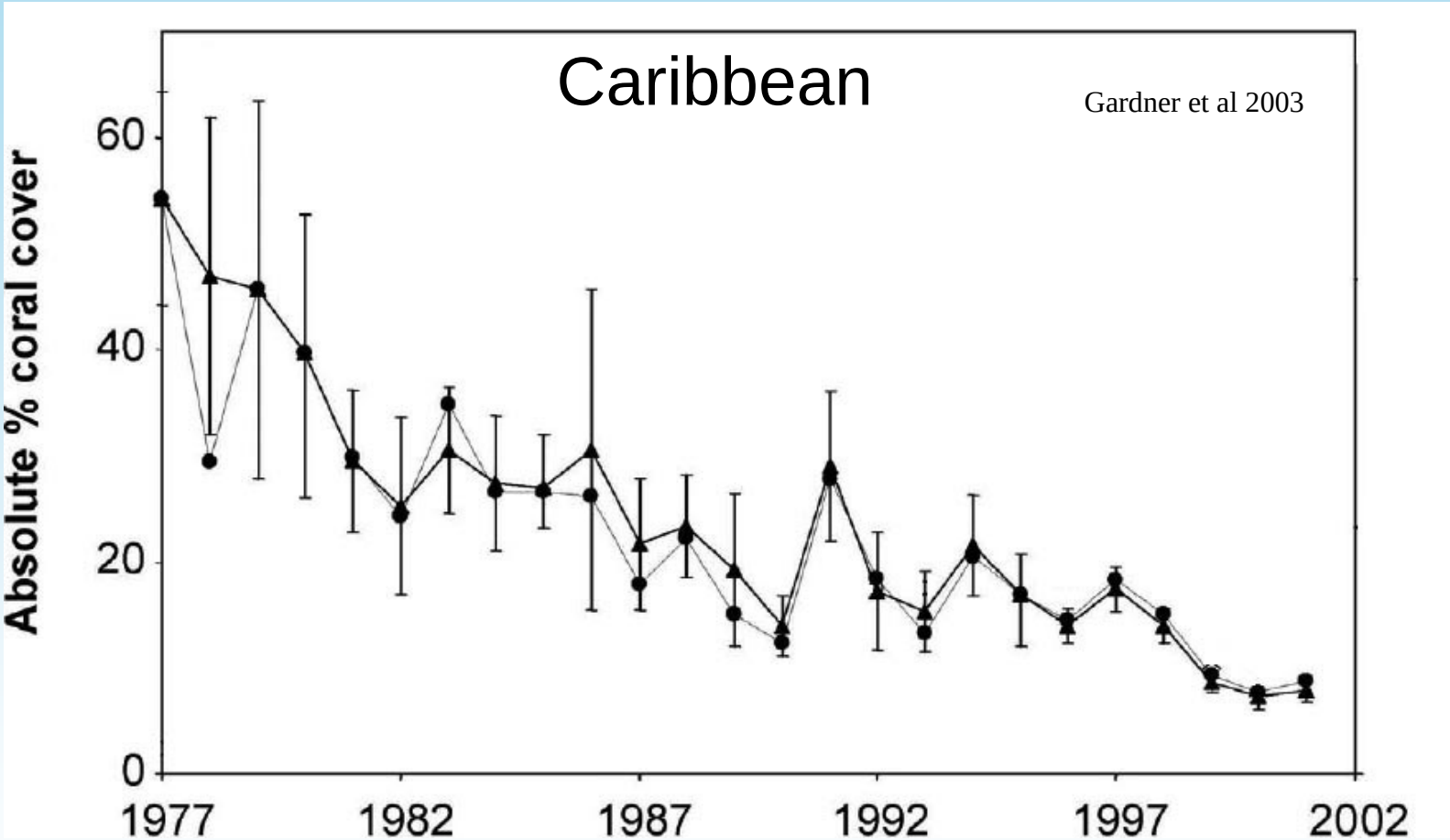


Example: 20+ year decline of Grecian Rocks, Key Largo Florida



Source: Gene Shinn, USGS Center for Coastal Studies http://coastal.er.usgs.gov/african_dust/grecianrocks1.html

Caribbean-wide decline in coral cover



Human Impacts:

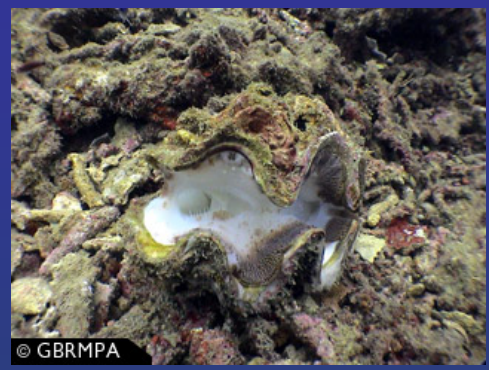
destructive fishing

coastal development

pollution

What is Coral bleaching?

- Stress response- can lead to death
- Caused by a number of factors:
  - temperature + UV light
  - salinity change
  - disease
  - pollution
- Susceptibility to bleaching differs by location/species
  - Some areas are resistant or resilient



