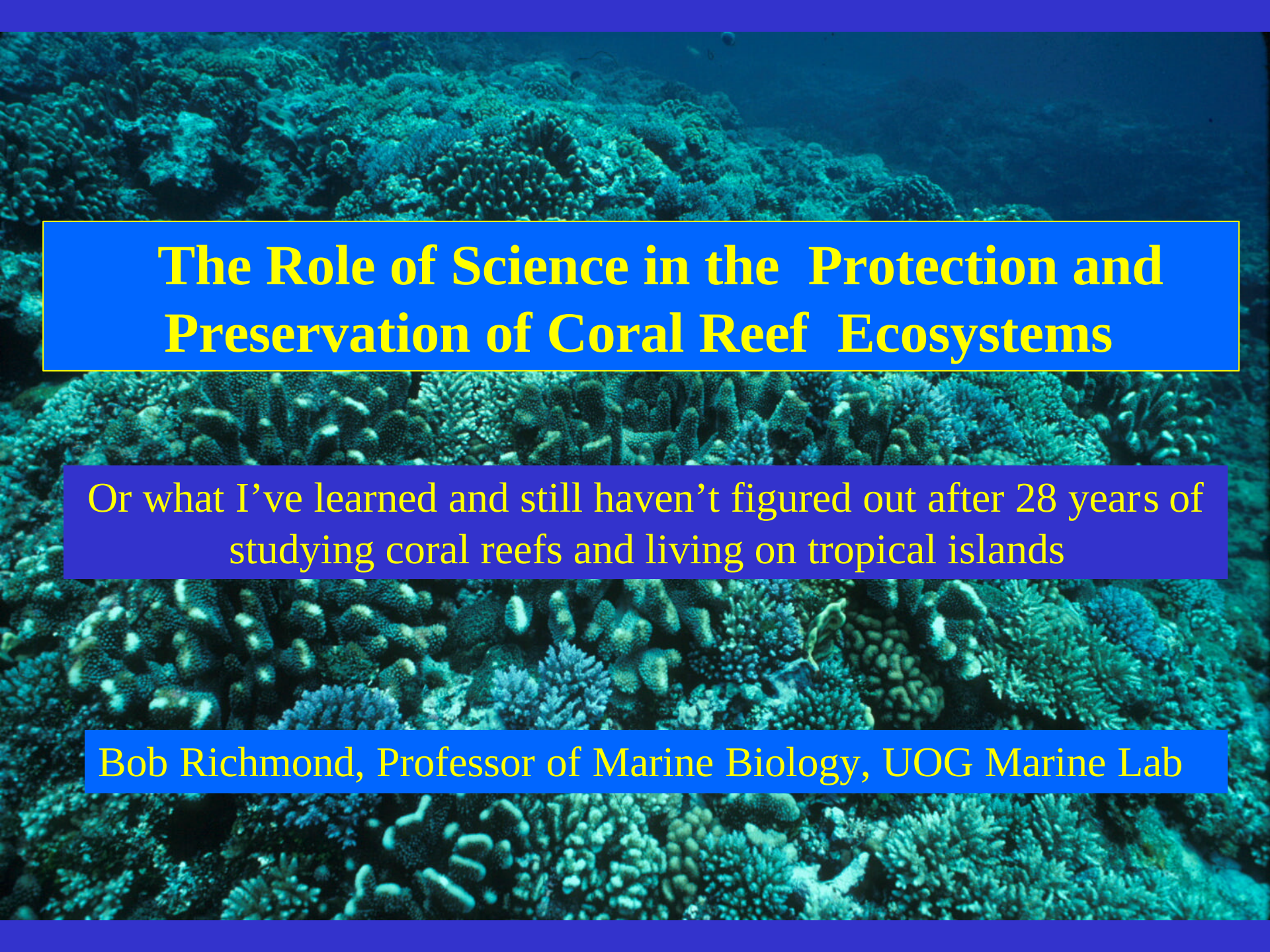


The Role of Science in the Protection and Preservation of Coral Reef Ecosystems

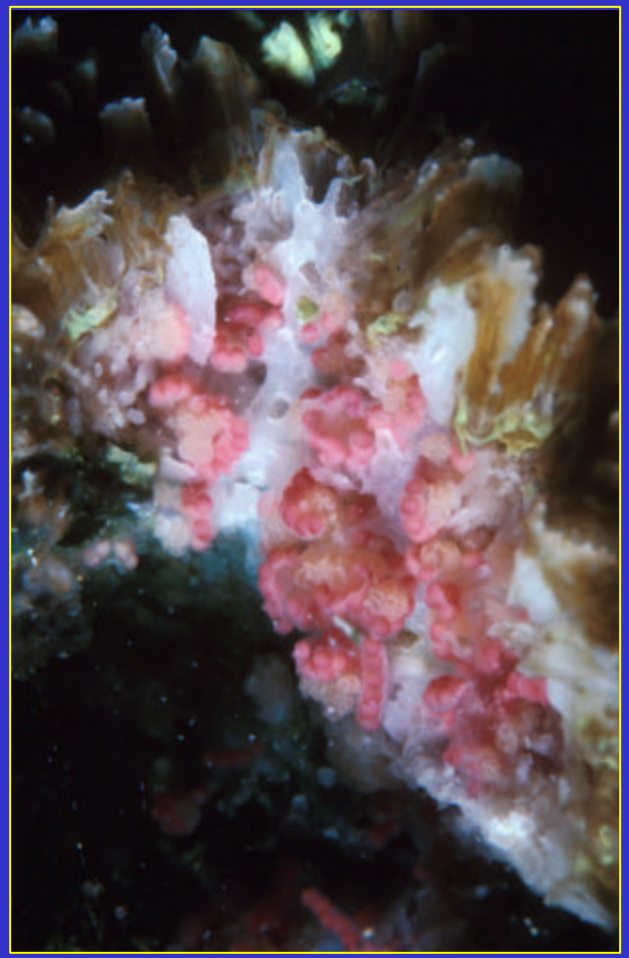
Or what I've learned and still haven't figured out after 28 years of studying coral reefs and living on tropical islands

