REEF CHECK 98

The International Year of the Ocean

WHY REEF CHECK?

Coral reefs -- a valuable natural resource

- rainforests of the sea -- high biodiversity
- a food source for millions of people
- source of medicines -- worth billions $$
- coastal protection from wave erosion
- source of islands & white sand beaches for tourist resorts
- 7 million scuba divers

What is the health of coral reefs globally?

Before Reef Check 97, "Science as usual" failed to give answers because:

- Too few scientists, too little time on reefs
- Too few study sites
- Few long-term studies
- Emphasis on basic research
- Different questions and methods

What is a coral reef ecosystem?

- Geological framework of old dead reef
- Surface of living, growing coral animals
- Thousands of species of fish, shellfish, worms, sponges etc. living in and around the reef

Reef Check 98 -- Two goals

1. Science

-- a synoptic assessment of human impacts on coral reefs worldwide

2. Conservation

-- to raise public awareness about the value of coral reefs, threats to their health and solutions to these problems

-- to establish a global network of monitoring and management teams

Reef Check Approach

- Internet-based -- website, listservers, e-mail
- Global network of national coordinators
- Each coordinator matches teams of experienced recreational divers with professional marine scientists (60%PhD)
- Volunteer -- with private funding e.g. Rockefeller Brothers Fund for start-up teams in less developed countries

Marine scientist leads each team:

- training in methods and identification
- on the actual field surveys
- checking and submitting data to headquarters at HKUST

Special methods designed:

- short training period (<1 day)
- sport divers with a high school education
- one reef surveyed in one day

“Key Indicators” of human impacts

- worldwide and regional “indicator organisms”

