The Florida Reef Resilience Program
A Public/Private Partnership

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The Nature Conservancy

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

Bleaching- So What?

What can managers do to deal with climate change?

1) Disturbance response plan
2) Scientific framework
3) Testing factors
    - Example 1- extrinsic temperature/light
    - Example 2- intrinsic genotypic variation
4) Human dimensions
5) Improve effective Management

FRRP Questions

Under a global climate change scenario, are there reef areas/coral populations that are destined to become the '*winners*'[1] and others destined to become the '*losers*'?

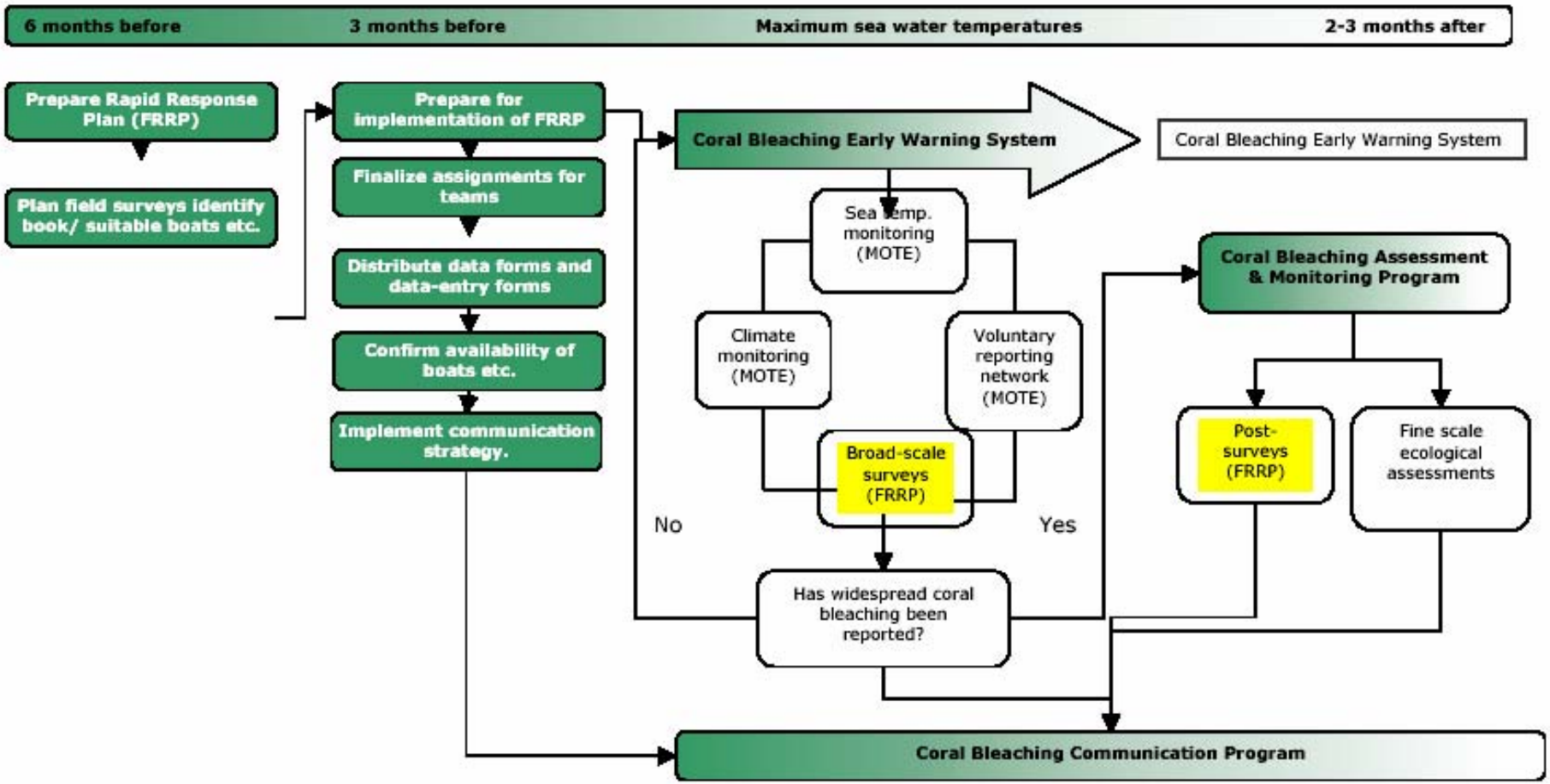
If so, what are some of the driving factors influencing this pattern?

If so, how will reef ecosystem services (fishing, diving, etc..) be affected?

Are there management strategies that can confer/enhance resistance/tolerance/recovery to S. Florida reefs?