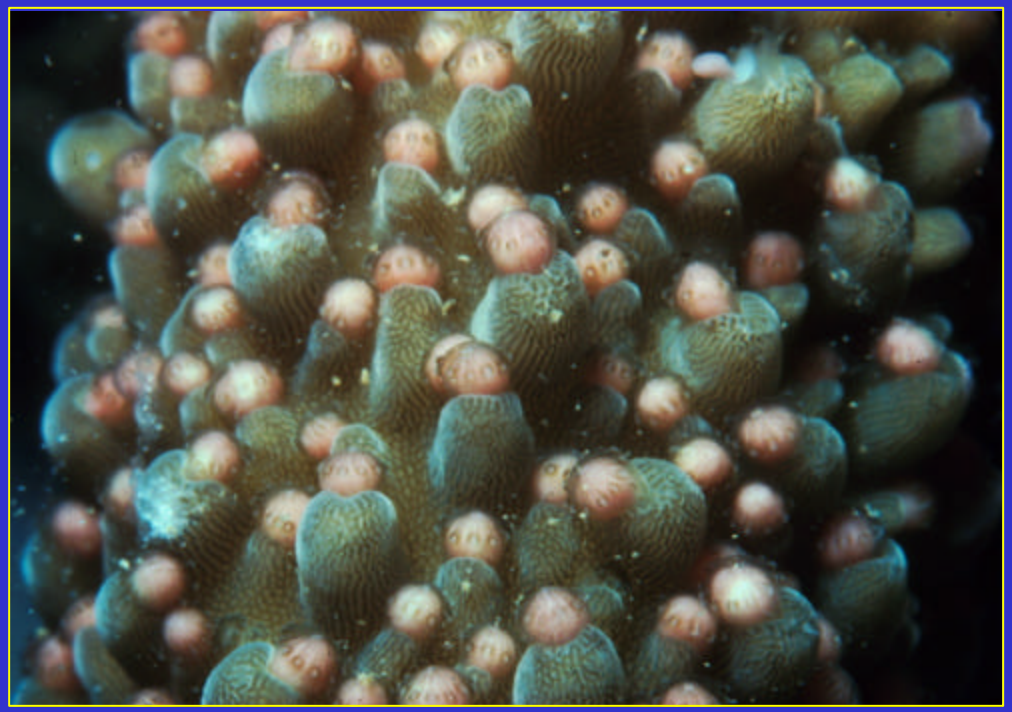
Bob Richmond, Professor of Marine Biology, UOG Marine Lab

Northern Mariana Islands
Guam
Marshall Islands
Palau
Federated States of Micronesia
American Samoa
China
Taiwan
Tropic of Cancer
Luzon Strait
South China
Philippines
Philippine Sea
Mariana Islands
Saipan
Agana
Wake Island (U. S.)
Johnston (U. S.)
Hawaiian Islands
Honolulu
Oahu
Maui
Hawaii
North Pacific Ocean
Mindoro
Palawan
Sulu Sea
Malaysia
Brunei
Celebes Sea
Borneo
Yap
Caroline Islands
Palau Islands
Koror
Kolonia
Senyavin Islands
Marshall Islands
Kingman Reef (U. S.)
Palmyra Atoll (U. S.)
Howland Island (U. S.)
Baker Island (U. S.)
Jarvis
Kiritmati (Christmas)
Equator
Nauru
Banaba
Gilbert Islands
Kiribati
Phoenix Islands
Malden
Starbuck
Indonesia
Java Sea
Flores
Sumba
Timor
Arafura Sea
Timor Sea
Darwin
Ashmore and Cartier Islands (Australia)
Gulf of Carpentaria
New Guinea
Papua New Guinea
Solomon Sea
Solomon Islands
Guadalcanal
Santa Cruz Islands
Nanumea
Niutan
Tuvalu
Nukufetau
Tokelau (N. Z.)
Tokelau Islands
Nikumaroro (Gardner)
Northern Cook Islands
Samoa
Samoa Islands
Wallis and Futuna (France)
Wallis
Pago Pago
Cook Islands (New Zealand)
Vanuatu
Coral Sea
Cairns
Townsville
Coral Islands (Australia)
New Caledonia (France)
Viti Levu
Fiji
Tonga
Tonga Islands
Niue (N.Z.)
Southern Cook Islands
New Caledonia
Ceva-i-Ra
Tropic of Capricorn
Australia
Brisbane
Perth
Norfolk Island (Australia)
Kermadec Islands
Lord Howe Island
Great Australian Bight
Adelaide
Canberra
Sydney
Melbourne
Tasman Sea
New Zealand
Auckland
North Island
South Pacific Ocean