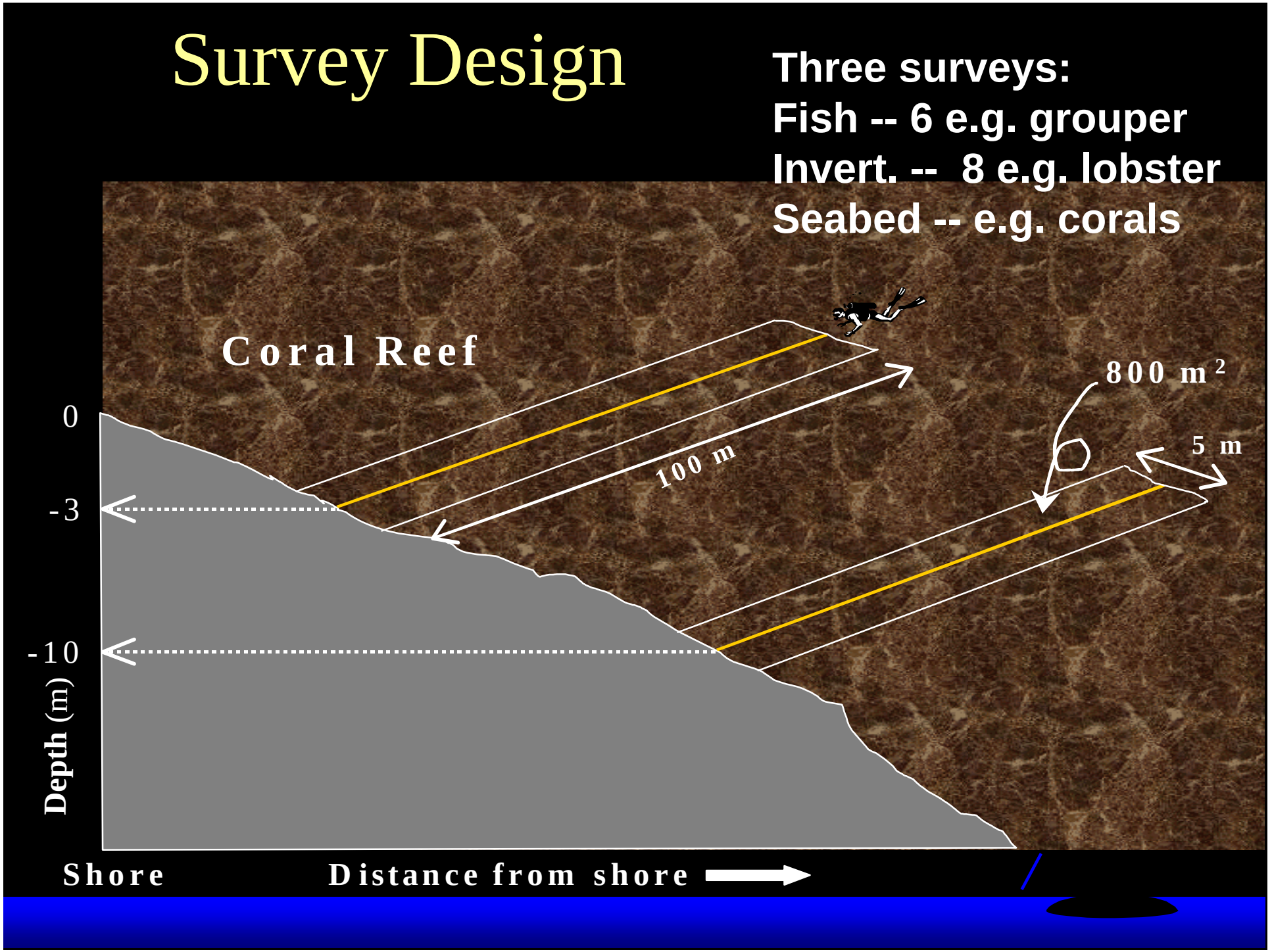
  -- a high market value

  -- easily identified by non-biologists due to distinctive shape and color

- other direct indicators e.g. broken coral, trash, bleaching

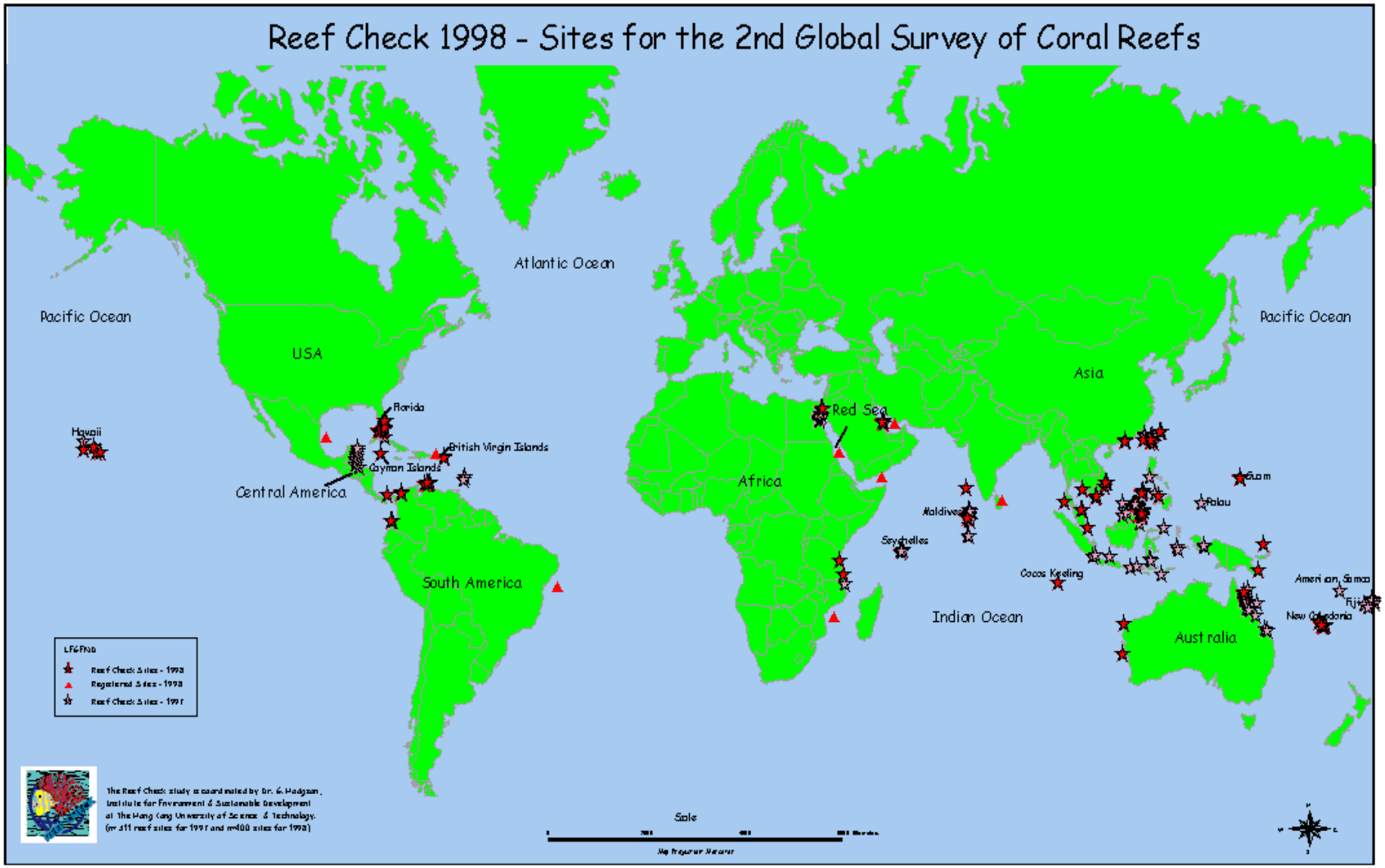
Survey Design

Three surveys:
Fish -- 6 e.g. grouper
Invert. -- 8 e.g. lobster
Seabed -- e.g. corals



What happened?

- Growing support worldwide from scientists, divers, community, sponsors, governments
- Hundreds of divers, >100 marine scientists
- Surveys: 1 April to 30 September, 1998
- Teams in almost 40 countries and territories in all tropical seas
- 2nd global survey of coral reefs completed


Reef Check 1998 - Sites for the 2nd Global Survey of Coral Reefs
Atlantic Ocean
Pacific Ocean
Pacific Ocean
USA
Asia
Florida
Red Sea
Hawaii
British Virgin Islands
Cayman Islands
Central America
Africa
Guam
Palau
Maldives
Seychelles
Cocos Keeling
American Samoa
Fiji
New Caledonia
South America
Indian Ocean
Australia
Reef Check Sites - 1998
Registered Sites - 1998
Reef Check Sites - 1997
The Reef Check study is coordinated by Dr. C. Hodgson,
Institute for Environment & Sustainable Development
at The Hong Kong University of Science & Technology.
(n=311 reef sites for 1997 and n=400 sites for 1998)
Scale

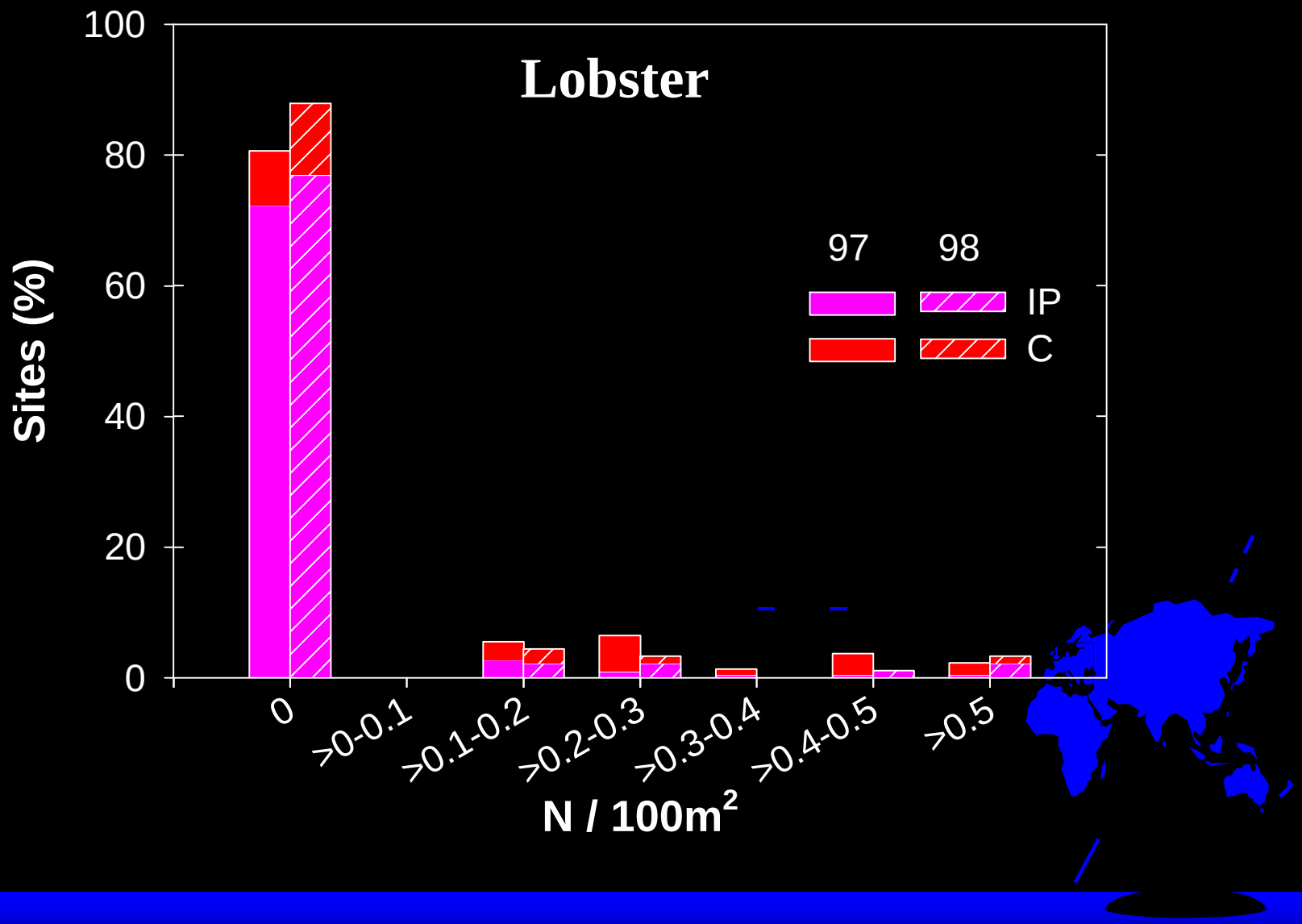
Major Results 1998

- Confirmed 1997 findings that reefs are severely over-fished -- worse in 1998
- Most high-value species are missing
- Reefs far from cities just as bad as reefs near-by
- An unprecedented global bleaching and mortality event occurred