1. Loya Y, Sakai K, Yamazato K, Nakano Y, Sambali H, Van Woesik R (2001) ***Ecology Letters*** **4: 122-131**

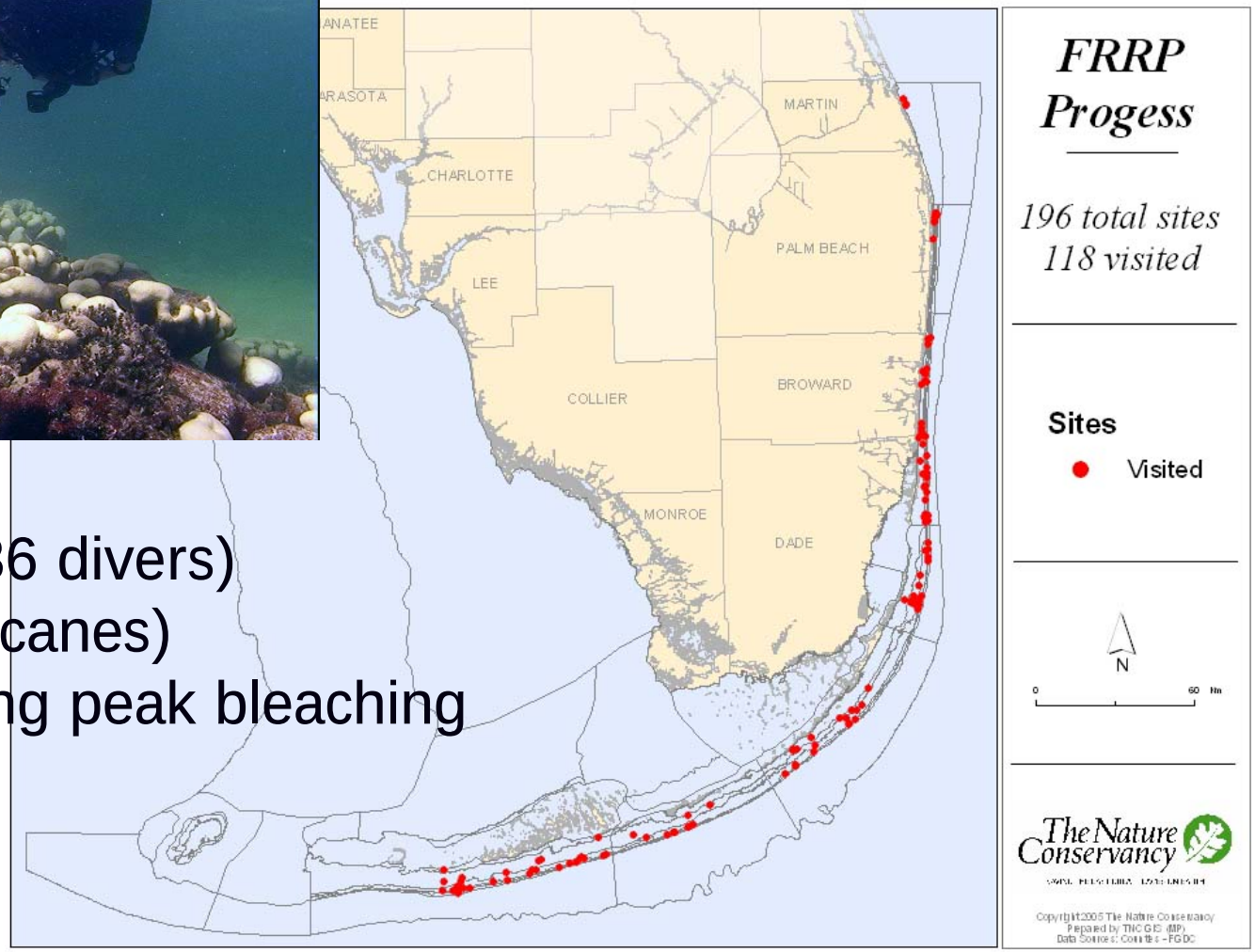
1)Disturbance Plan
FRRP Response to Bleaching Plan



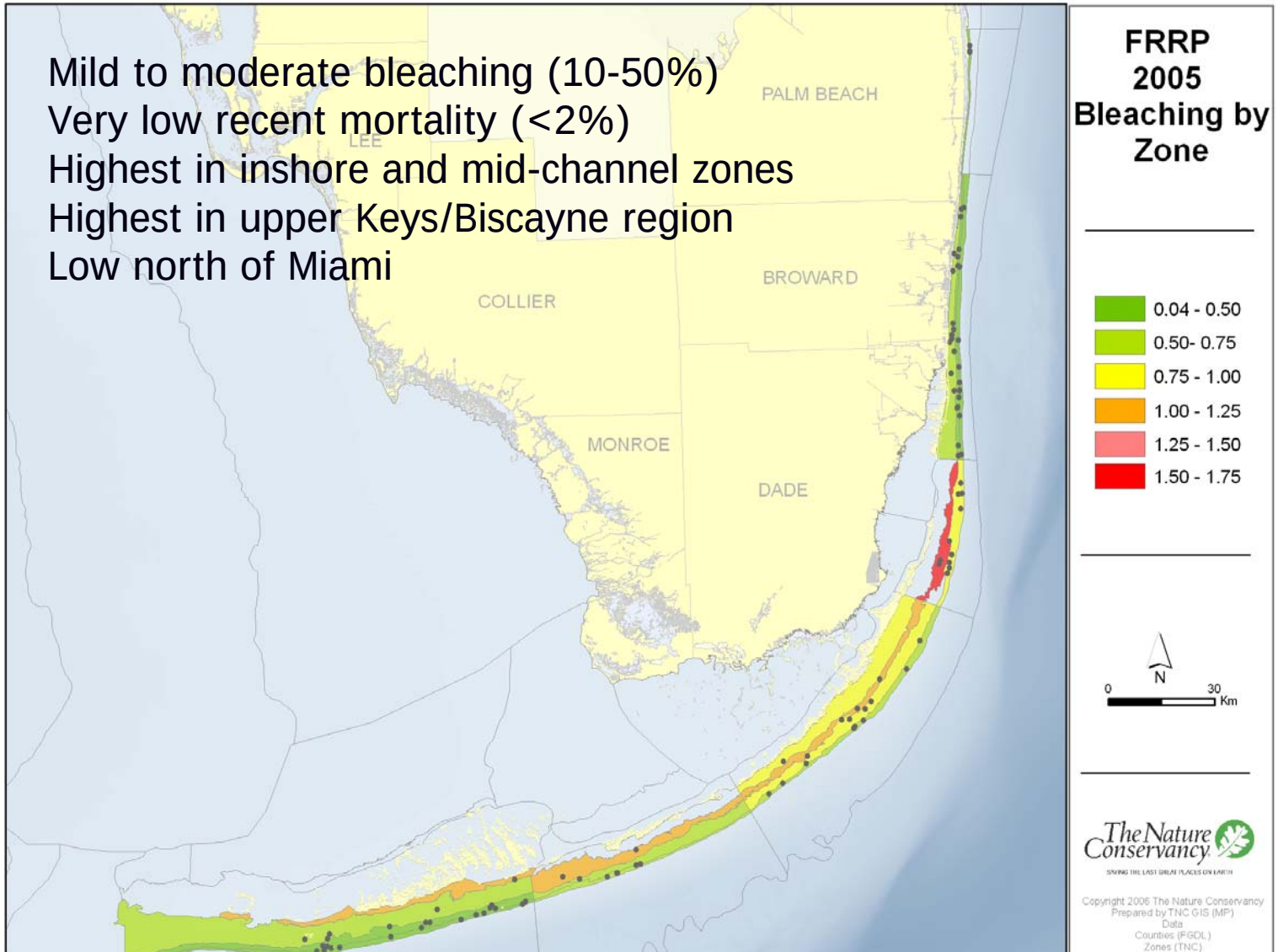
Bleaching response time line.

