Reduce Impacts of Climate Change

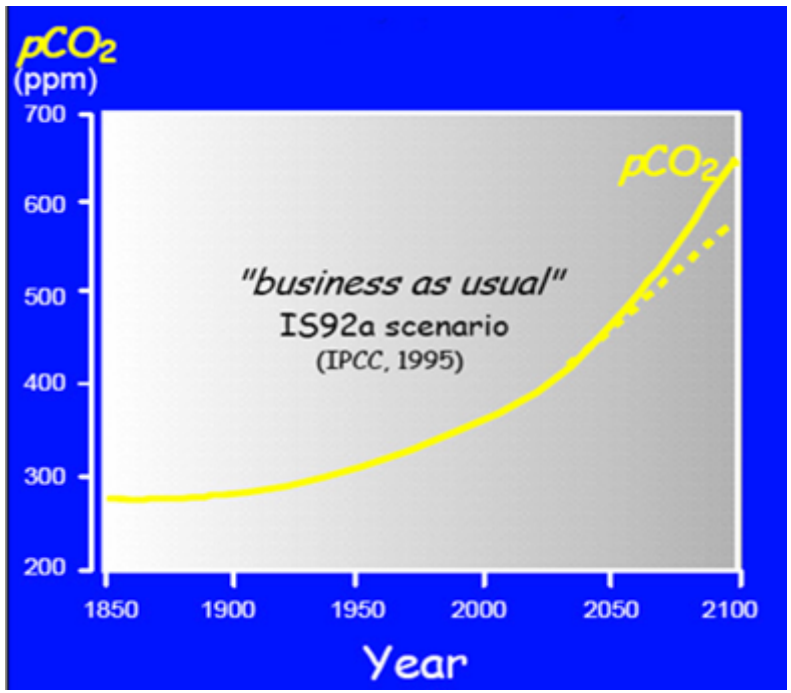
Program Review

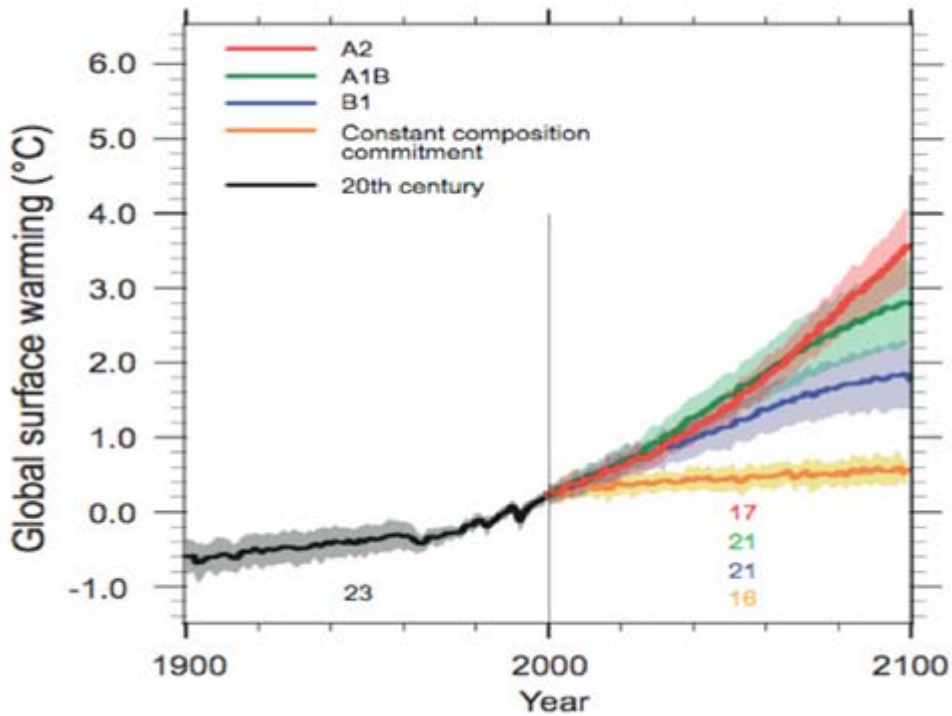
NOAA Coral Reef Conservation Program

September 25th, 2007

Overview

- Rationale:
  - Global CO_2 and temperature levels have increased, and will continue to increase in the future (IPCC 2007)