Bleaching/thermal stress leads to disease

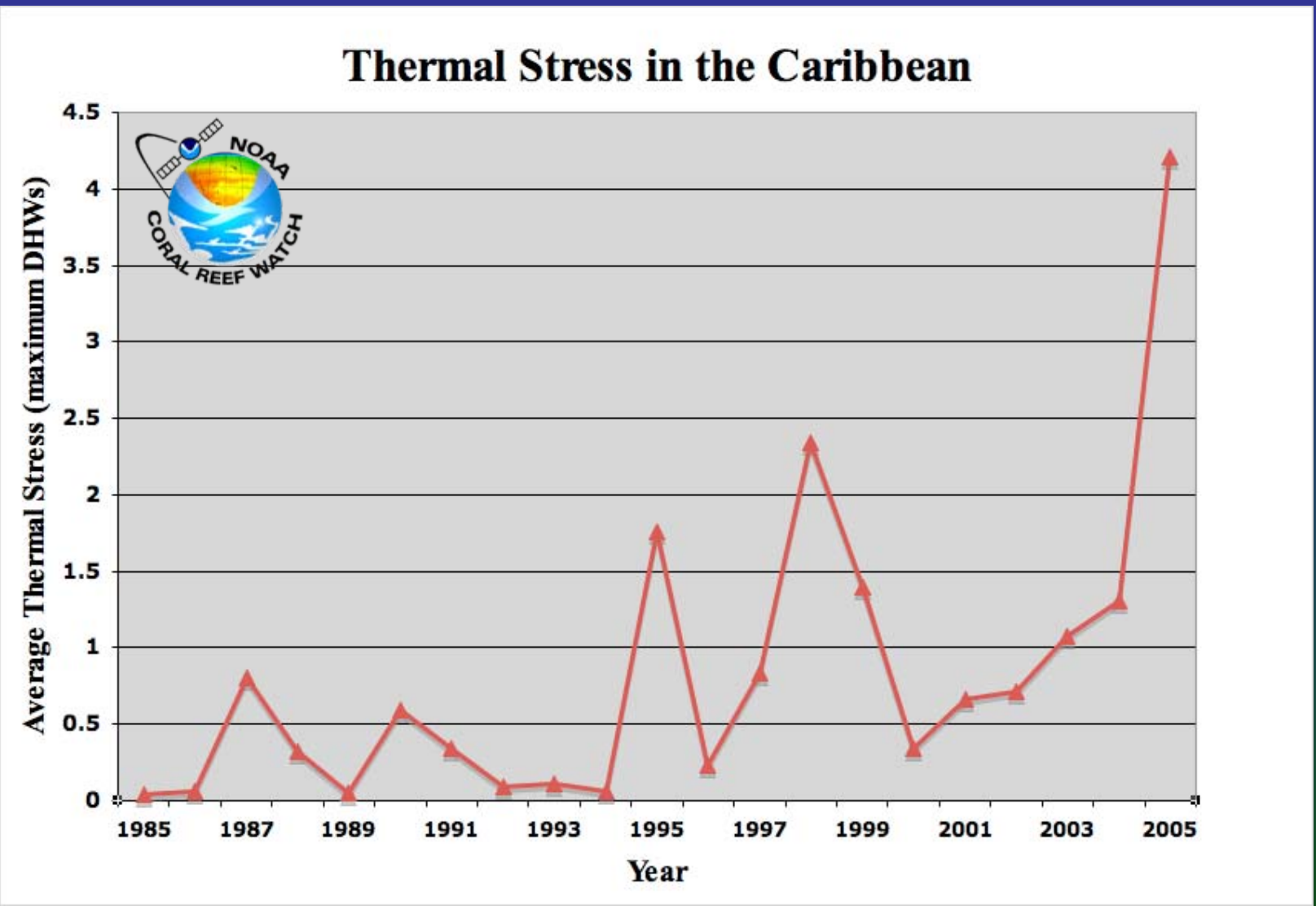
- **Many bleached colonies have become diseased**

- **Some diseases are rapid and devastating**

Inshore patch reefs
Middle Florida Keys

Marilyn E. Brandt
University of Miami

Warmest Caribbean in Over 20 Years



Maximum accumulated coral stress for each year, averaged across all Caribbean 50 km^2 satellite SST pixels

M. Eakin

How do we manage for Climate Change?

Warming Seas

Rising Seas

Disease

Changing Storm Patterns

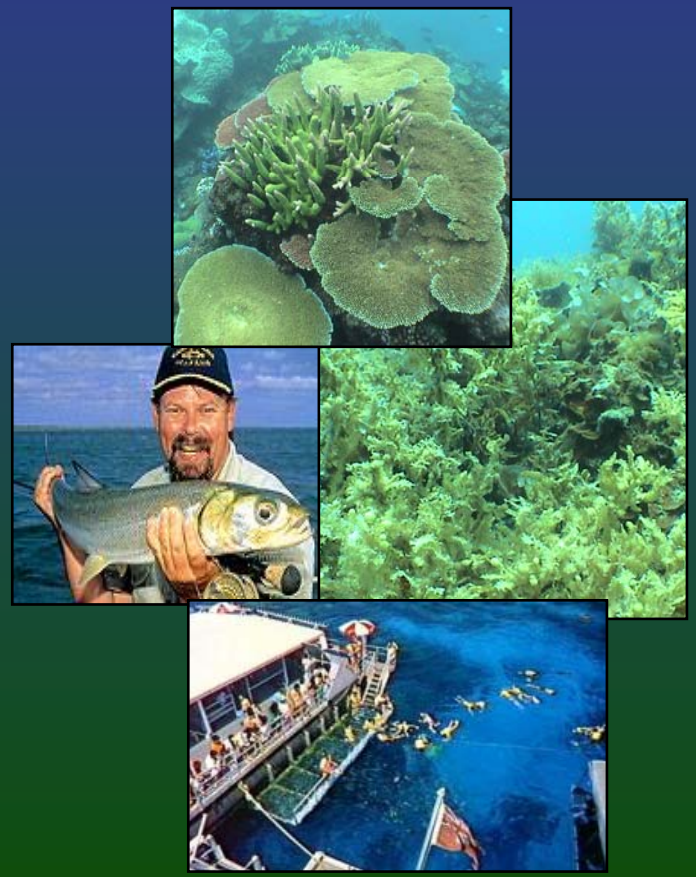
Altered Currents

Managing for resilience – a strategy to cope?