World Results: Lobster

- Formerly abundant -- overfishing indicator
- None found at 88% of reefs, an increase of 7% “empty” reefs over 1997

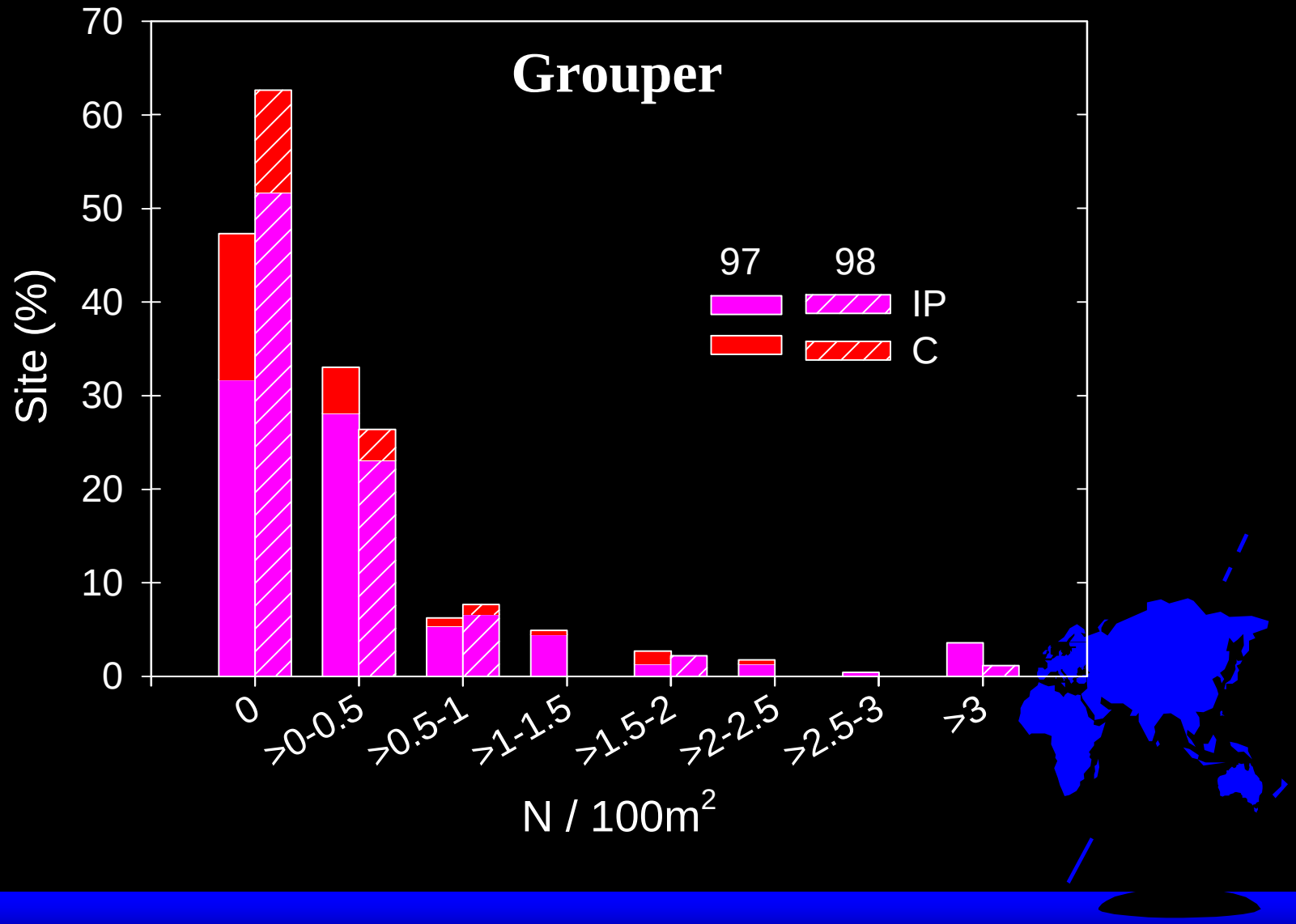
World Abundance of Lobster



World Results: Large Grouper

- Cyanide fishing indicator
- None at 63% of reefs (16% more empty reefs in 1998)
- 18+ fish at some reefs
- Caribbean: Nassau grouper -- only 3 fish at 4 of 14 reefs

World Results: Grouper



Indo-pacific Results: Humphead

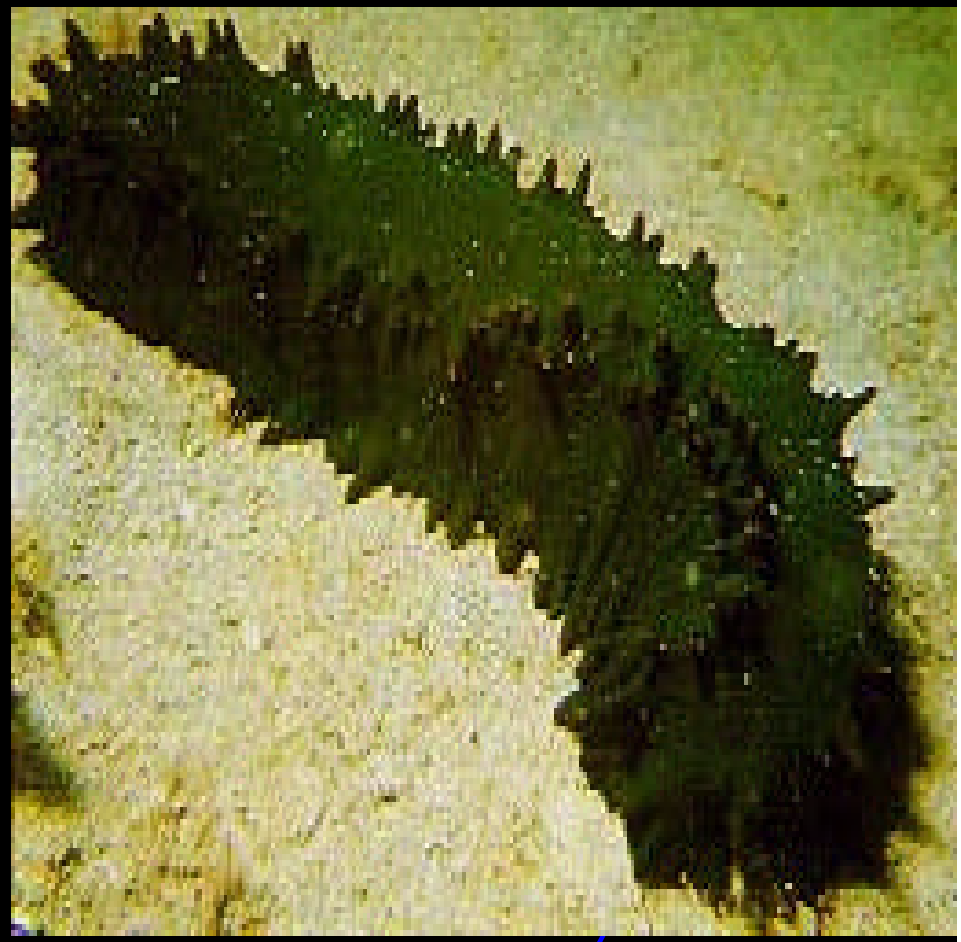
- Once moderately common in groups
- None at 90% of reefs
- Cyanide-fishing indicator