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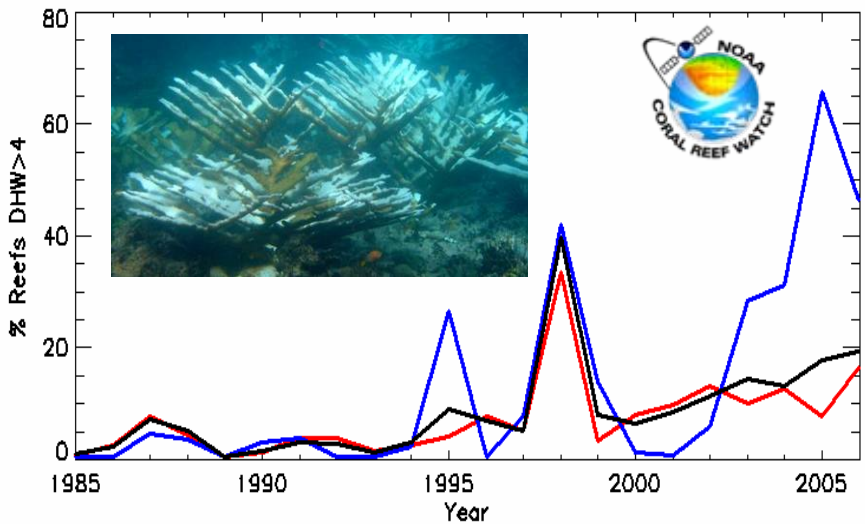

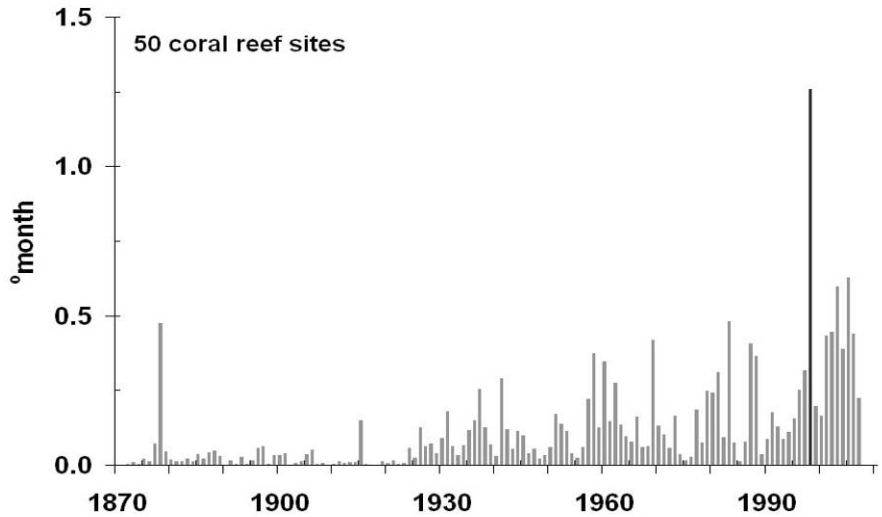

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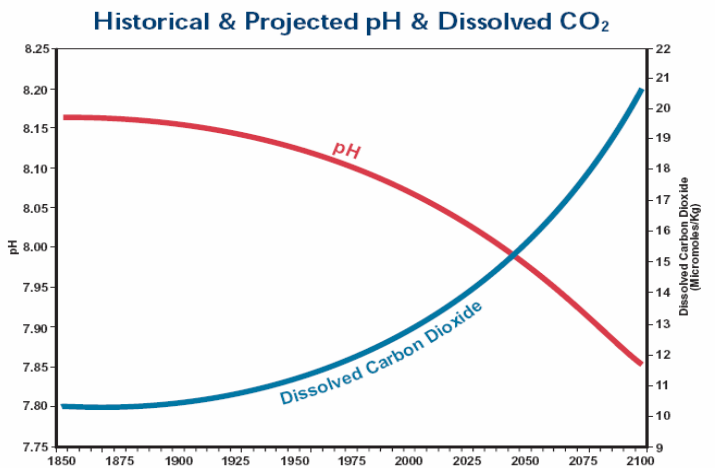