2005 pilot implementation

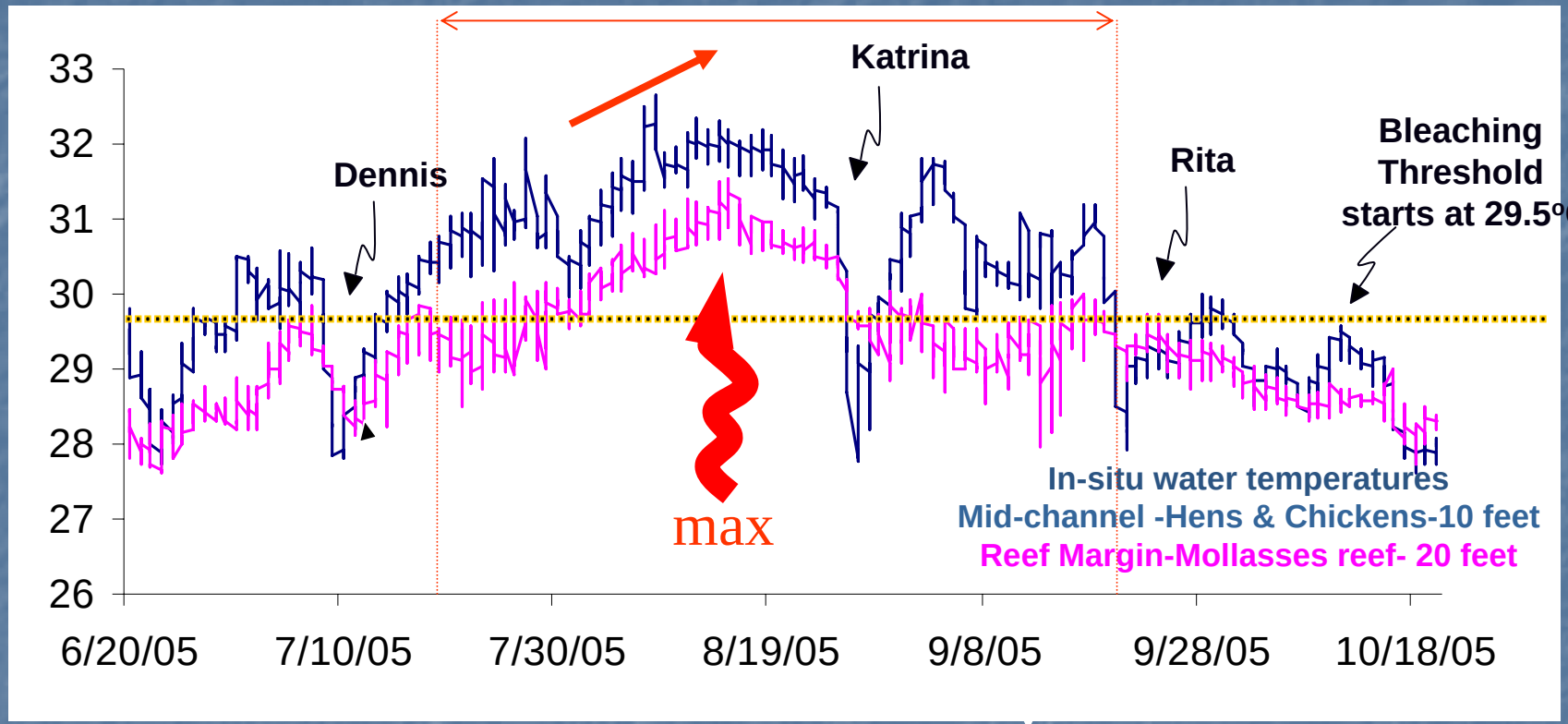
12 agencies (36 divers)
6 weeks (hurricanes)
Deployed during peak bleaching
97 sites



2005 bleaching extent by zone



2005 Temperature stress



In-situ temp data from
Harold Hudson
FKNMS

2006 post bleaching assessment

4 teams (3 FRRP subregions)
Deployed 5-6 months after
50 sites

Good recovery
Low to mild bleaching (~10%)
Mostly low recent mortality (~<2%)
(inshore *M. annularis*)
Low disease (<5%)