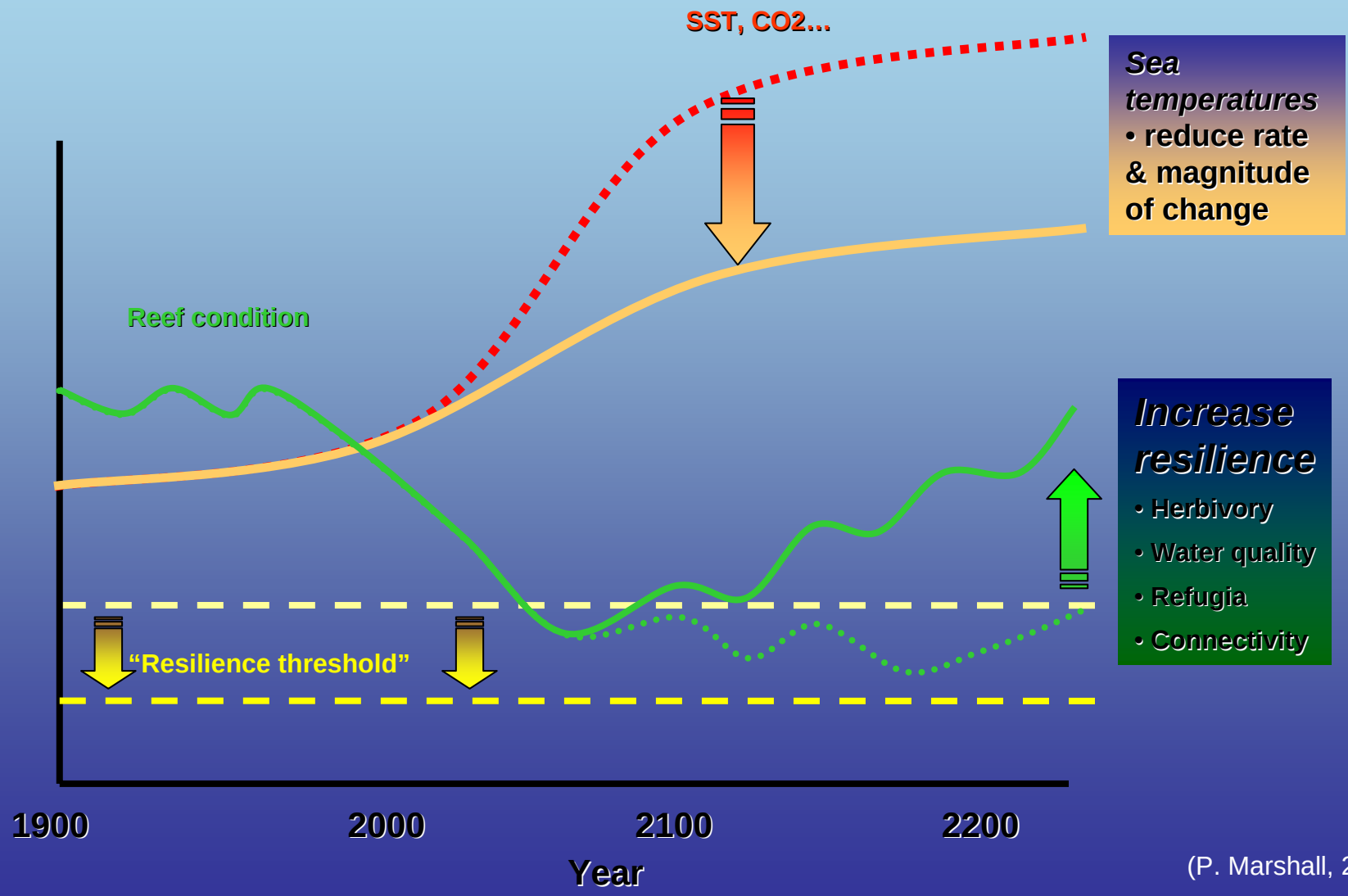
Resilience-based management

Australian Government
Great Barrier Reef Marine Park Authority

- Increase stability of desirable states
- *Decrease* stability of *un*desirable states
- Conservation *and* sustainable use
- Social-ecological linkages

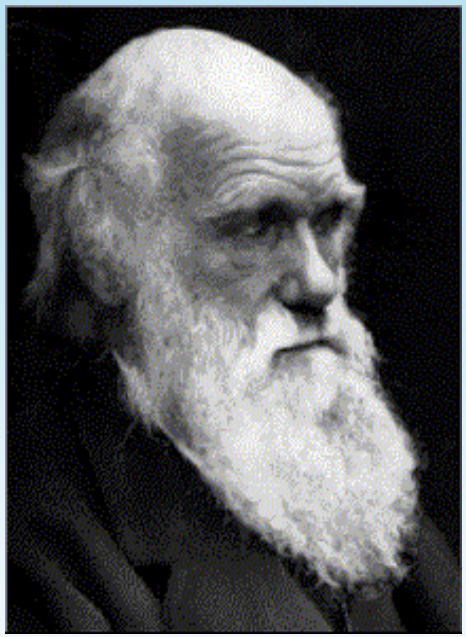


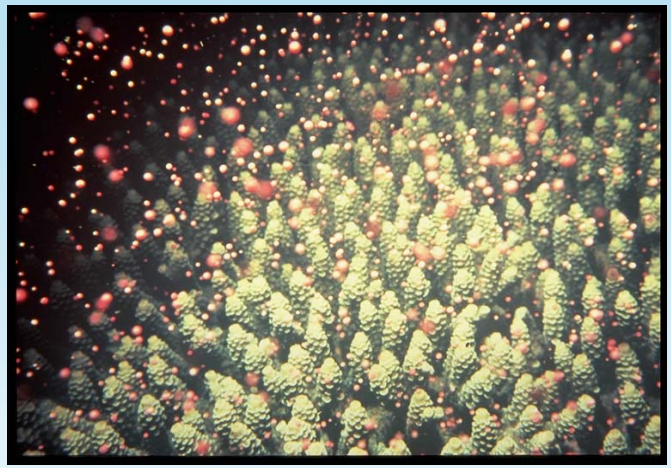
Resilience - a framework for management response to climate change



(P. Marshall, 2005)

Which corals will adapt?