CORAL SPAWNING

Gamete development

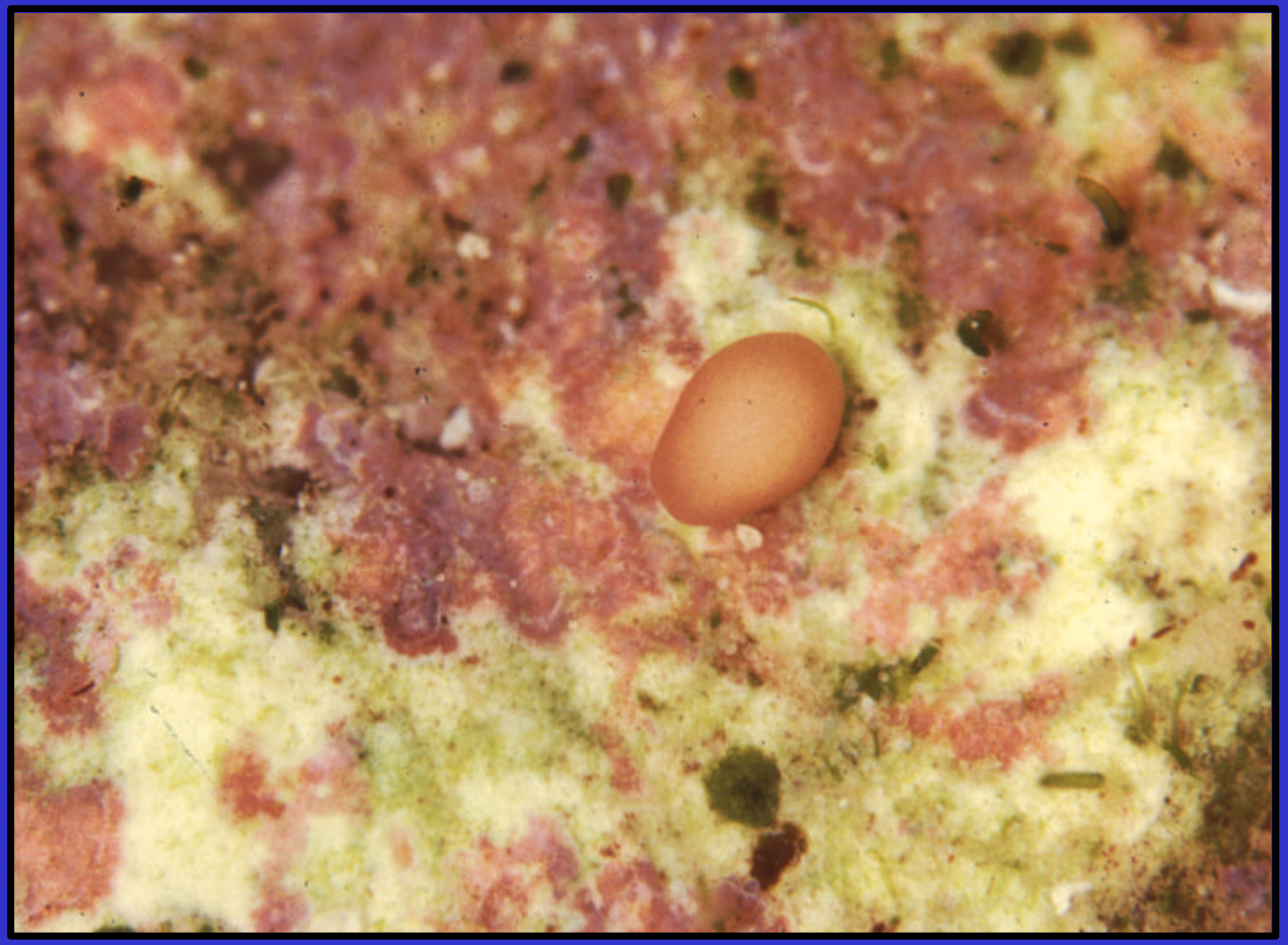




Gamete release

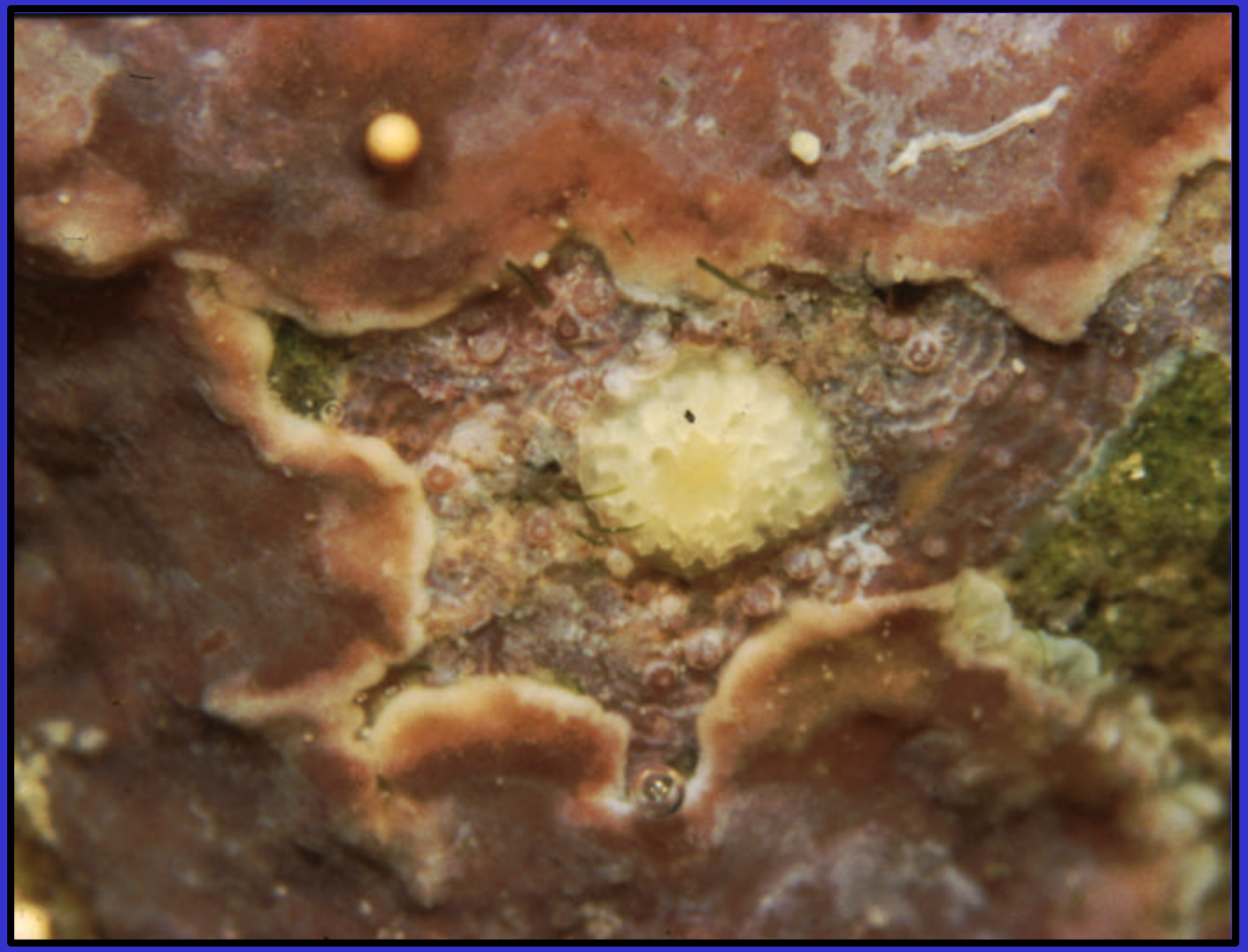
RECRUITMENT

1. Settlement