2) Scientific Framework

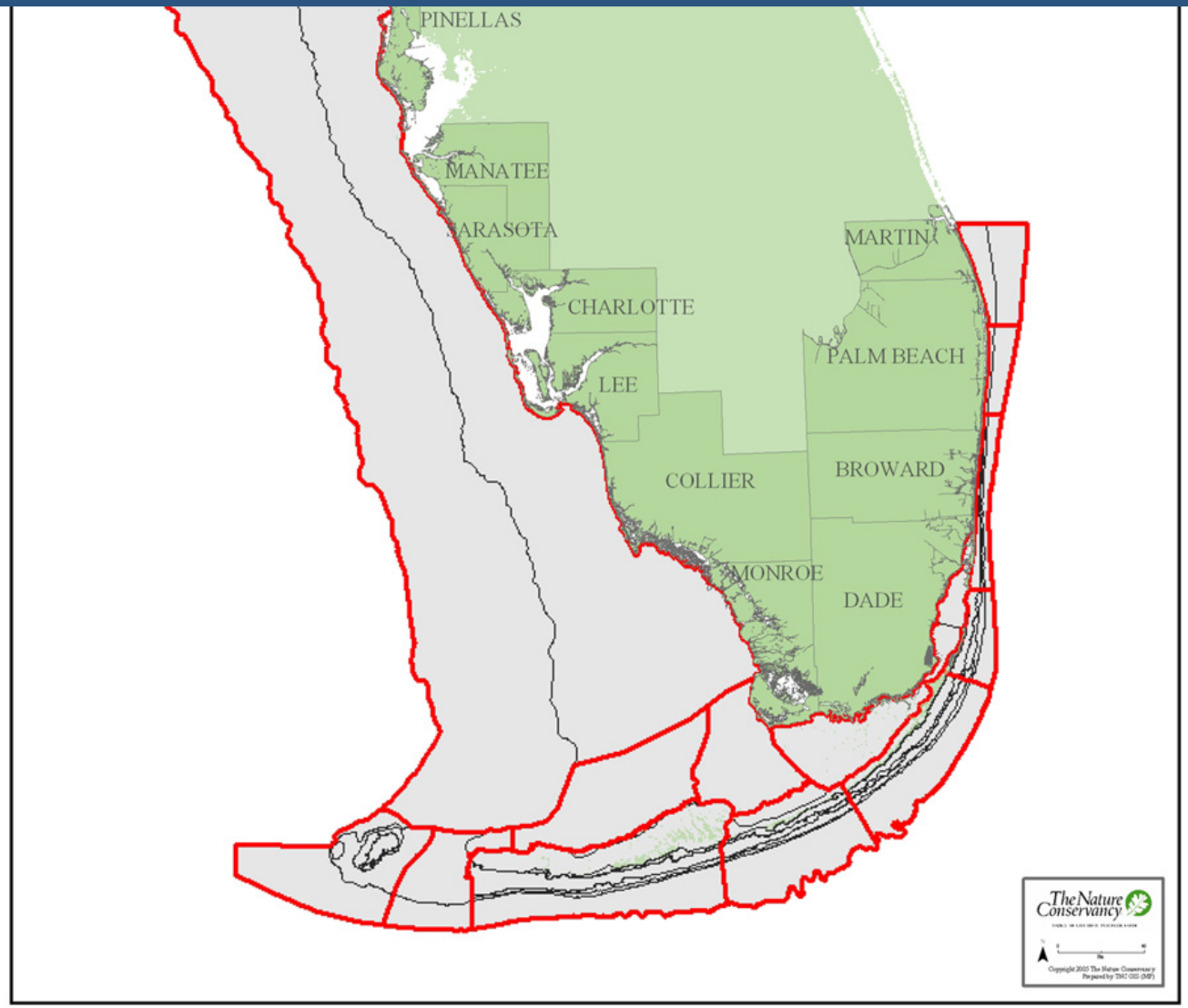
A biophysical spatial framework

Review Existing Maps; data Biophysical Info

2 workshops Expert input Delphic Framework

74 reef "strata" (biozones) each with different factors

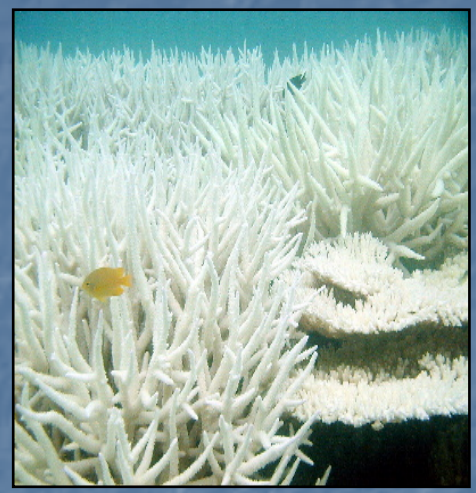
Adaptive- currently revising based on 2005 results



3) Testing factors that influence resistance/tolerance

External factors

- **Cooling**
- **Flushing**
- **Shading**



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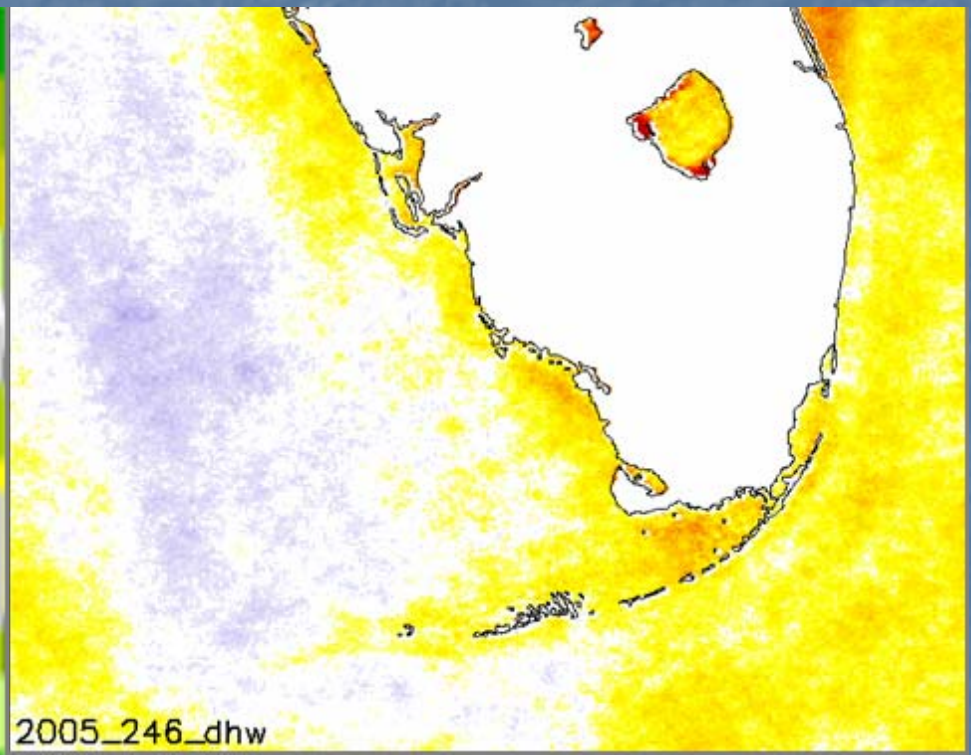
Internal factors