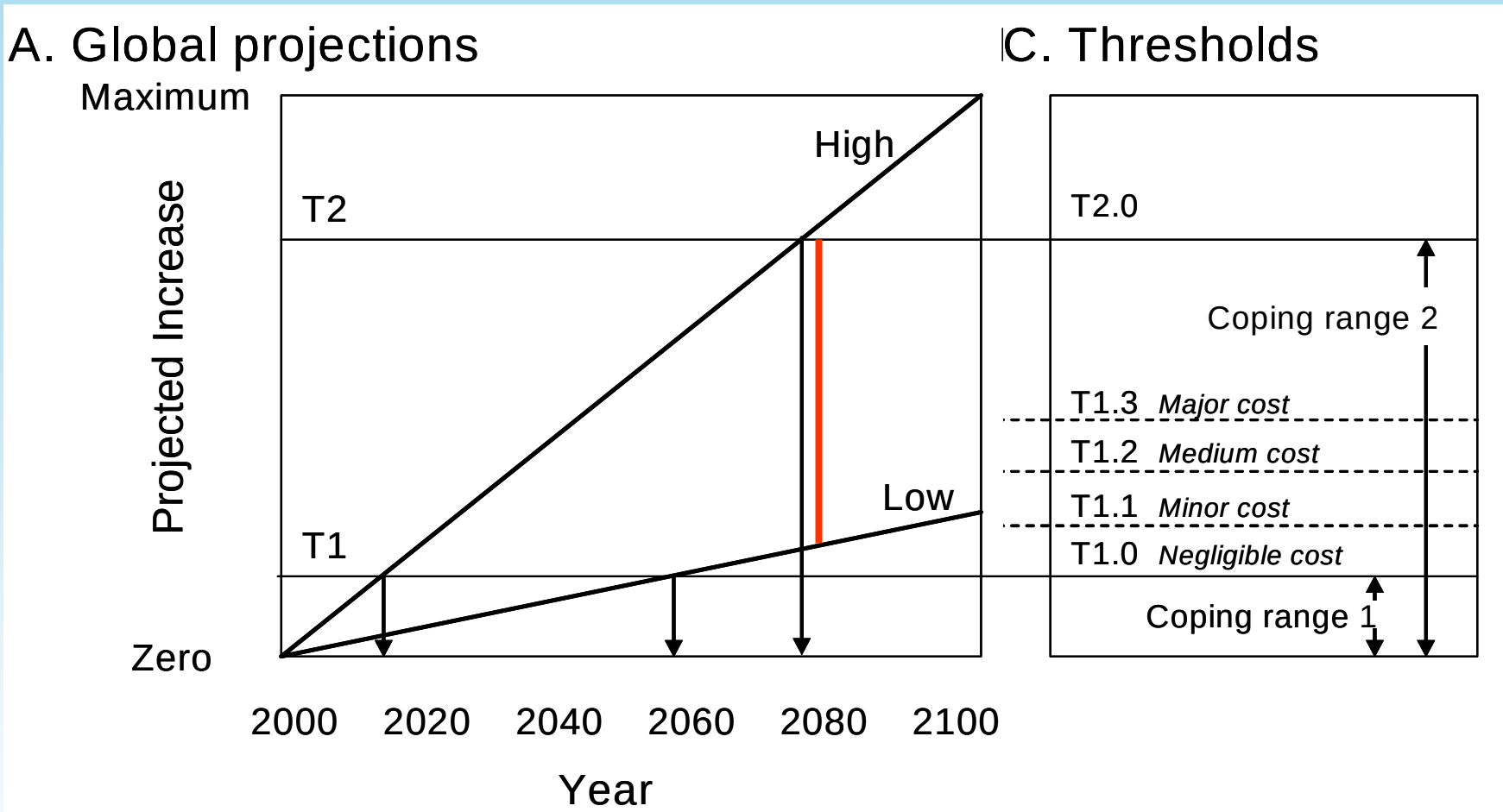




Adap

adaptation involves ***differential-reproductive rates*** on different individuals within populations.

R. Woesik



Better defining future of coral reefs within range of projections:
And the actions/cost for implementation

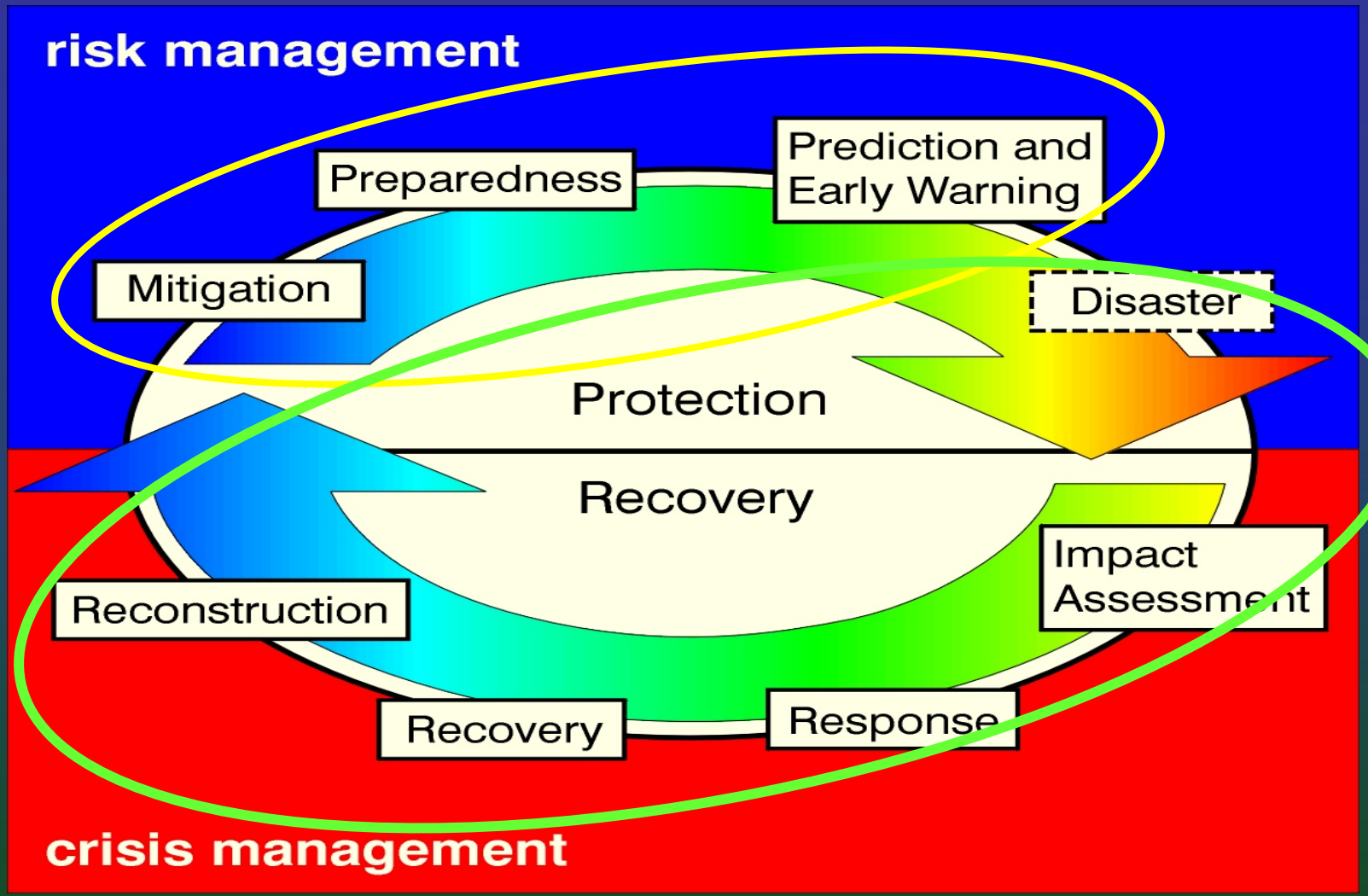
Florida Reef Resilience Program

Focal areas

1) Disturbance response plan/science
2) Human dimensions
3) Piloting coping strategies for managers
4) Communication/education/outreach
5) Management recommendations