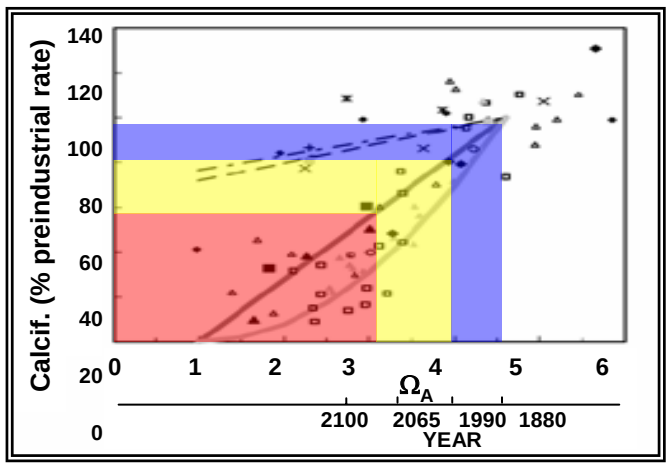

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- Effective management of coral ecosystems in light of climate change requires a better understanding of ecosystem resilience

Overview

- Mandates on corals relevant to climate change:
  - **Executive Order #13089:**

    Identify major causes and consequences of degradation of coral reef ecosystems.
  - **Coral Reef Conservation Act of 2000:**

    Develop sound scientific information on the condition of coral reef ecosystems and the threats to such ecosystems.
  - **National Coral Reef Action Strategy/Plan:**

    Theme 1: Understanding Coral Reef Ecosystems

    Theme 2: Reduce the Adverse Impacts of Human Activities

- Climate change is a new issue

Overview

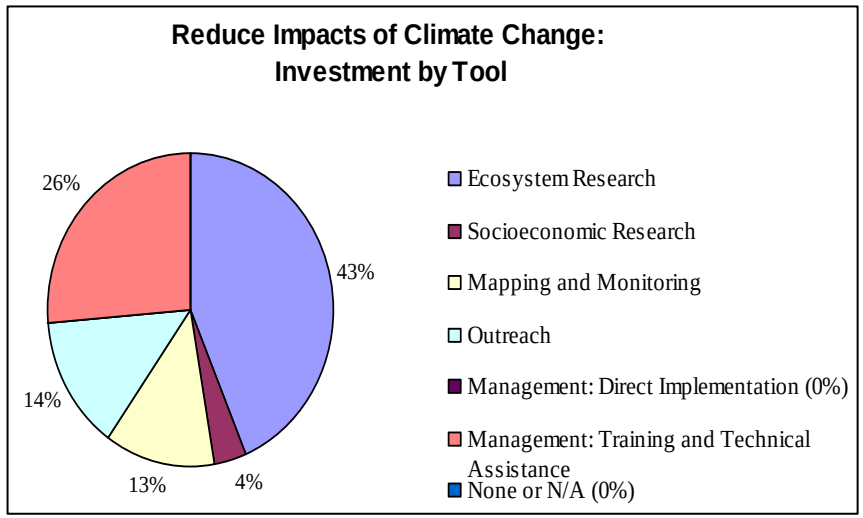
- CRCP aims to:
  - improve our understanding of the impacts of climate change
  - increase public awareness regarding those impacts
  - promote the development of management strategies

- CRCP addresses Climate Change through:
  - CREIOS
  - Grants Program
  - MPAs
  - Reducing Local Stressors

- Two “Focus Areas”
  - Coral Bleaching and Resilience to Climate Change
  - Ocean Acidification

Overview

- Funding: $398 K (<1% total)
- Projects: 11 (<1% total)