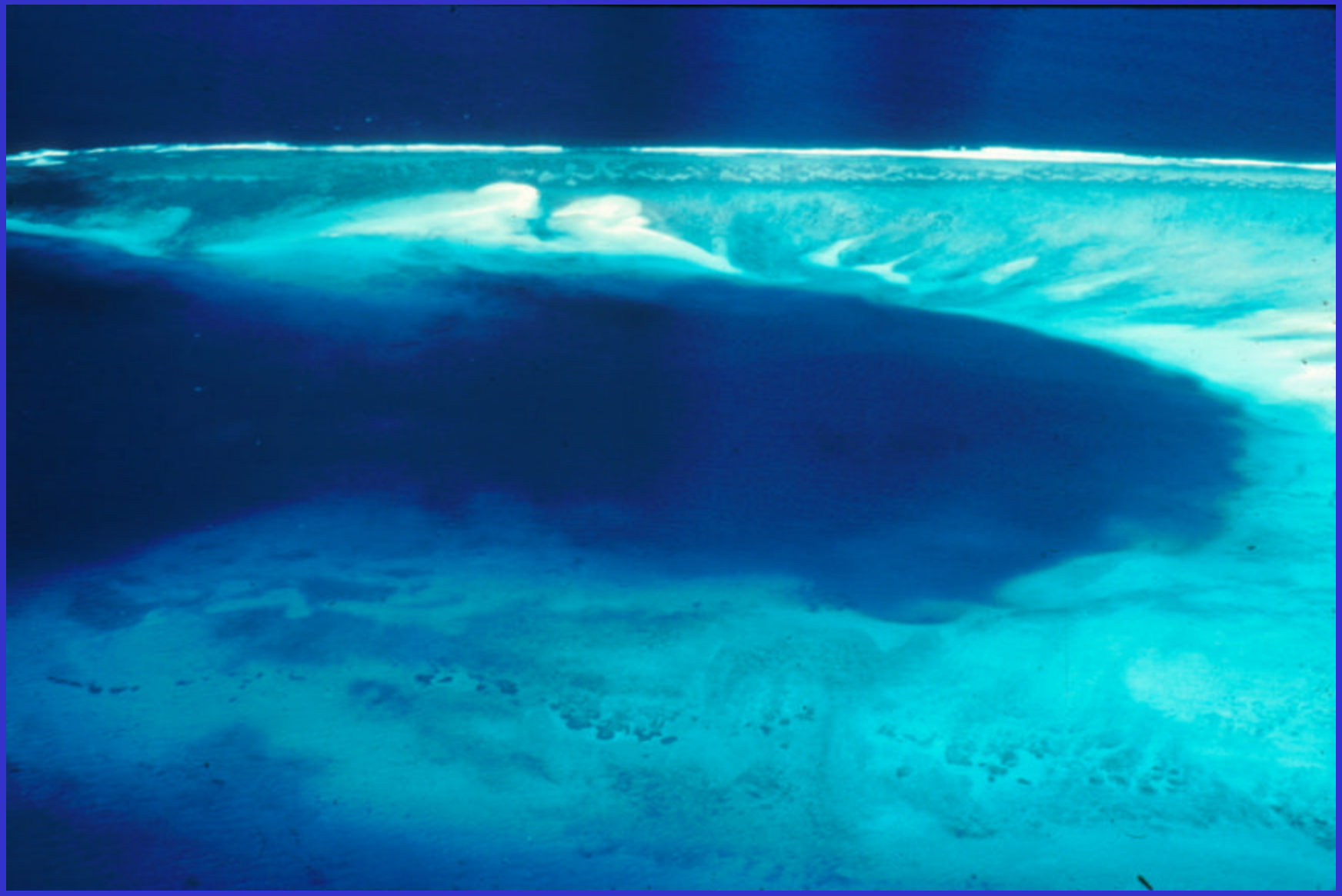


RECRUITMENT

2. Metamorphosis



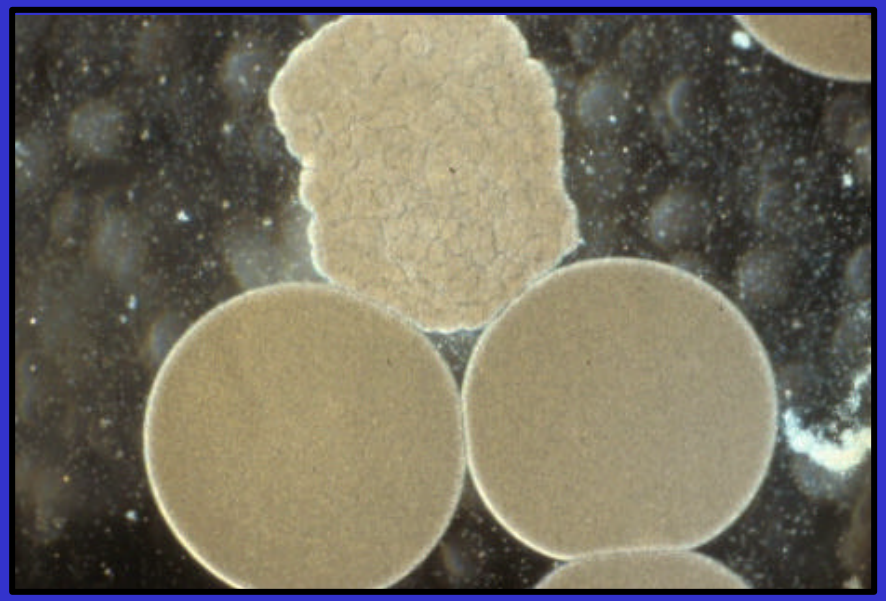
Nuclear Testing: Extreme/Acute Disturbance