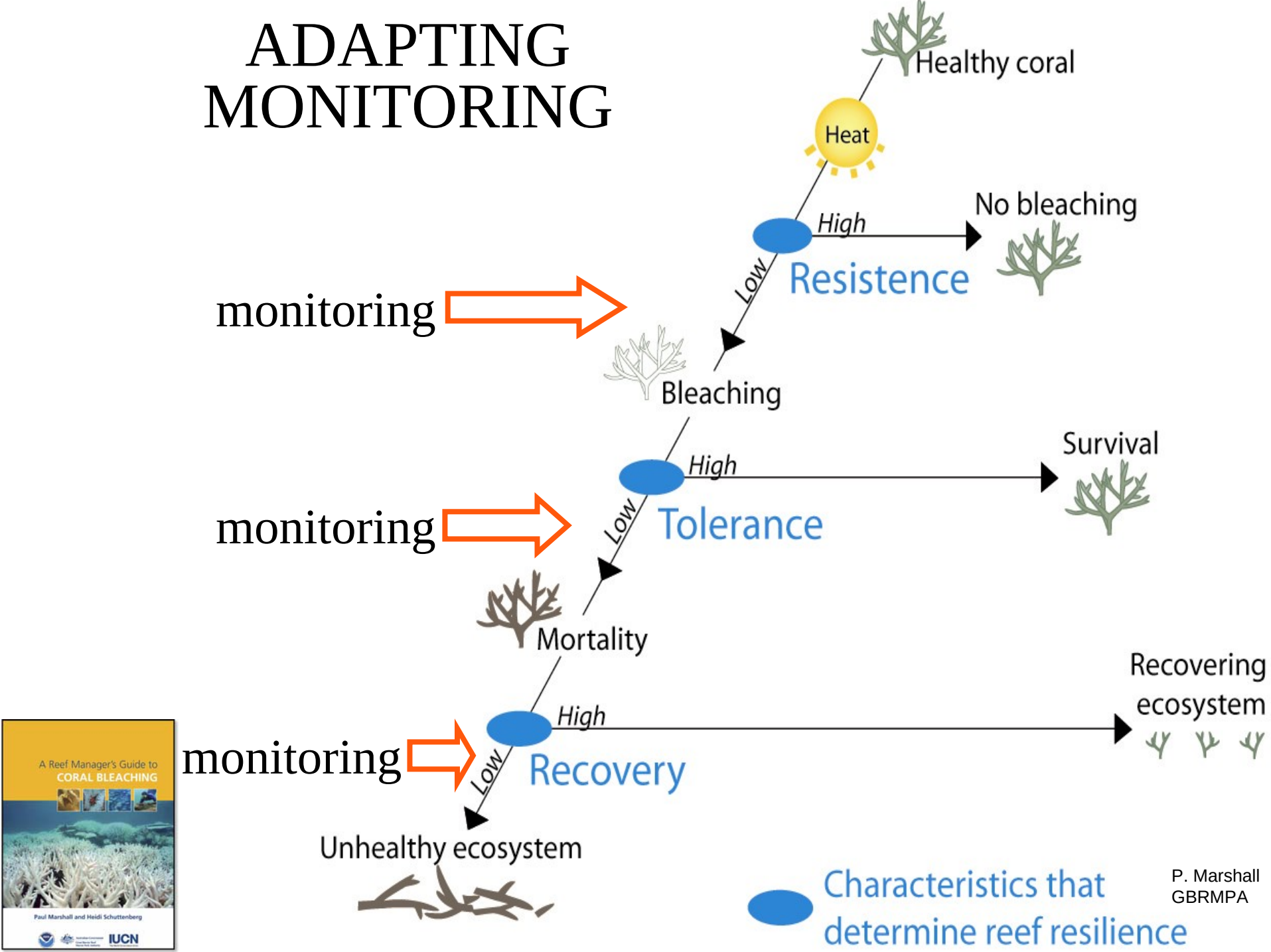
Grim outlook for future coral reefs – bleaching/acidification