Indo-pacific Results: Barramundi

- Previously common, now rare
- Overfishing and cyanide fishing

Indo-pacific Results: Edible sea cucumbers -- 3 species

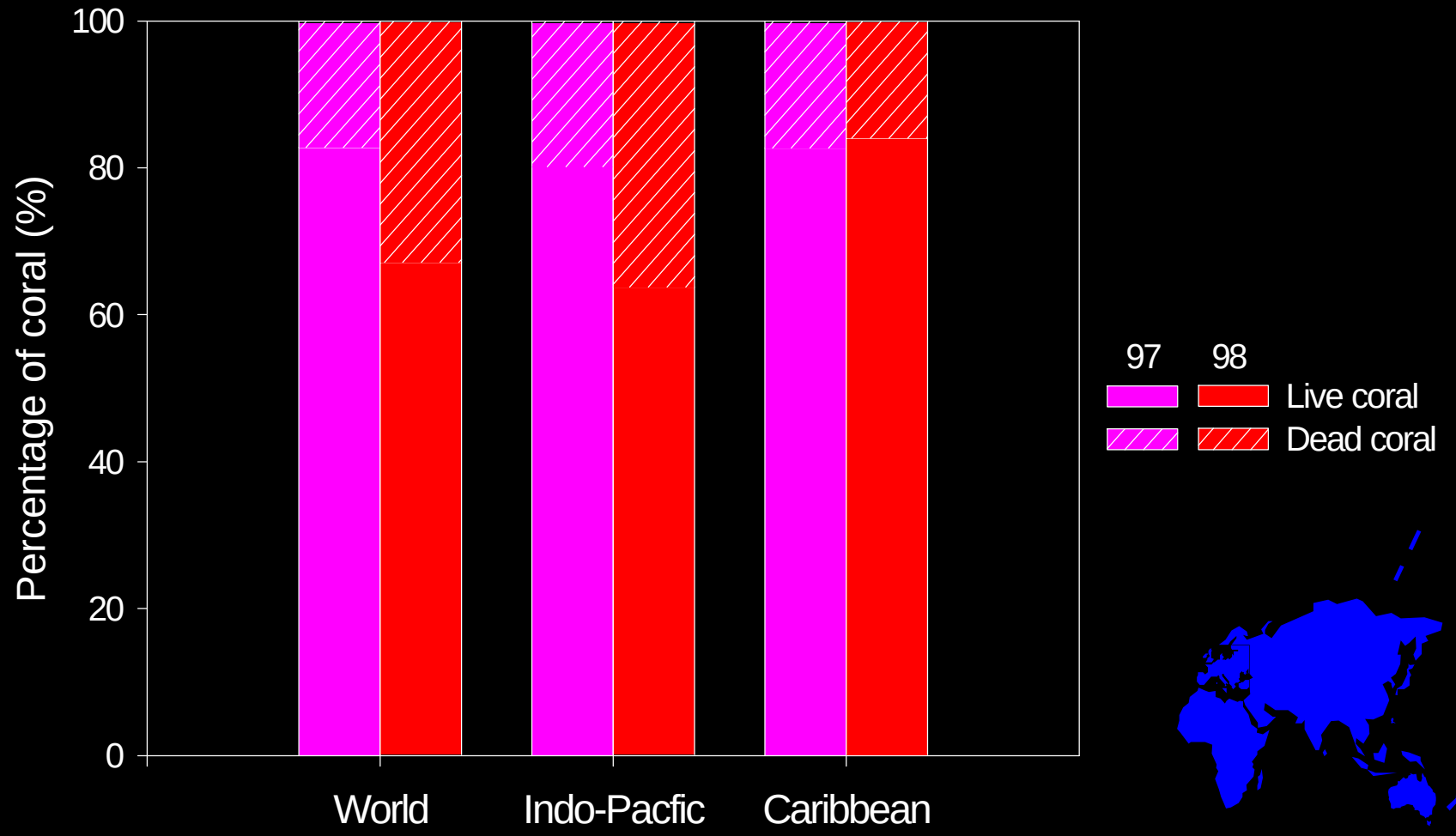
- Formerly abundant
- None at 62% of reefs--(a 23% increase in empty reefs)
- 49 at protected site
- Overharvesting



Indo-pacific Results: Giant clams

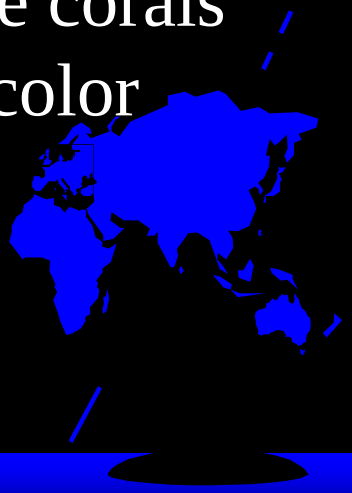
- Sashimi market
- Shell for curio trade
- None at 53% of reefs (a 30% increase in vacant reefs)
- Over 400 clams per site at protected reefs
- Overharvesting