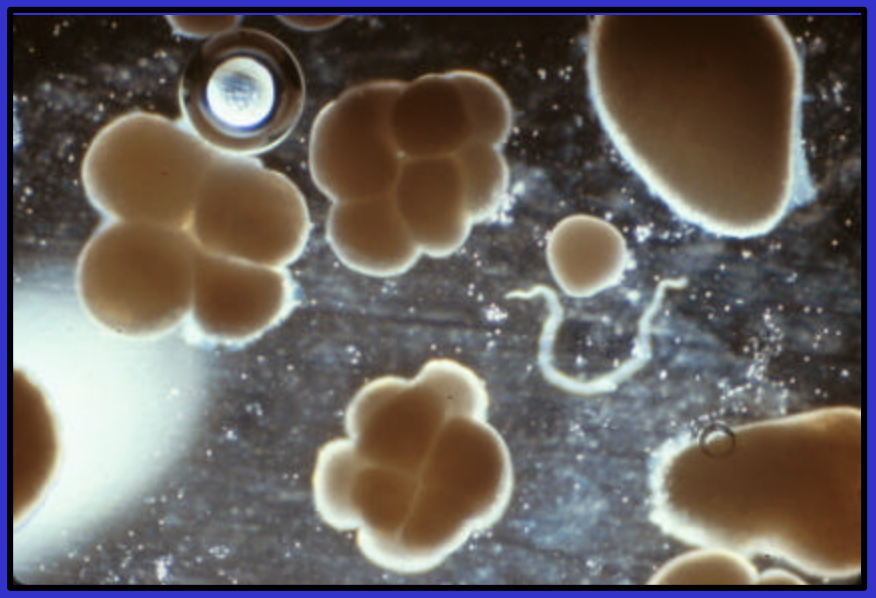


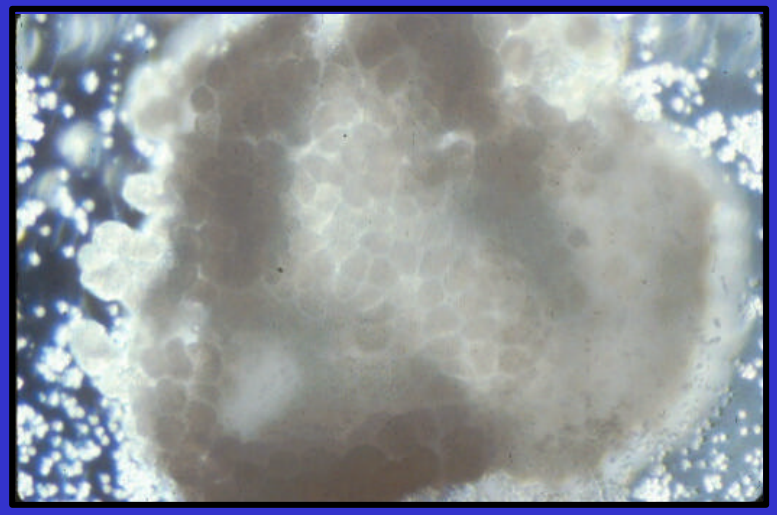
Reduced Water and Substratum Quality

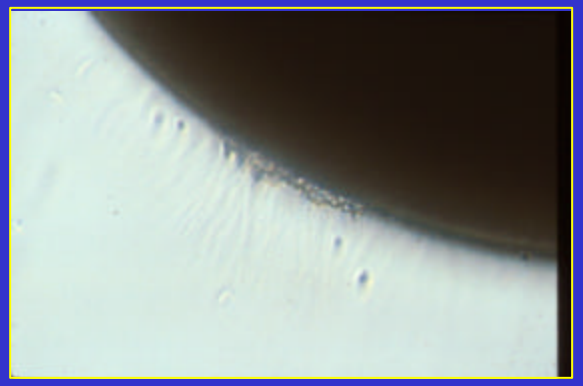
Chronic Disturbance

REPRODUCTIVE FAILURE



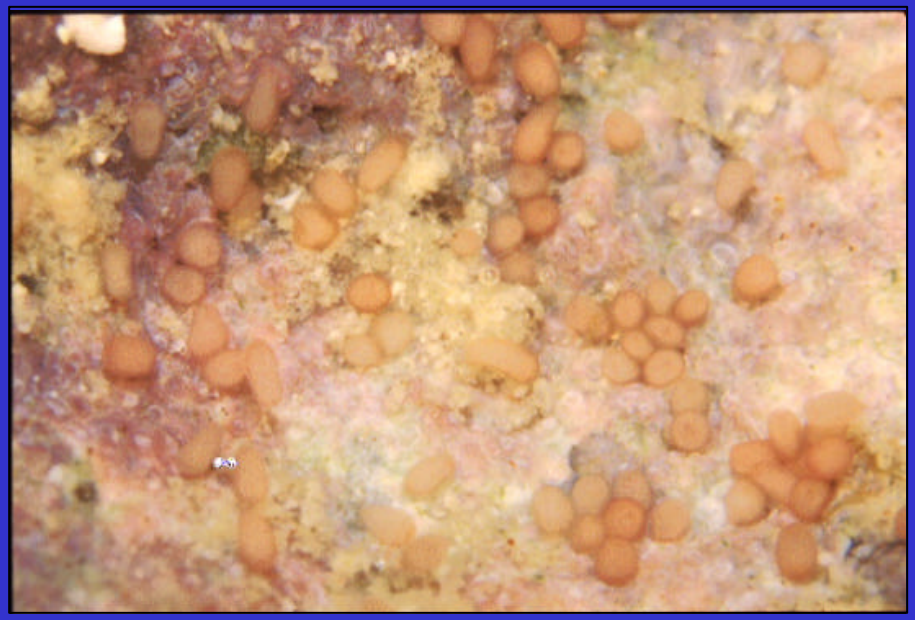


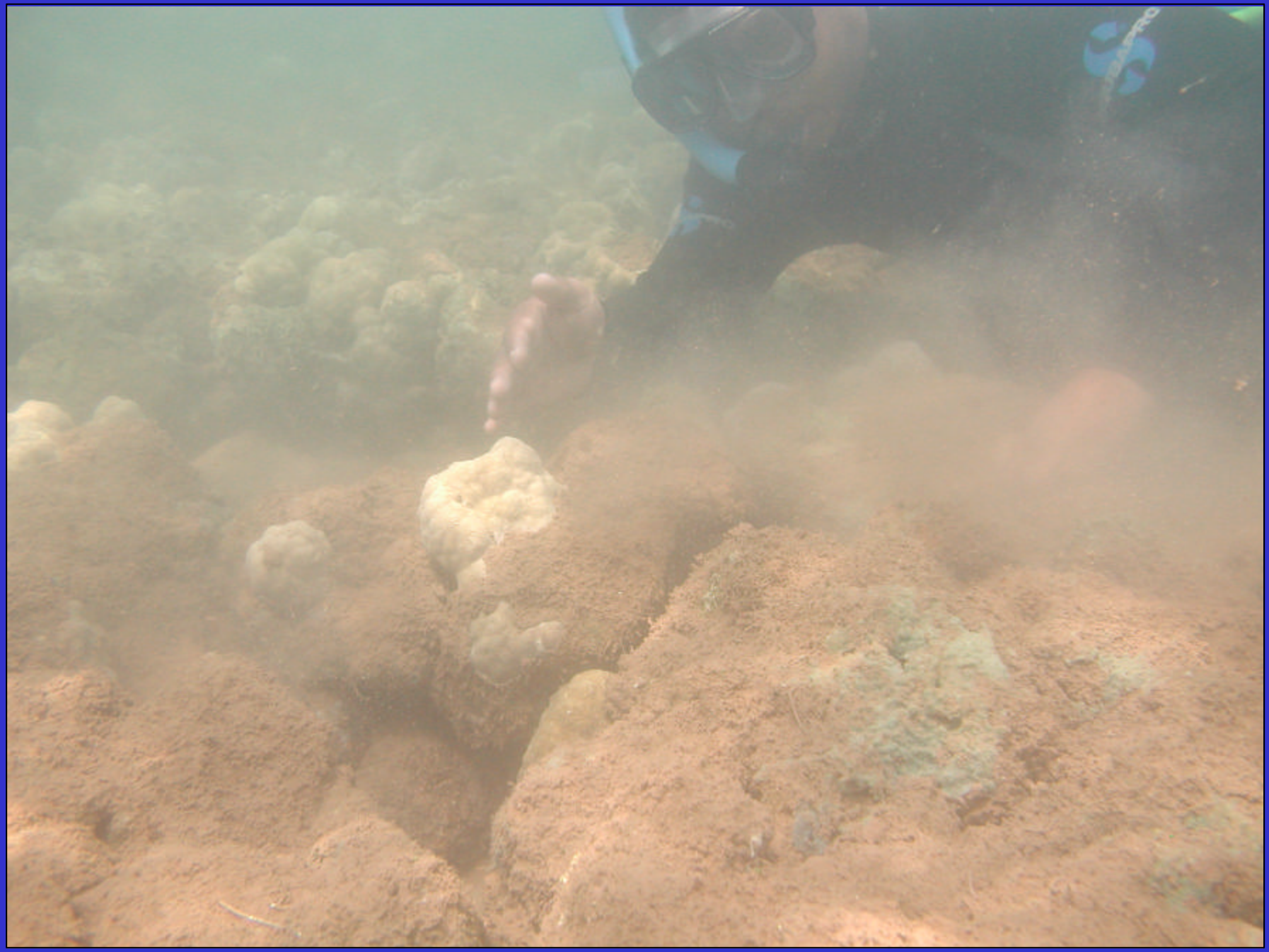




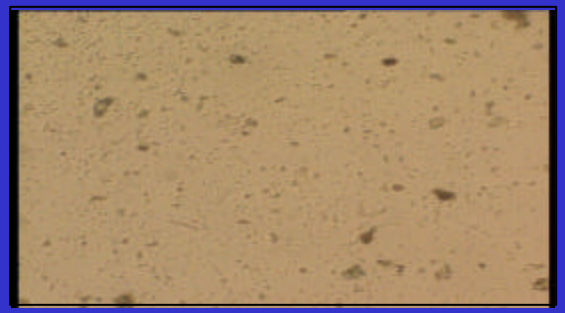