- **Abundance of bleaching tolerant species**
- **History of bleaching (adaptation)**
- **Acclimatization / genotypes**

Example 1- temperature

NOAA/USF SST Comparison

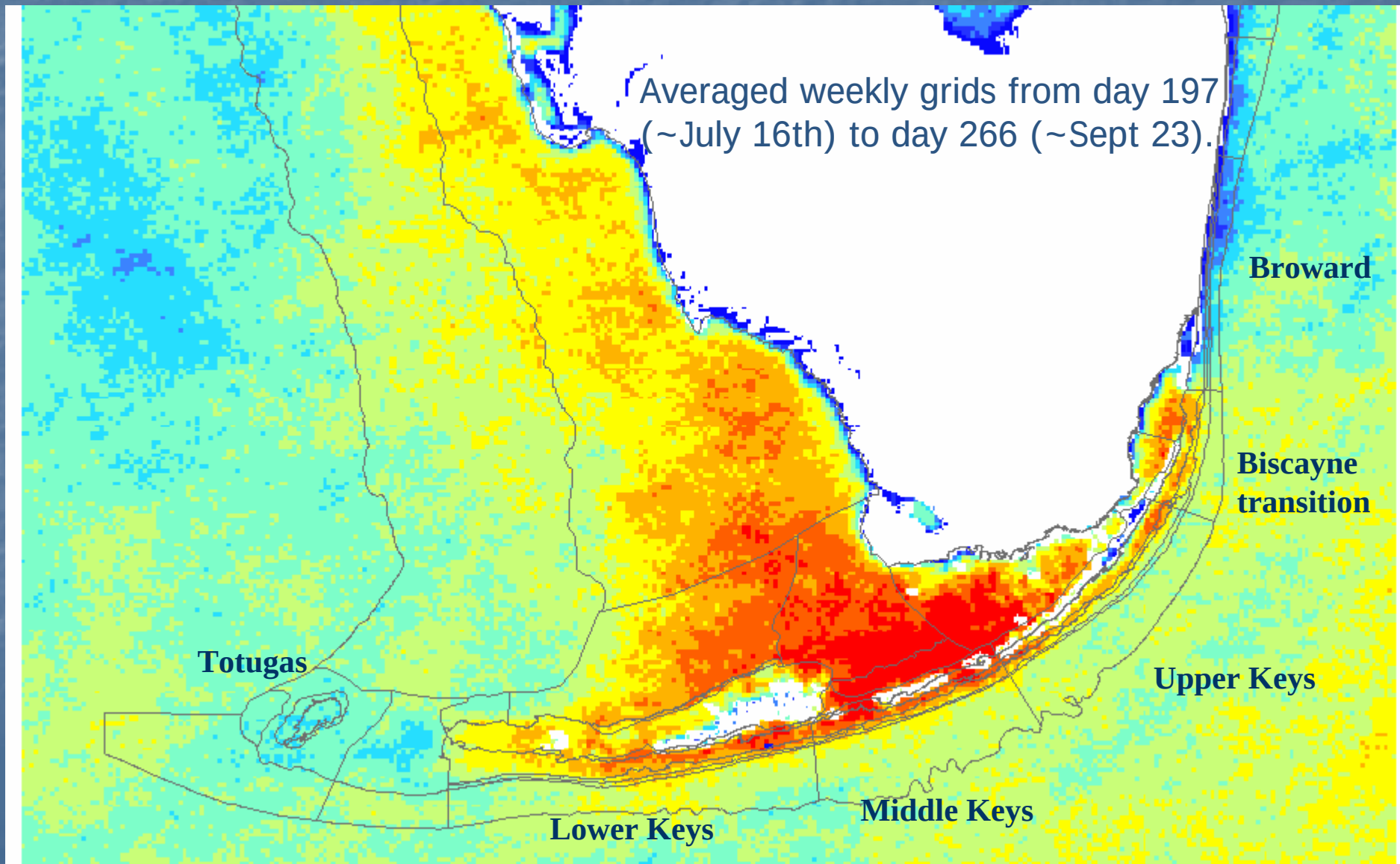


NOAA

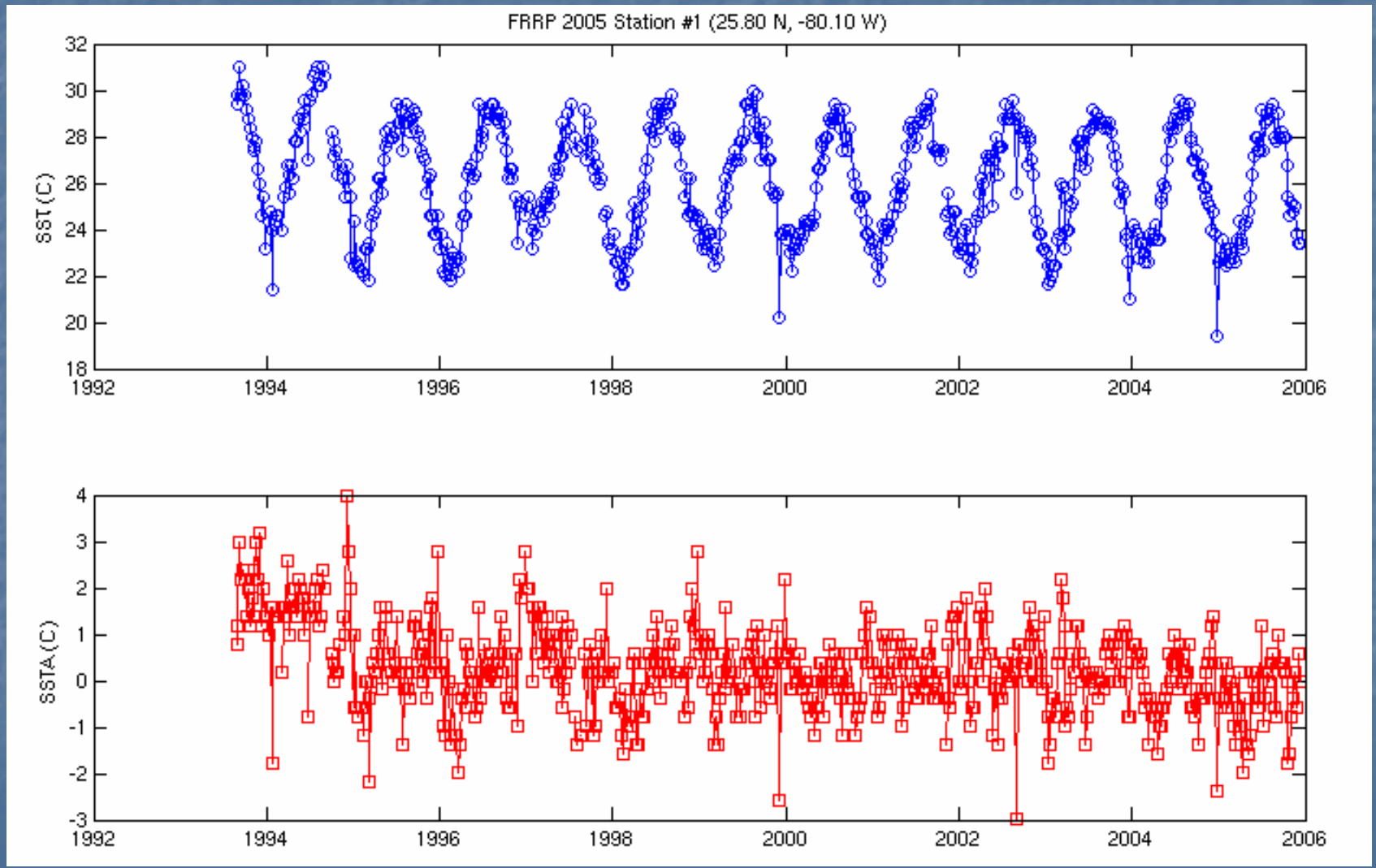
FRRP

Week of Sept. 6, 2005

2005 69-day composite SST map



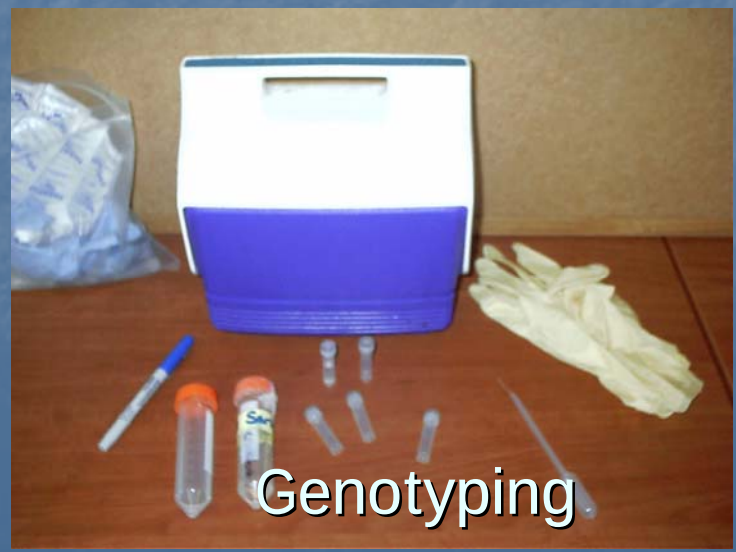
1.5 km SST 15 year Time Series

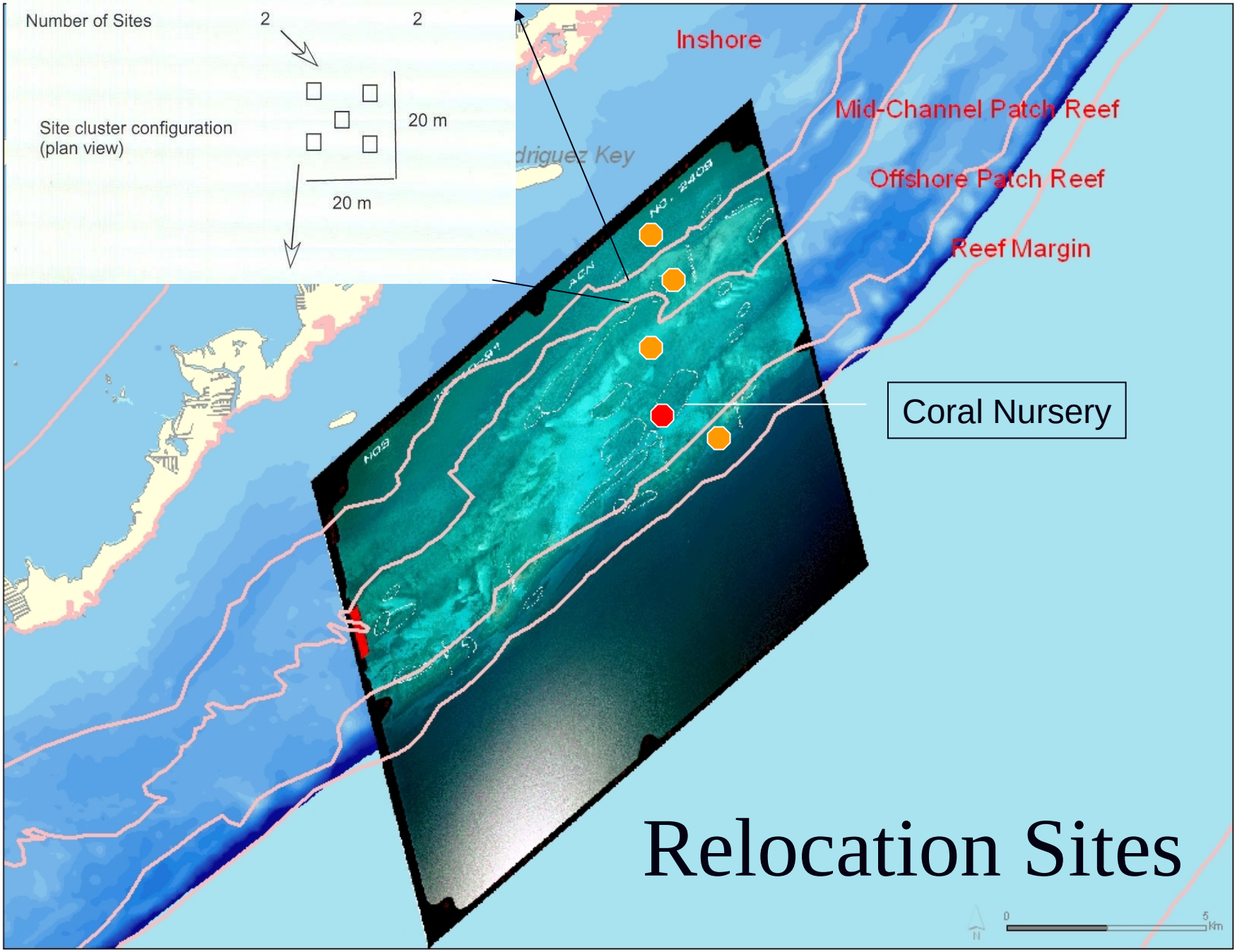