World Results: Live/Dead Coral

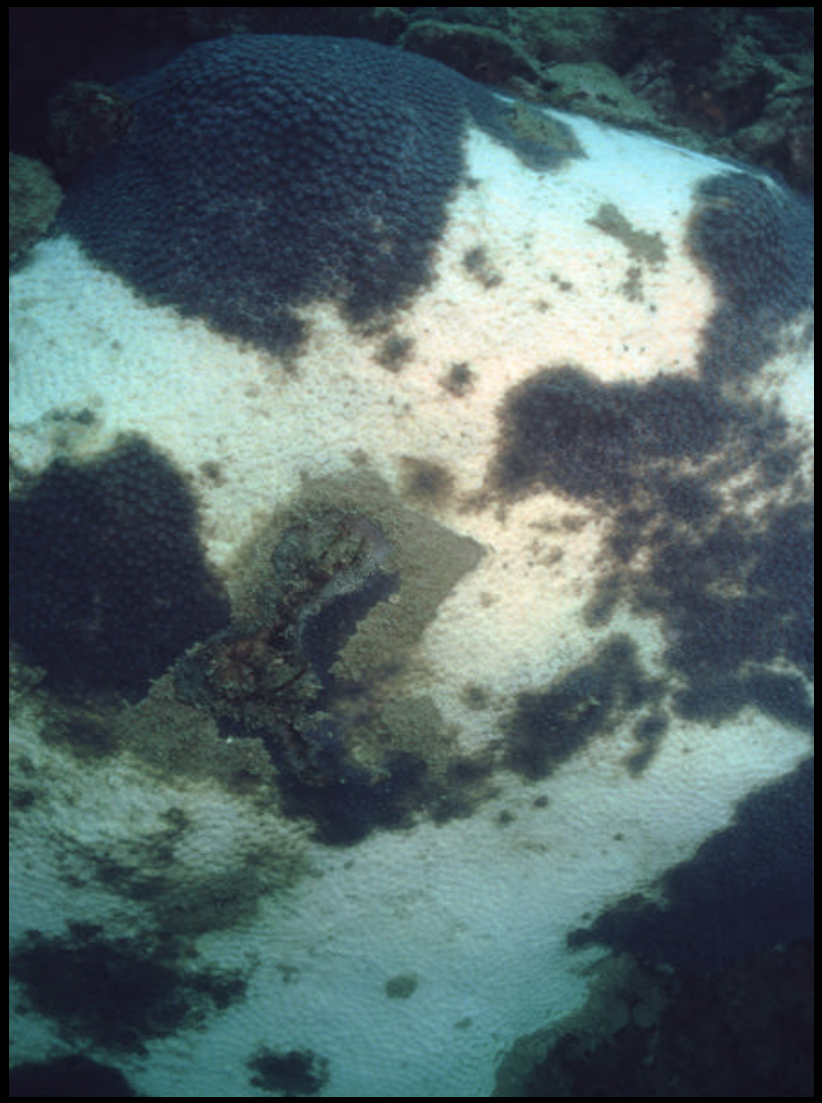


What is coral “bleaching?”

- Corals are animals
- They contain millions of tiny plant cells
- The plants (algae) provide food to coral
- The algae give corals green/brown color

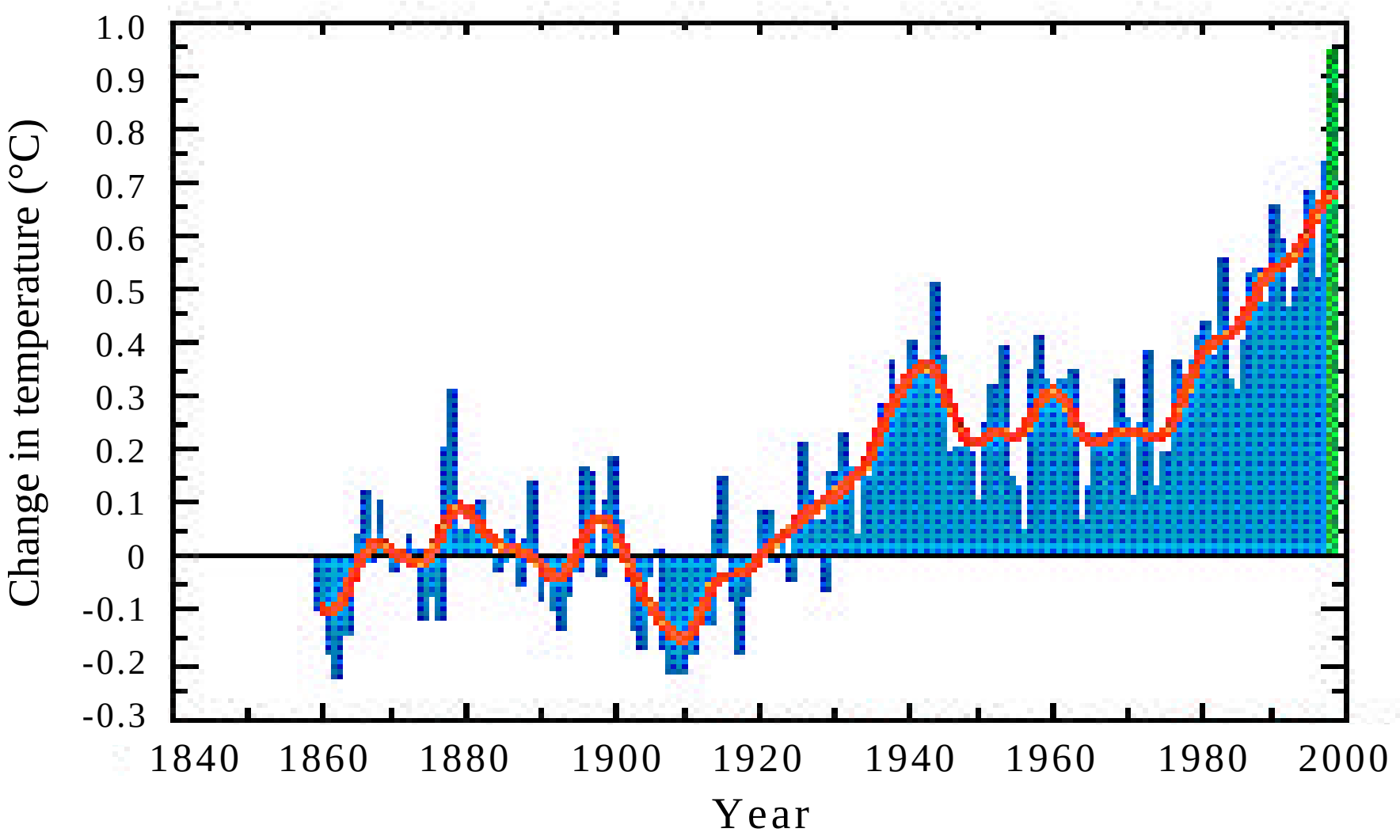


Hot water causes loss of algae



- If the coral polyps are stressed, the algae leave the coral
- The coral becomes white because we can see the white skeleton underneath

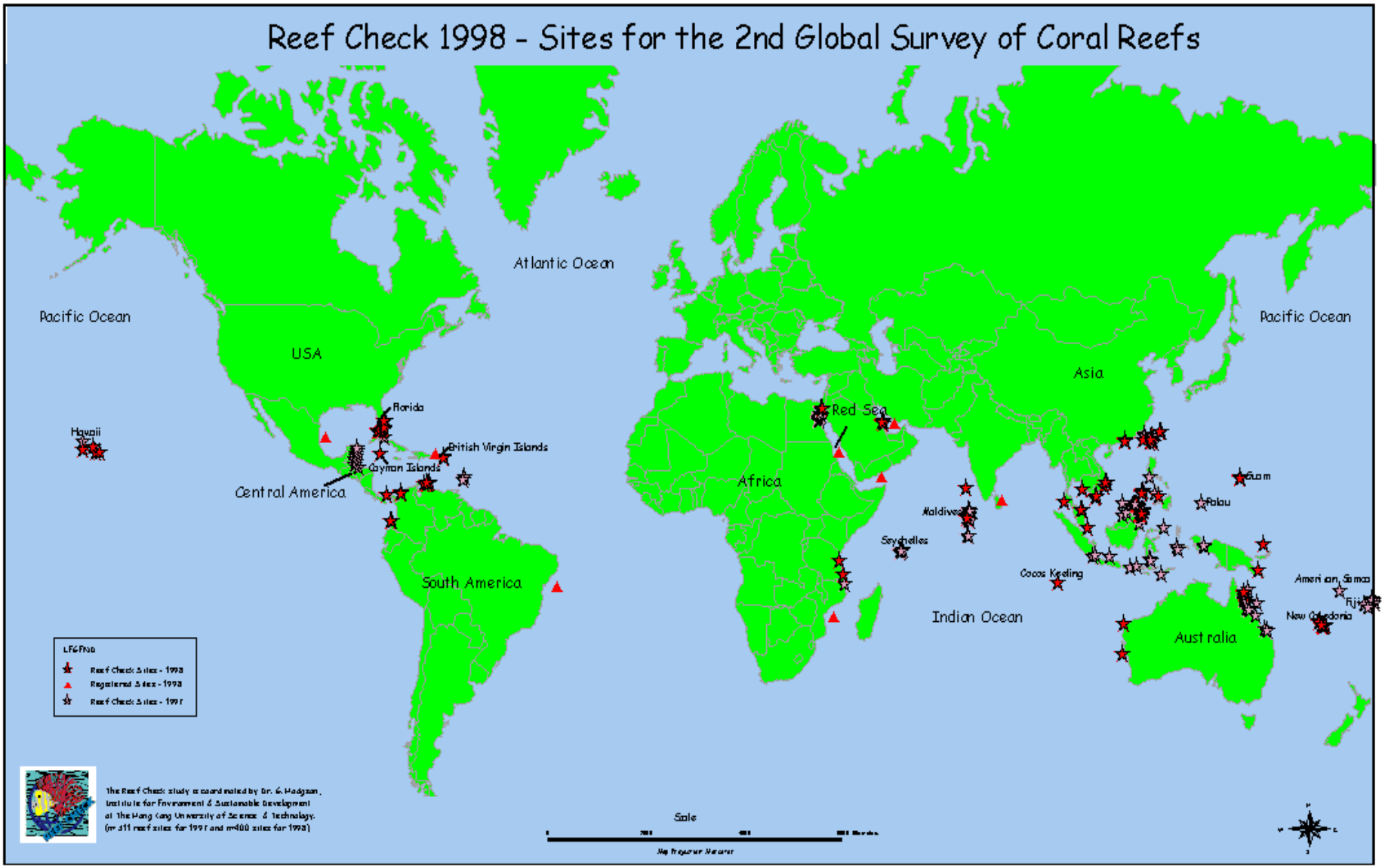
Global temperature pattern -- 138 years
1998 was the hottest year on record