Eutrophication and Algal Overgrowth

CORAL RESEEDING & RESTORATION

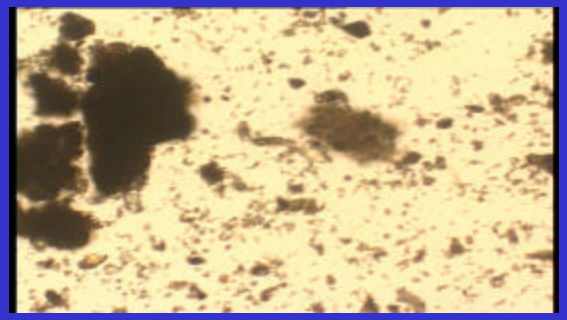




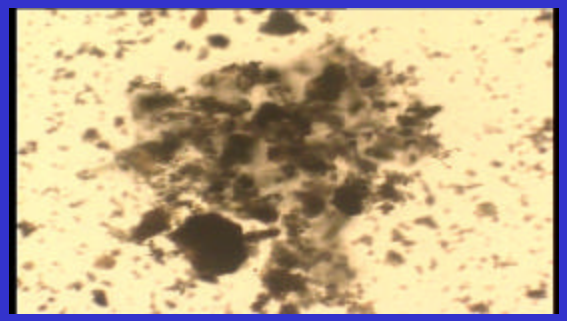
Marine Snow



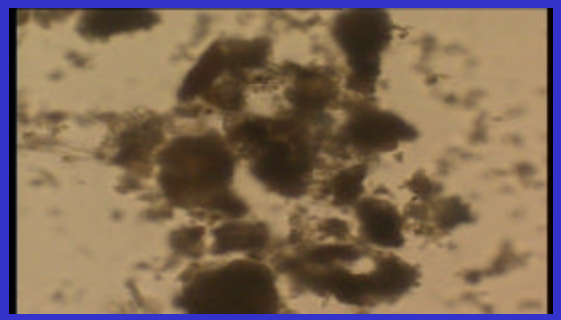
Freshwater



5 min



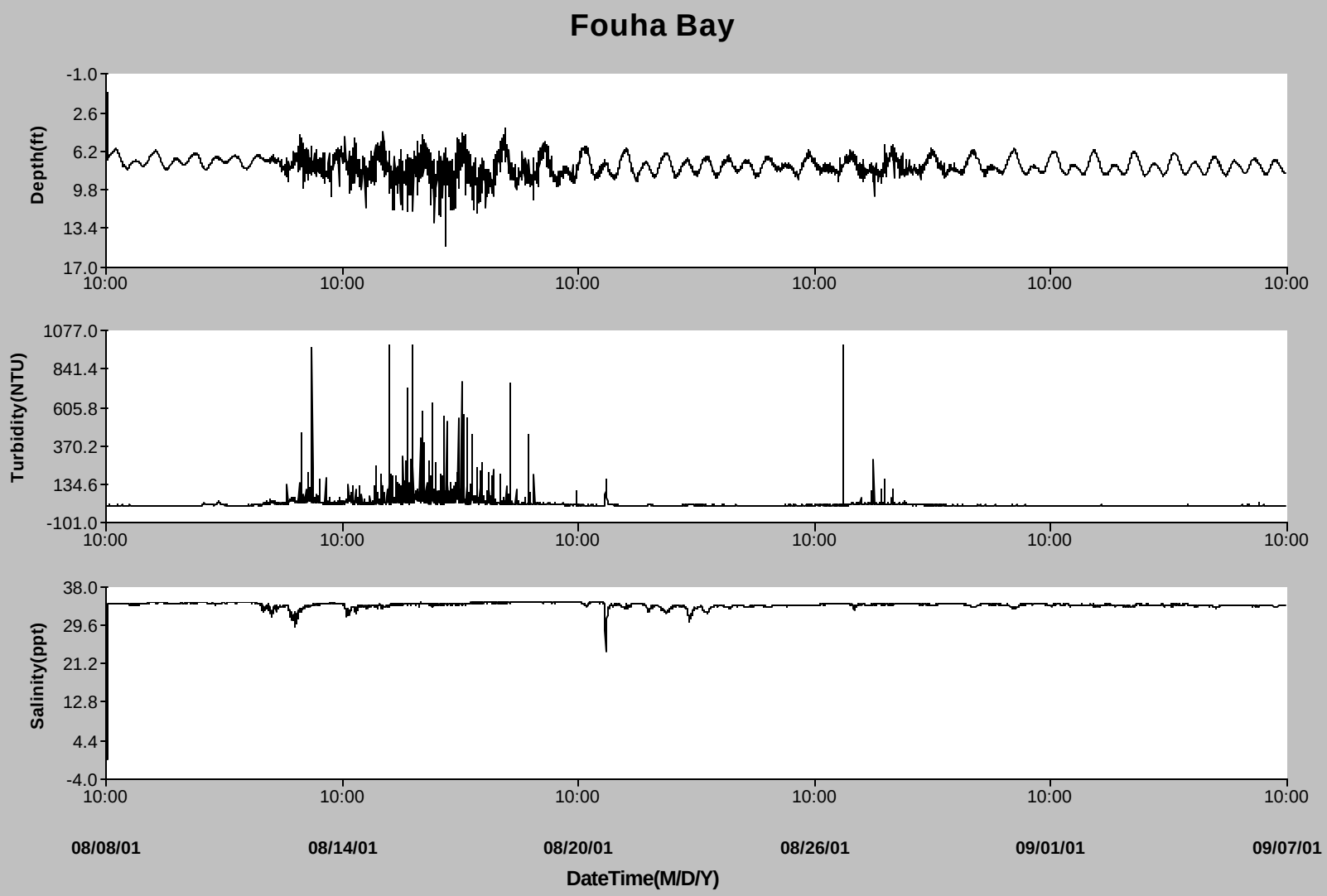
10 min