Example 2:Testing intrinsic factors

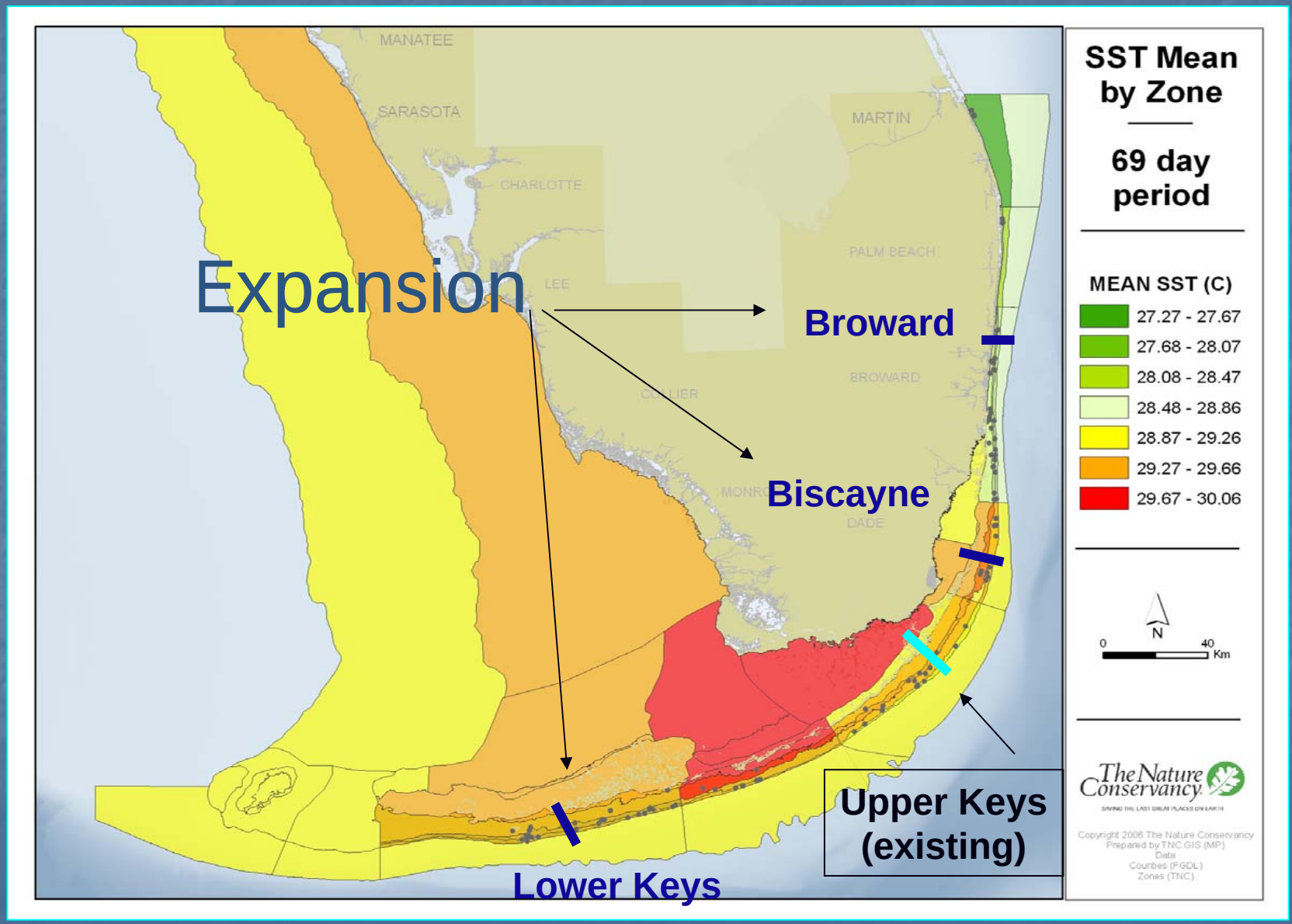
Genotypic response to climate change

In-situ nursery cultivation




Number of Sites
2
2
Site cluster configuration
(plan view)
20 m
20 m
Inshore
Mid-Channel Patch Reef
Offshore Patch Reef
Reef Margin
Coral Nursery
Relocation Sites

Spanning gradients of change



4) Human Dimensions- climate change

User groups (who will be affected)