FRRP- response plan for coral bleaching



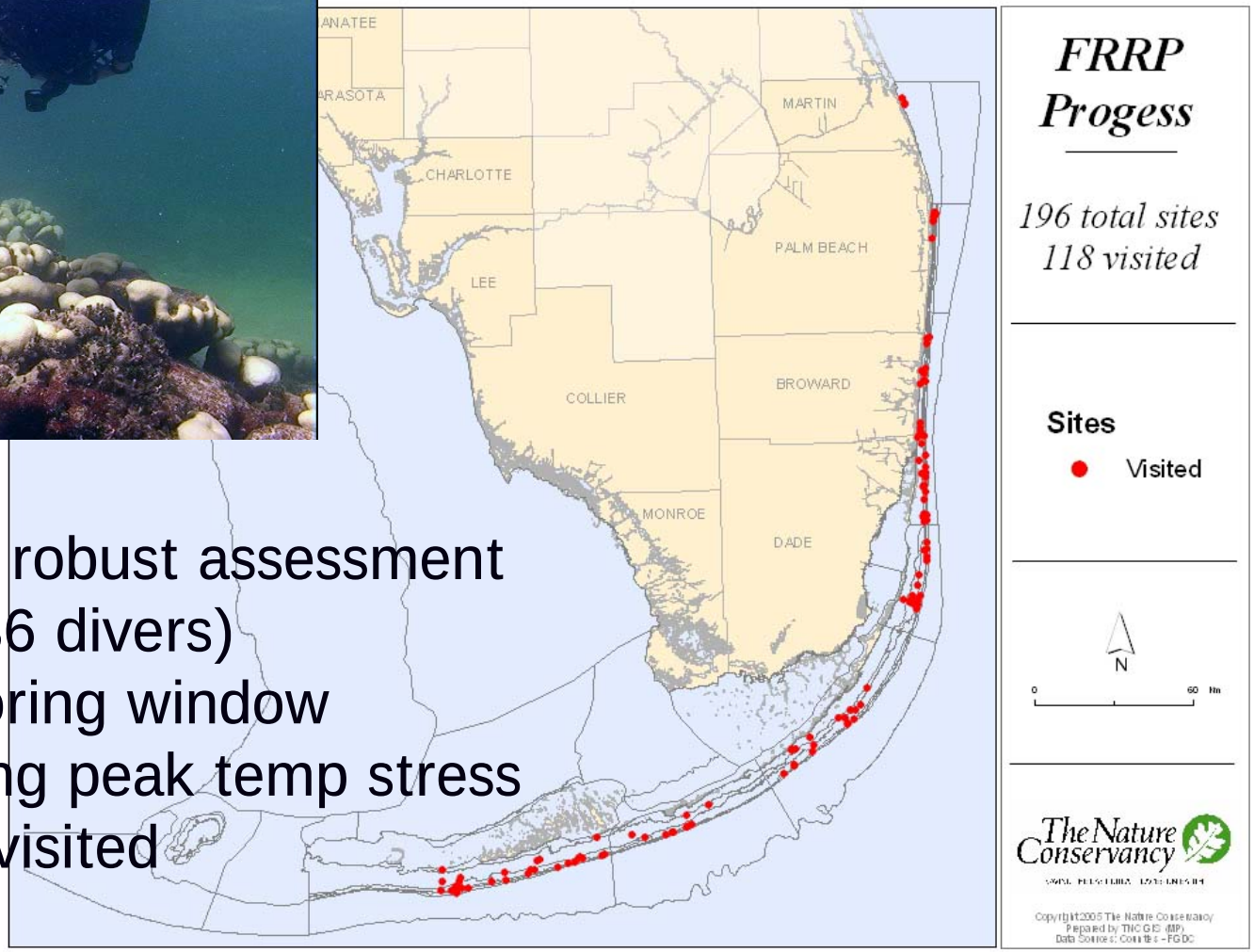
Events get policy makers attention

ADAPTING MONITORING



P. Marshall
GBRMPA

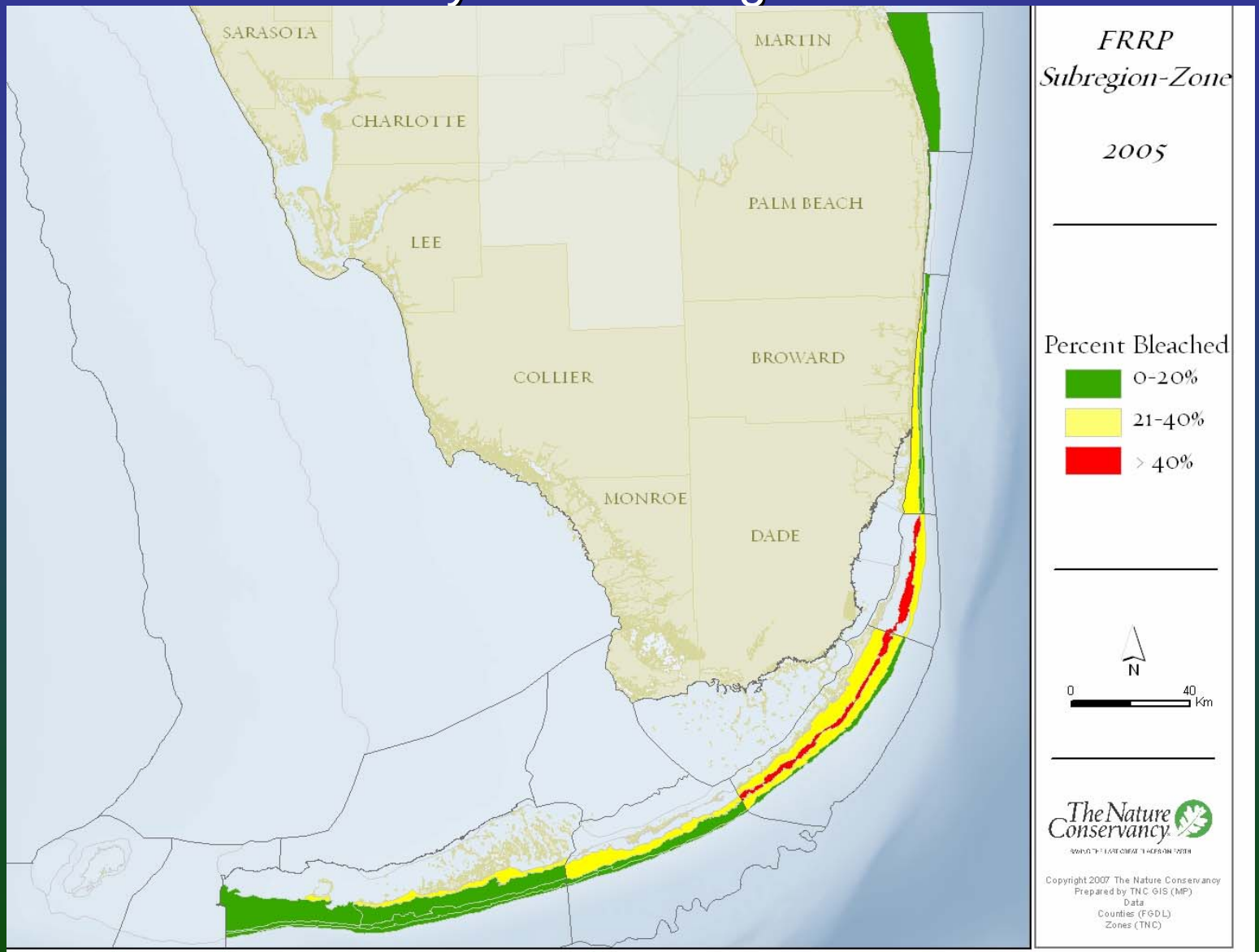
System-wide disturbance monitoring climate change impacts