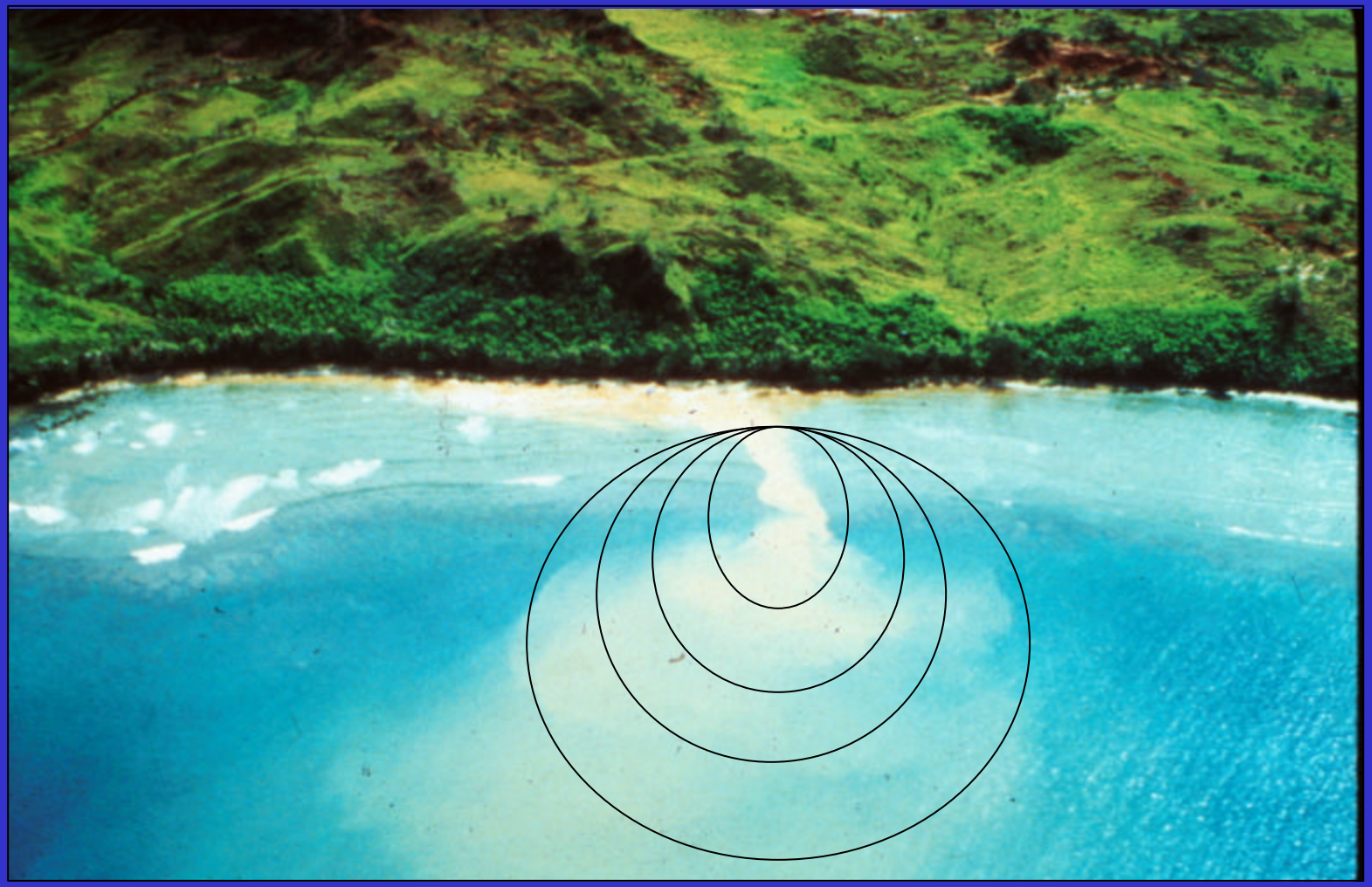
30 min

Width=1000 um

Turbidity/salinity/wave profile – Fouha Bay, Guam



Integrated Watershed Management



Mortality is a rather crude indicator of

Stress

Multiple Technologies and their Application

Ngerikill Watershed - Palau

Relevant Legislation

1) 1898 - River and Harbors Act (ACOE)