“Bleached” corals may recover or die

- 29% of Reef Check sites reported bleaching
- Mortality ranged between 0 and 95%
- Many old colonies killed (1000 years old)

Reef Check 1998 - Sites for the 2nd Global Survey of Coral Reefs



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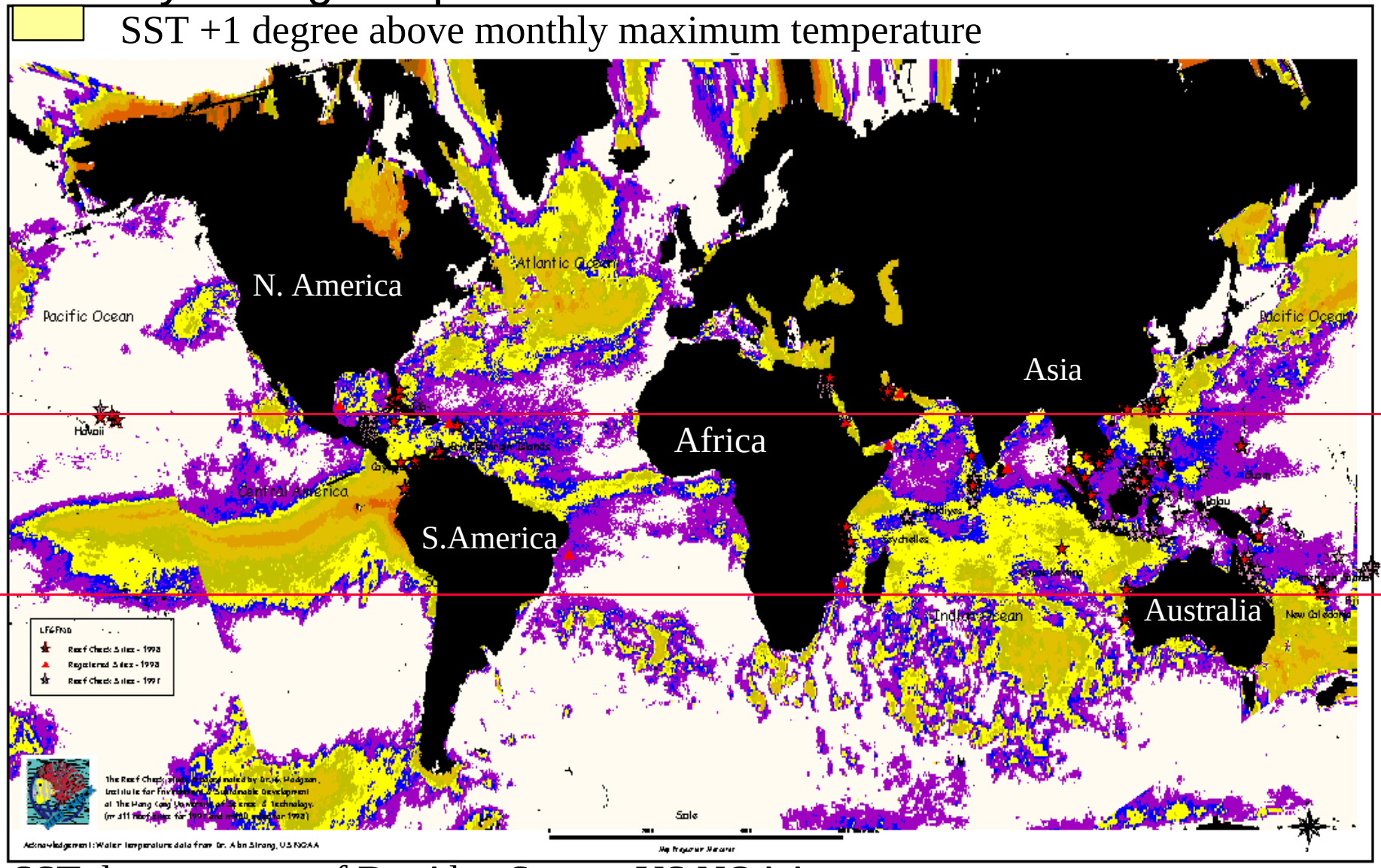
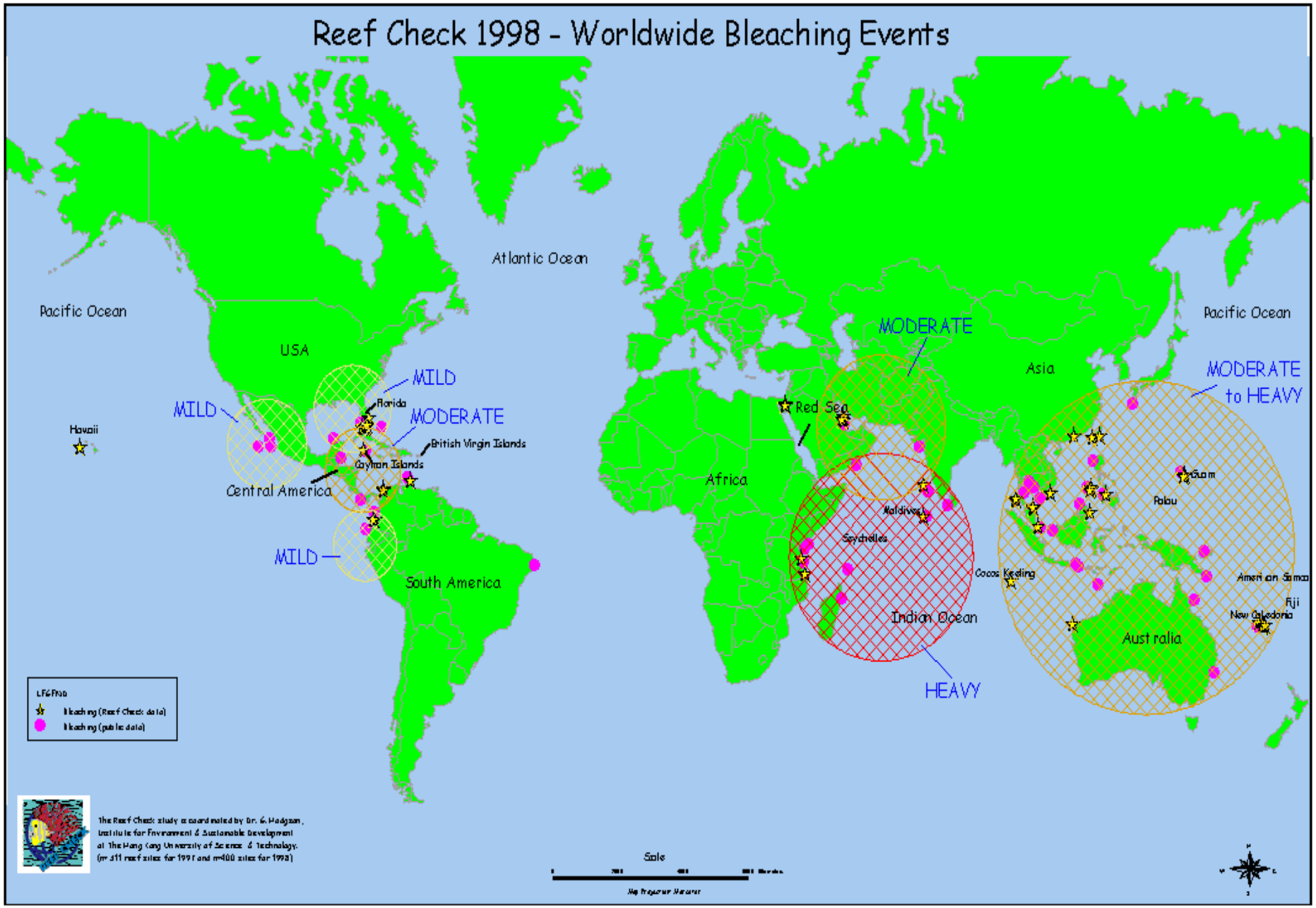
Composite monthly satellite sea surface temperature increases January through September 1998 and Reef Check sites