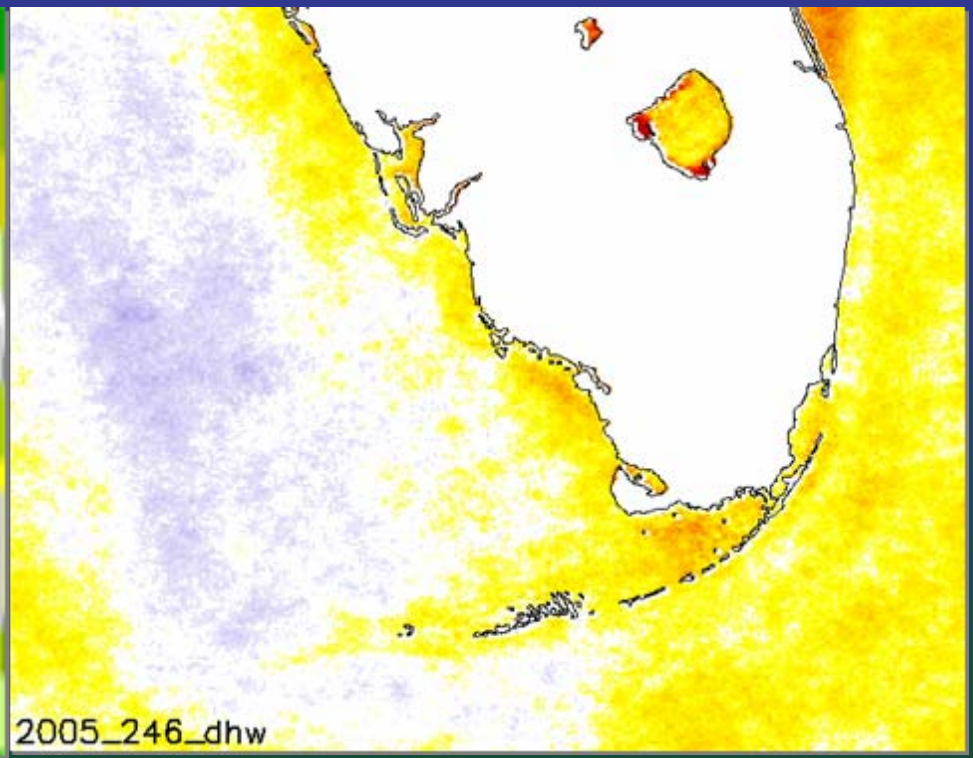
Science-based robust assessment
12 agencies (36 divers)
6 week monitoring window
Deployed during peak temp stress
100-150 sites visited

Florida Reef Resilience Program

Vulnerability to bleaching assessments



Improving resolution/prediction of events



NOAA coral watch

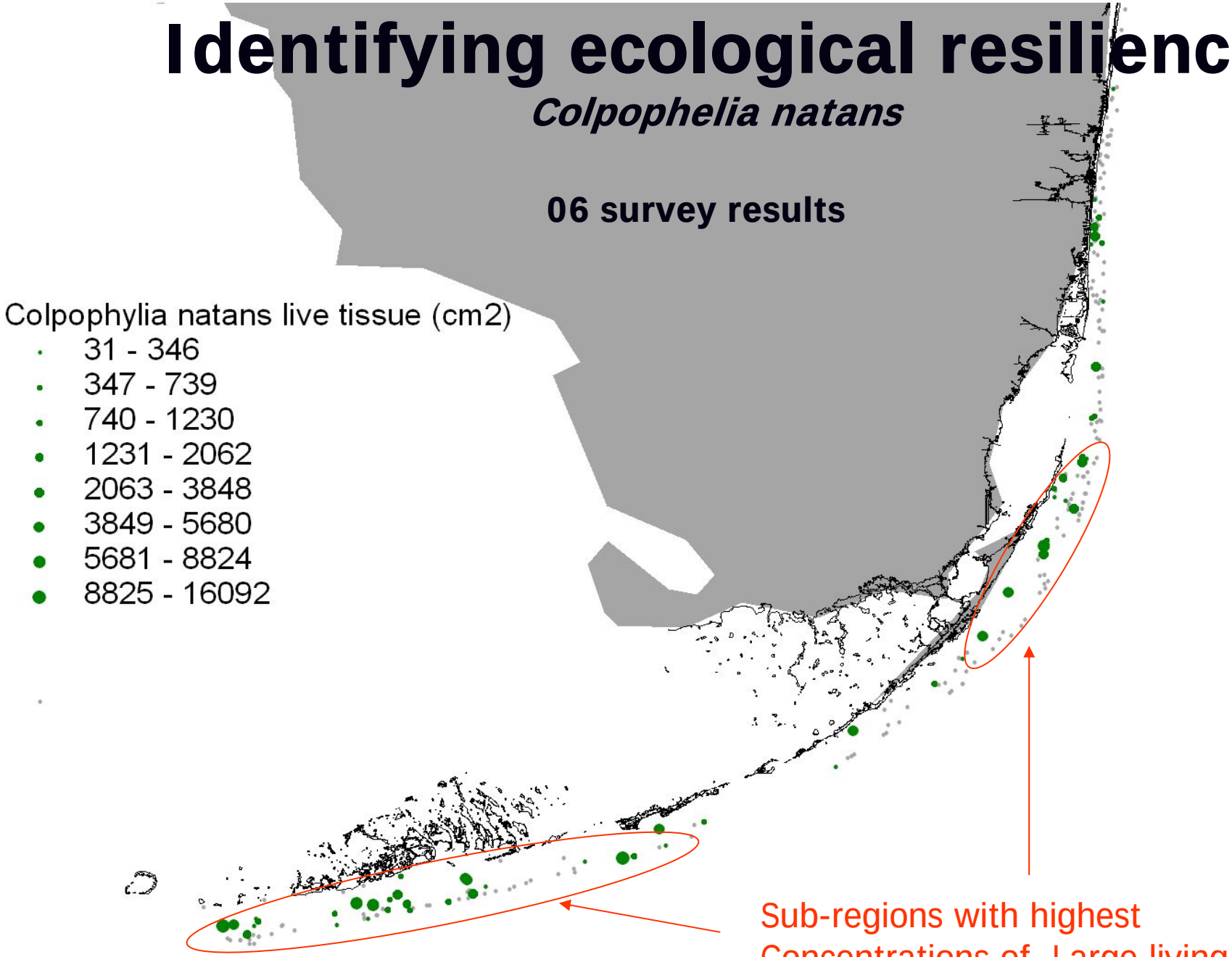
USF (poster)