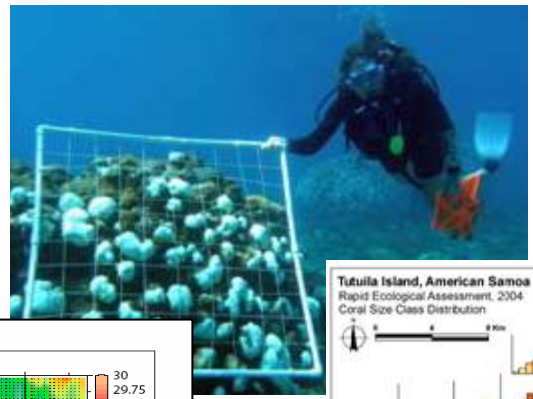
- Major tools funded:
  - 64% ecosystem research
  - 9% socioeconomic research
  - 9% monitoring
  - 9% management training and technical assistance

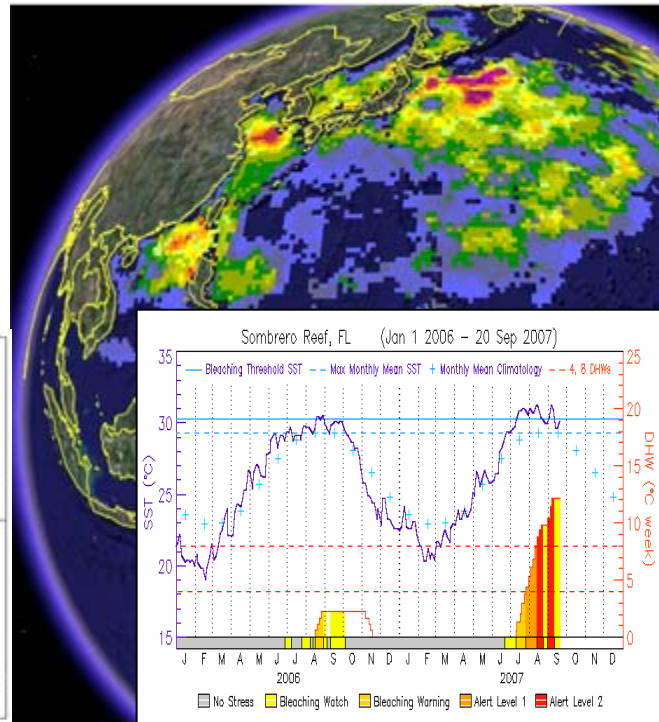
- Funding split between Atlantic/Caribbean (47%) and all regions (43%)
- Cross-links with CREIOS monitoring and National Program

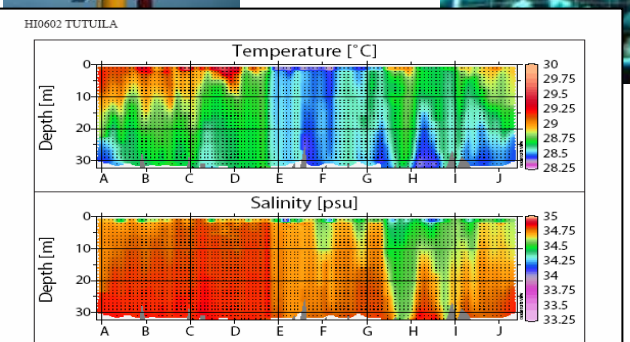
Coral Bleaching and Resilience to Climate Change

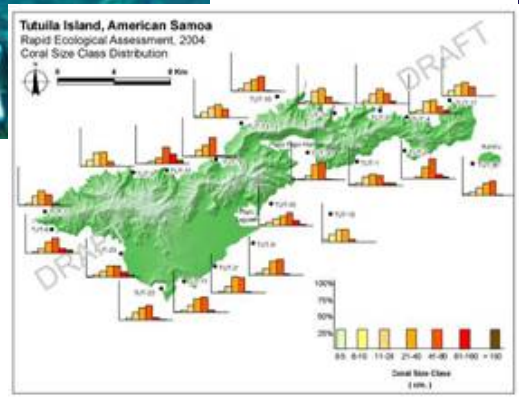
Activities:

- Long-term monitoring and research:
  - to understand the underlying causes of coral bleaching
  - to clarify initial and long-term impacts of coral bleaching events
  - to identify factors affecting resistance and resilience to coral bleaching









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- Collaborations with Australian agencies on climate change and resilience

Coral Reef Targeted Research & Capacity Building for Management

our great barrier reef let's keep it great

Australian Government
Australian Research Council

Australian Government
Great Barrier Reef Marine Park Authority

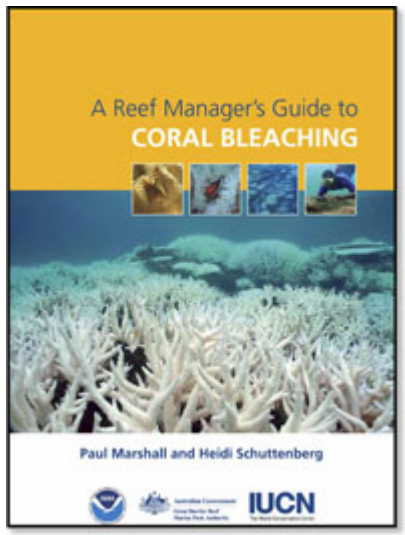
The University Of Queensland
AUSTRALIA

Australian Institute of Marine Science

Coral Bleaching and Resilience to Climate Change

Outputs and Outcomes:

- *A Reef Manager's Guide to Coral Bleaching*
- Published by CRCP, the Great Barrier Reef Marine Park Authority, and many others, in 2006

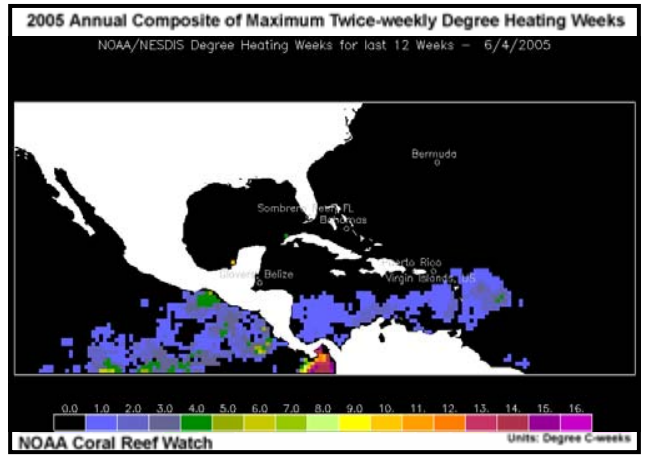


- Provides information to managers on:
  - the causes and consequences of coral bleaching
  - predicting mass bleaching events
  - assessing impacts of bleaching
  - building long-term resilience into management
  - strategies to reduce local threats exacerbated by bleaching
- Serves as basis for a new series of workshops on "Responding to Climate Change"

Coral Bleaching and Resilience to Climate Change

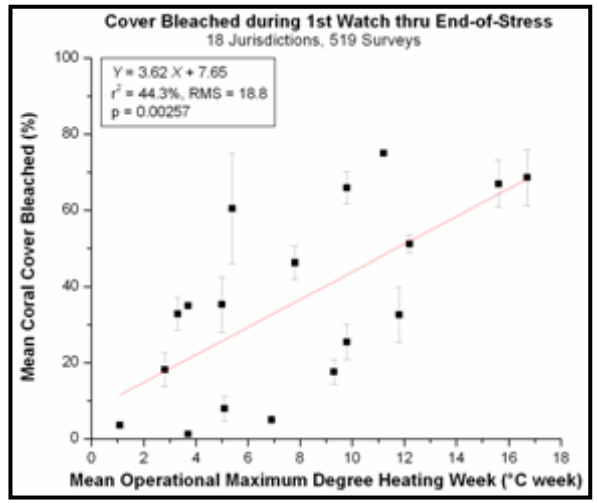
Outputs and Outcomes:

- Caribbean Bleaching Event of 2005
  - Thermal stress far exceeded previous levels
  - Most intense mass coral bleaching event ever observed in the Caribbean
  - Many reefs suffered over 90% bleaching and 50% mortality



- NOAA's satellite and *in situ* monitoring alerted managers and scientists to this event as it developed

- NOAA led interagency effort to:
  - engage partners to assess the impacts
  - make recommendations on how to prepare for future events



Ocean Acidification

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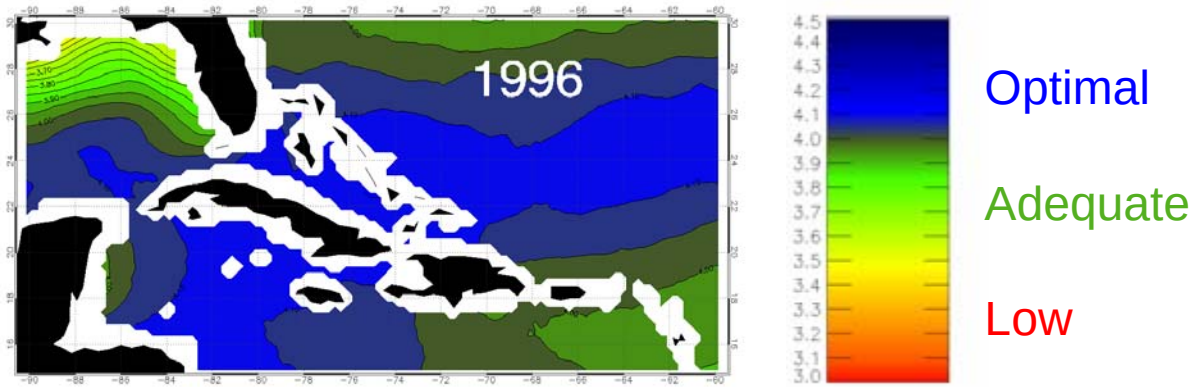
- Collaborations with US federal agencies and academics on ocean acidification

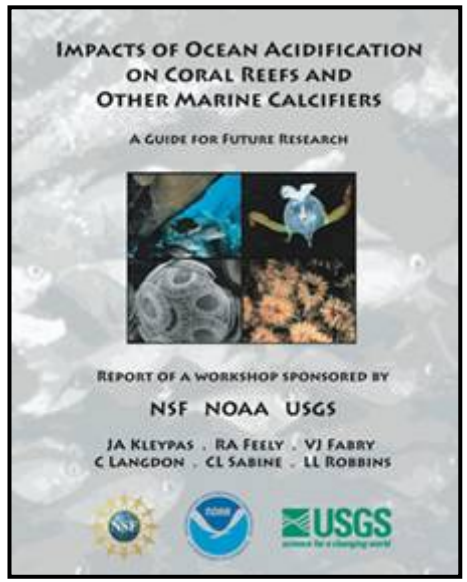
- Monitoring and research:
  - Deployment of sensors to measure surface partial pressure of carbon dioxide (pCO_2)
  - Satellite-derived pCO_2 model developed for the Caribbean



Ocean Acidification

Outputs and Outcomes:

- *Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers*
- Published by NOAA, the National Science Foundation, and the US Geological Survey, in 2006



- Provides information to researchers and managers on:
  - changes in ocean carbonate chemistry
  - biological responses to ocean acidification
  - critical research and monitoring needs

- Serves as basis for ongoing initiatives

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Challenges and Future Directions:

- Direct observations and research on climate are a small part of budget (<1%)

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- Need for a multi-pronged approach:
  - Monitor climate change, ocean acidification, and their impacts
  - Better understanding of processes
  - Leverage Climate Program monitoring at global-scale
  - Develop management tools to increase reef resilience

Conclusion

- Climate change poses a significant threat to coral reefs throughout the world
- CRCP is particularly concerned about bleaching and ocean acidification
- CRCP has focused efforts to:
  - Monitor climate change and understand its impacts
  - Develop and promote resilient management strategies
  - Collaborate to develop tools, initiatives, and regional assessments
- To fully address monitoring and research needs will require increased support