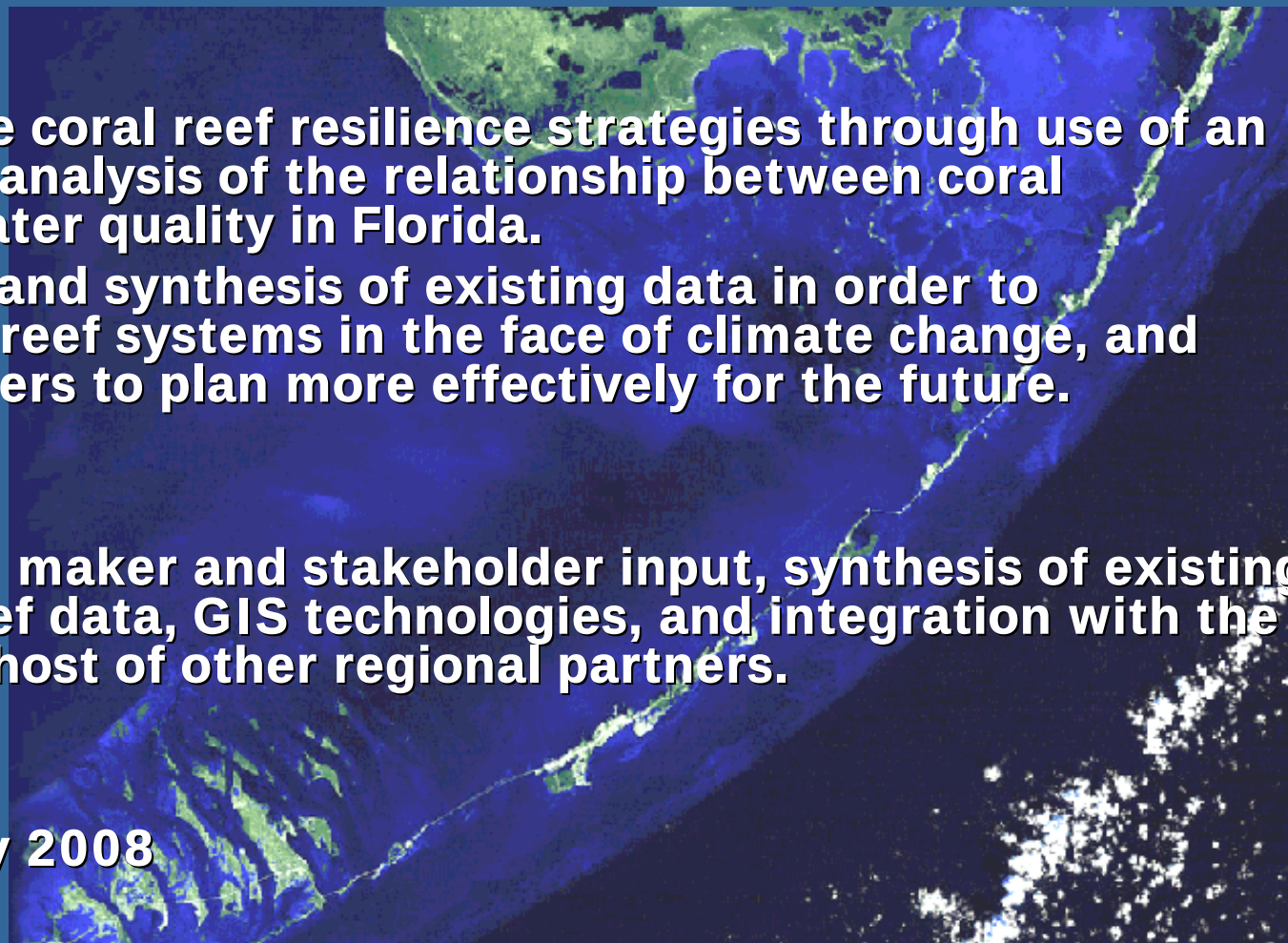
Ecosystem services (what will be disrupted)

Conflicts?

Management actions

5) Climate Change LEADS: Linking Environmental Analysis to Decision Support

Funded by NOAA Climate Program, Sectoral Applications Research Program



Goals:

- **Advance effective coral reef resilience strategies through use of an innovative meta-analysis of the relationship between coral bleaching and water quality in Florida.**
- **Facilitate access and synthesis of existing data in order to strengthen coral reef systems in the face of climate change, and enable stakeholders to plan more effectively for the future.**

How?

Through decision maker and stakeholder input, synthesis of existing water quality/reef data, GIS technologies, and integration with the TNC FRRP and a host of other regional partners.

When?

June 2006 – May 2008

Thanks to all partners