SST data courtesy of Dr. Alan Strong, US NOAA



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1998 Results Recap

- Confirmed 1997 findings that reefs are severely over-fished -- worse in 1998
- Most high-value species are missing
- Reefs far from cities just as bad as reefs near-by
- An unprecedented bleaching and mortality event occurred, damaging and killing reefs in throughout tropical seas

Seafood Conclusions

- Demand for seafood has exceeded supply
- Too many fishermen, too few fish
- HK, China and Taiwan are allowing their fishermen to use methods overseas that are illegal at home

Seafood Solutions

1. Countries should ban overseas use of fishing methods which are illegal at home
2. Cyanide testing programs for fish
3. Countries should ban export and import of immature fish and shellfish
4. More and larger marine protected areas urgently needed e.g. Pratas Reef (Dongsha)
5. R & D on aquaculture of high-value species

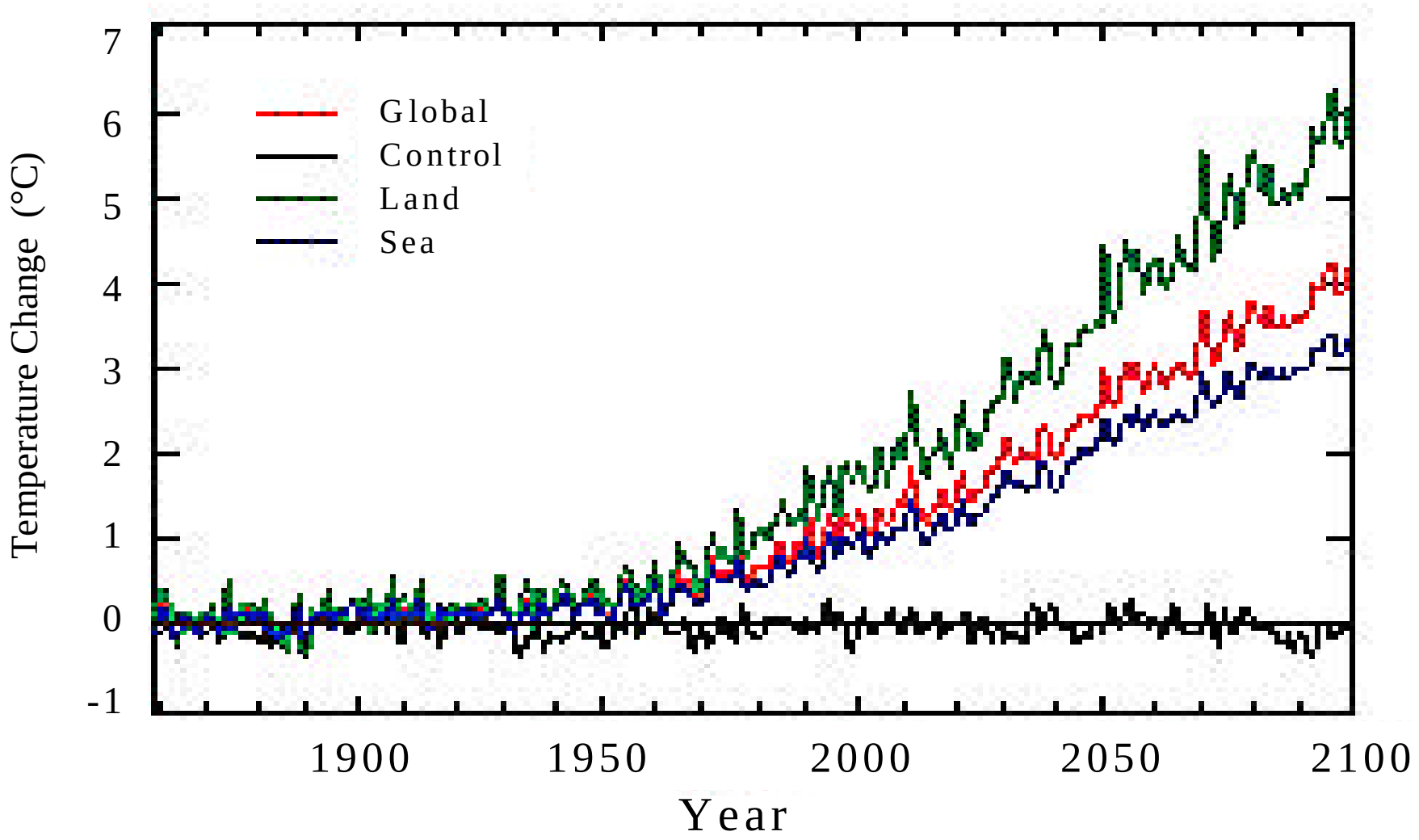
Reef Die-off Conclusions

- 1998 was hottest year ever, due partly to global warming and to El Niño
- Reef corals in all tropical seas were bleached and many died -- worst hit was the Indian Ocean
- Event is unprecedented in geographic extent, depth, and severity.
- Economic impacts (tourism, seafood) will be severe
- Precurser to severe global warming effects

Analysis

- US and China are the two top producers of Greenhouse gases
- IPCC recommends cuts of 60%
- Kyoto 12/97 agreed 5-7% cuts
- Buenos Aires 11/98 debated “flexibility mechanisms” e.g. emissions trading to avoid direct cuts

Global Climate Change Model (November 1998)
Hadley Climate Centre UK



Reef Die-off Solutions
How to stop global warming?