2) 1958 - Fish & Wildlife Coordination Act

3) 1969 - NEPA

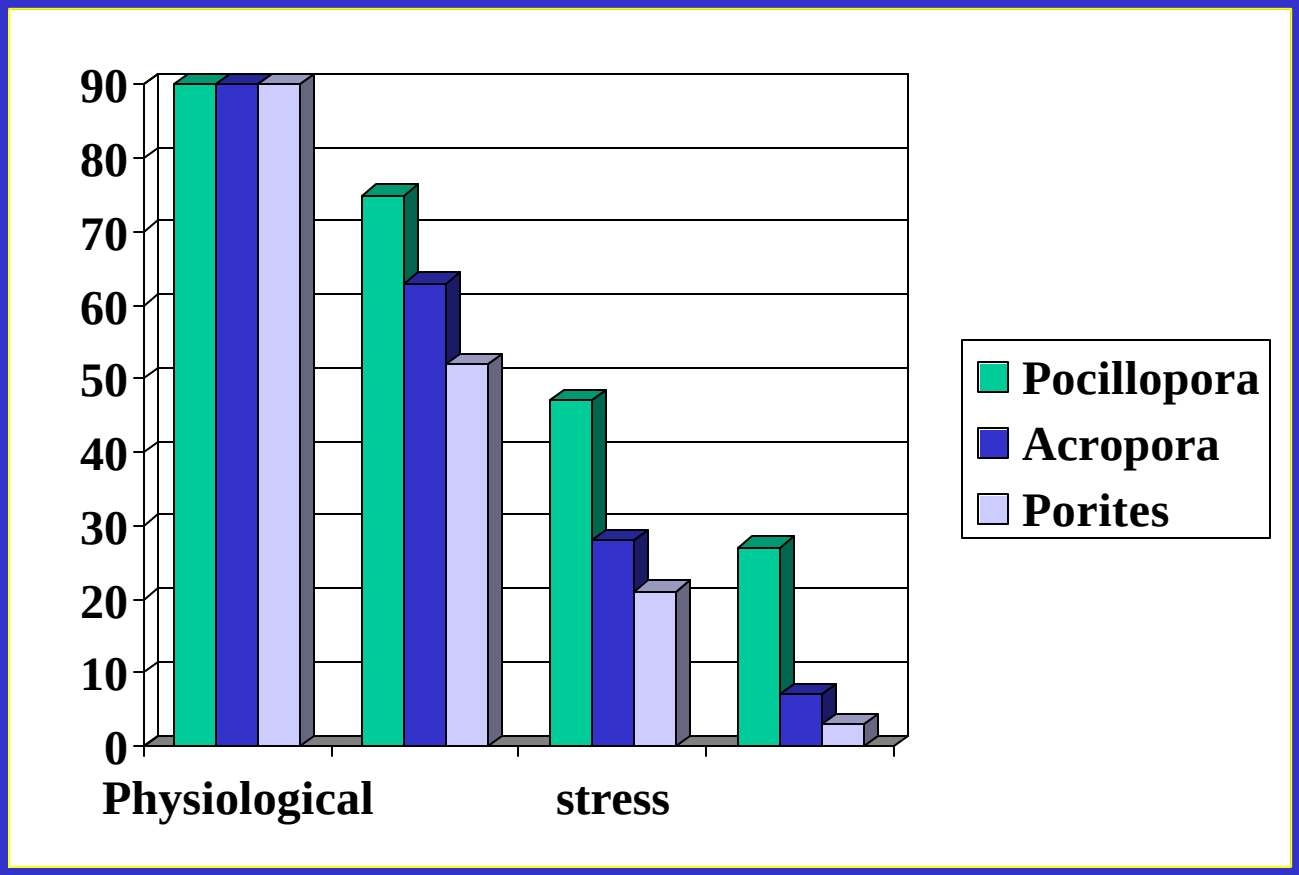
4) 1972 - CZM Act

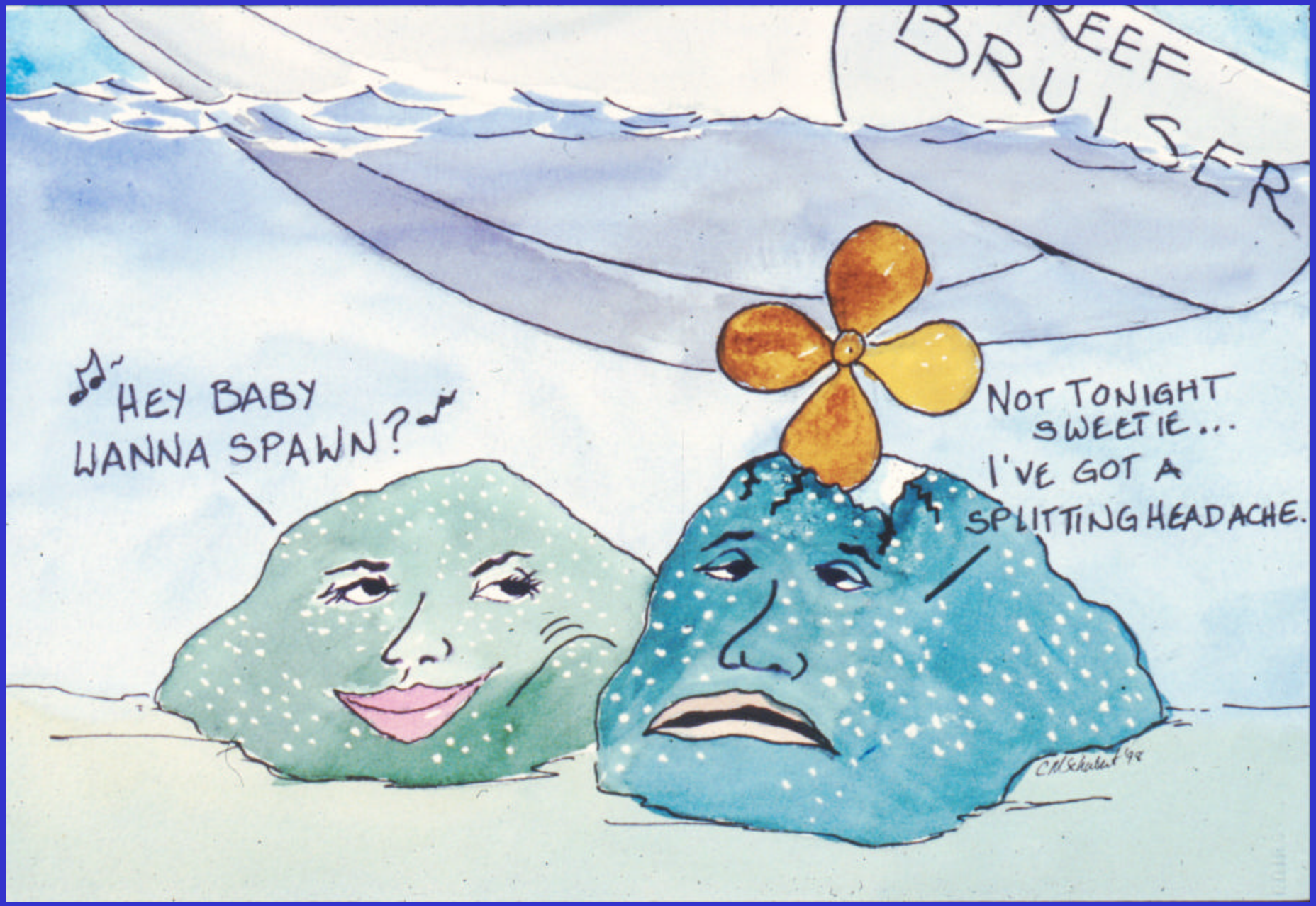
5) 1973 - Endangered Species Act

6) 1977 - Clean Water Act (EPA/ACE)

7) 1978 - Council of Envir. Quality 40 CFR 1500-1508 Sect. 404(B)(I)

8) Executive Order 13089


90
80
70
60
50
40
30
20
10
0
Physiological
stress
Pocillopora
Acropora
Porites


REEF BRUISER
HEY BABY WANNA SPAWN?
NOT TONIGHT SWEETIE... I'VE GOT A SPLITTING HEADACHE.

- Science: Asking and answering questions. Within the context of the CRTF, Why?
- Interdisciplinary and Multidisciplinary approach is important including the Social Sciences
- Integration of land-based and coastal issues rather than separation under the present regulatory framework (integratede watershed management).
- Translation of scientific information into a form and format that is easily accessible to stakeholders, policy makers and managers (of human behavior and activities)
- Restoration is a worthwhile goal, and success is dependent upon restoration of conditions that support natural recovery