Week of Sept. 6, 2005

Identifying ecological resilience

Colpophelia natans

06 survey results



Sub-regions with highest Concentrations of Large living colonies of CN

Identifying factors that erode or build resilience

FRRP - Human Dimensions

By reef type

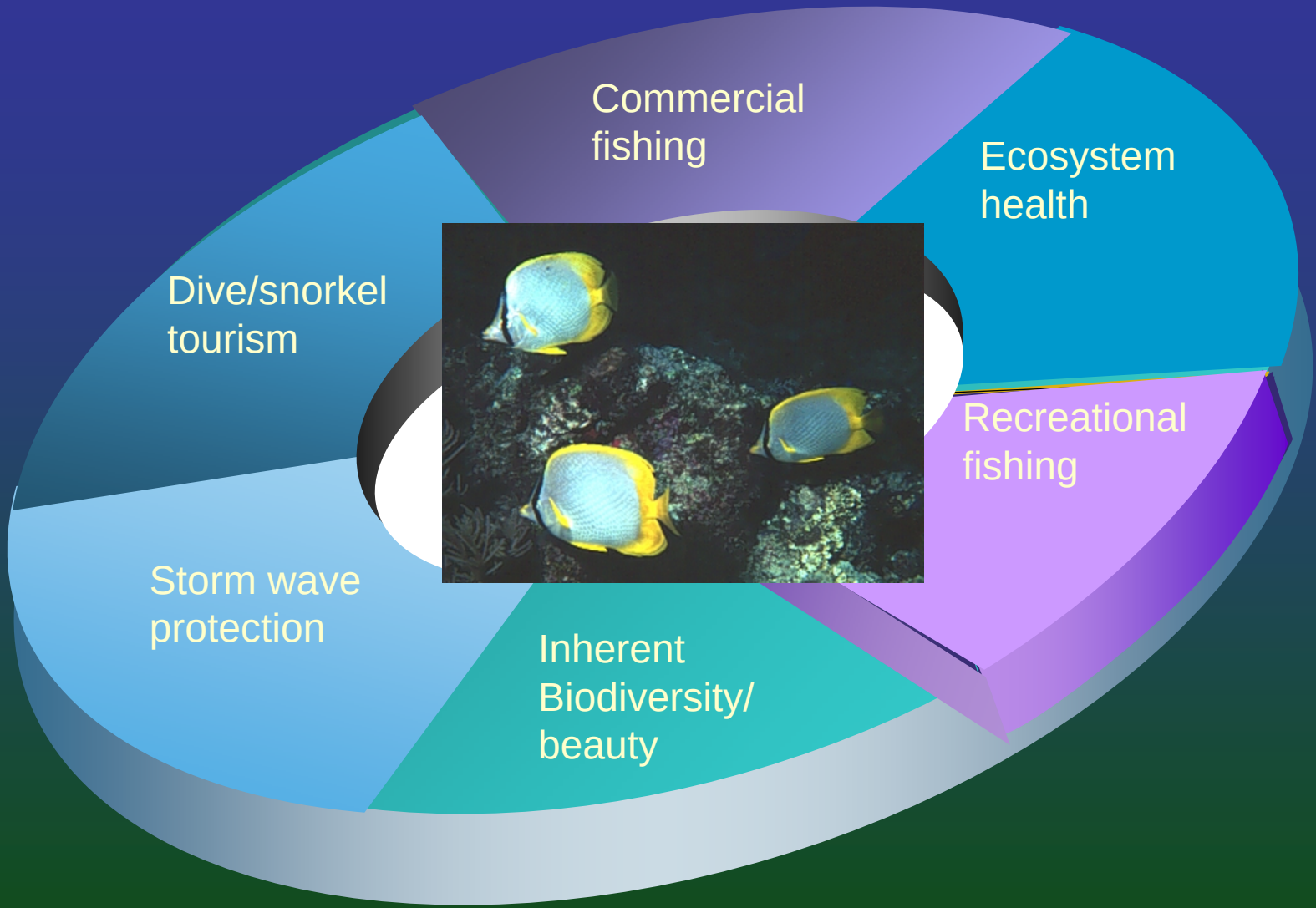
User groups (who will be affected)

Ecosystem services (what will be disrupted)

Conflicts?

Adaptation strategies for each

Multiple competing values/objectives



Adaptation strategies for each

FRRP- Piloting new coping strategies

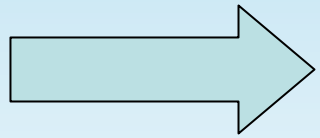
Small scale adaptation strategies

Are some genotypes more resistant than others?

In-situ nursery cultivation

Small scale adaptation strategies

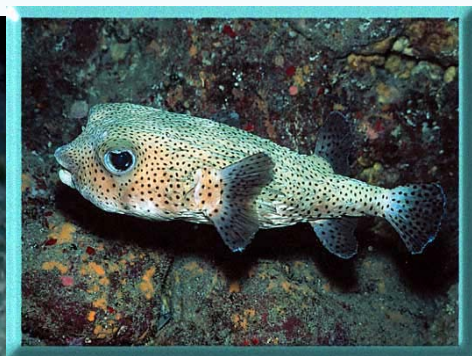
Relocation of *Diadema to increase herbivory*



Recruitment zones (rubble)

Patch reefs/reef crests

Diadema preditors (can suppress recovery)

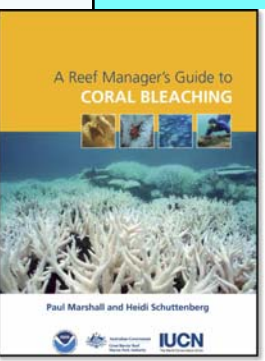


Small scale adaptation strategies

Local managers can:

- **Reduce bleaching**
  - **Reduce light stress**
  - **Cool reefs, increase mixing**

Quicksilver Connections



Small yet economically important effect

P. Marshall GBRMPA

FRRP- User Group Outreach Campaign

- Media outreach
- User education
- Focal user groups

Management recommendations

- 3-year rollout of FRRP recommendations- Conference- 2008

- Variety of potential actions to increase resilience (multiple agencies/policies)

(e.g., zoning, temporary closures, mooring buoys, fishing (rec/commercial), tourism, diving, water quality, restoration, mitigation)

- Next phase-

other components of the S. Florida ecosystem

Policy cycle linkages/opportunities

Challenges

- Integrated coral reef management….National vs. States vs. county priorities
- Planning…….“action” only after crisis or focusing event
- Lessons available on particular events but not to gradual changes (or abrupt regime shifts)
- Cumulative reduction of smaller scale risks…… may increase vulnerability to large events
- Develop procedural/participatory mechanisms: Coalitions of local stakeholders need to be inclusive and transparent……. but this can lead to power struggles/robustness under stress