1. Individual actions important -- conserve energy
2. Increase gas mileage on cars
3. Clean up power plants
4. Ban logging of old forests, plant new forest
5. Countries should follow lead of Argentina and set higher goals for reduction

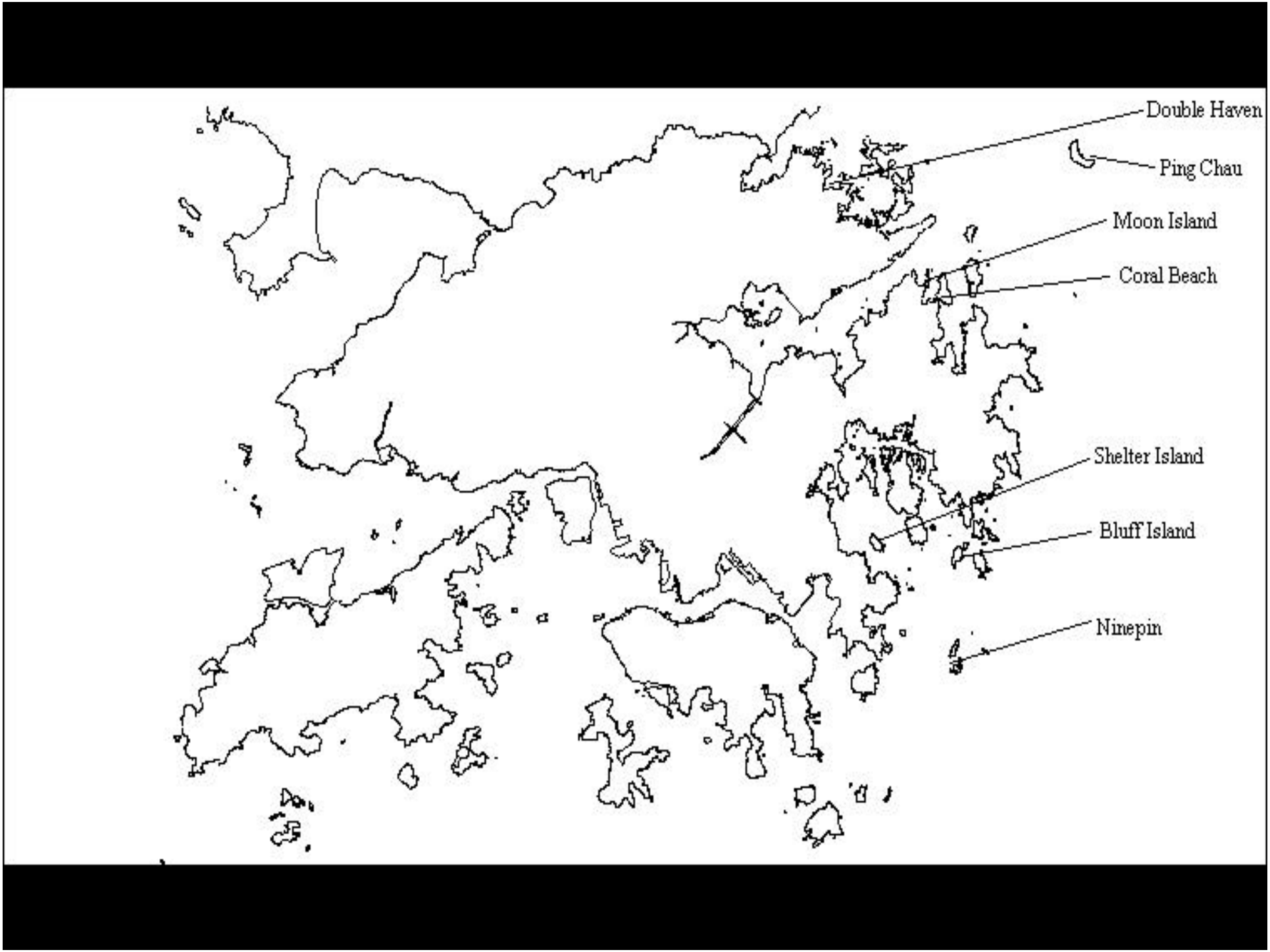
US Sierra Club Statement

“The human race is engaged in the largest experiment in history - an experiment to see what will happen to our health and the health of the planet when we make drastic changes in our climate. This is not a controlled scientific inquiry. It is a massive change in the Earth's environment, and we are gambling our children's future on the results.”

REEF CHECK 98
End of Global Presentation

HONG KONG REEF CHECK 98'

- **International Year of the Ocean**
- **Hong Kong Coordinator: WWF HK**
- **Six Teams: Hong Kong Marine Conservation Society, Hong Kong Underwater Association, HKU, HKUST WWF & general public**
- **7 sites**


Double Haven
Ping Chau
Moon Island
Coral Beach
Shelter Island
Bluff Island
Ninepin

HONG KONG REEF CHECK 98’

RESULTS:

- **All sites with medium - high coral coverage except Ninepin**
- **Coral bleaching less serious than last year**
- **Needs more rigorous scientific investigation**

HONG KONG REEF CHECK 98’

RESULTS:

- **Coral damage:**
  - **By dynamite fishing: Ping Chau and Double Haven**
  - **By fish nets: Ping Chau, Double Haven and Bluff Is.**
  - **By anchor: Shelter Is., Bluff Is. & Hoi Ha Wan**

HONG KONG REEF CHECK 98’

RESULTS:

- **Marine fauna**

- Butterflyfish: highest number at Shelter and Bluff Is.

- Some high value commercial species such as grouper and snapper: Ping Chau, Double Haven and Bluff Is.

- Other coral reef fish: Ping Chau and Double Haven

HONG KONG REEF CHECK 98’

RESULTS:

- **Marine fauna**

  - Diadema spp. (Long spine sea urchin)

  - great increase in number at Coral Beach and Ninepin

RECOMMENDATIONS

1. Ninepin: previously damaged by dredging

2. Ping Chau and Bluff Island: proposed to be designated as Marine Parks

3. Strengthen the monitoring and enforcement works in Marine Parks and Reserves

4. Educate the fishermen and general public on marine conservation

HONG KONG REEF CHECK 98’

ACKNOWLEDGMENTS

- Environment and Conservation Fund

- Institute for Environment & Sustainable Development, HKUST

- Other collaborating parties

- End of this Part -