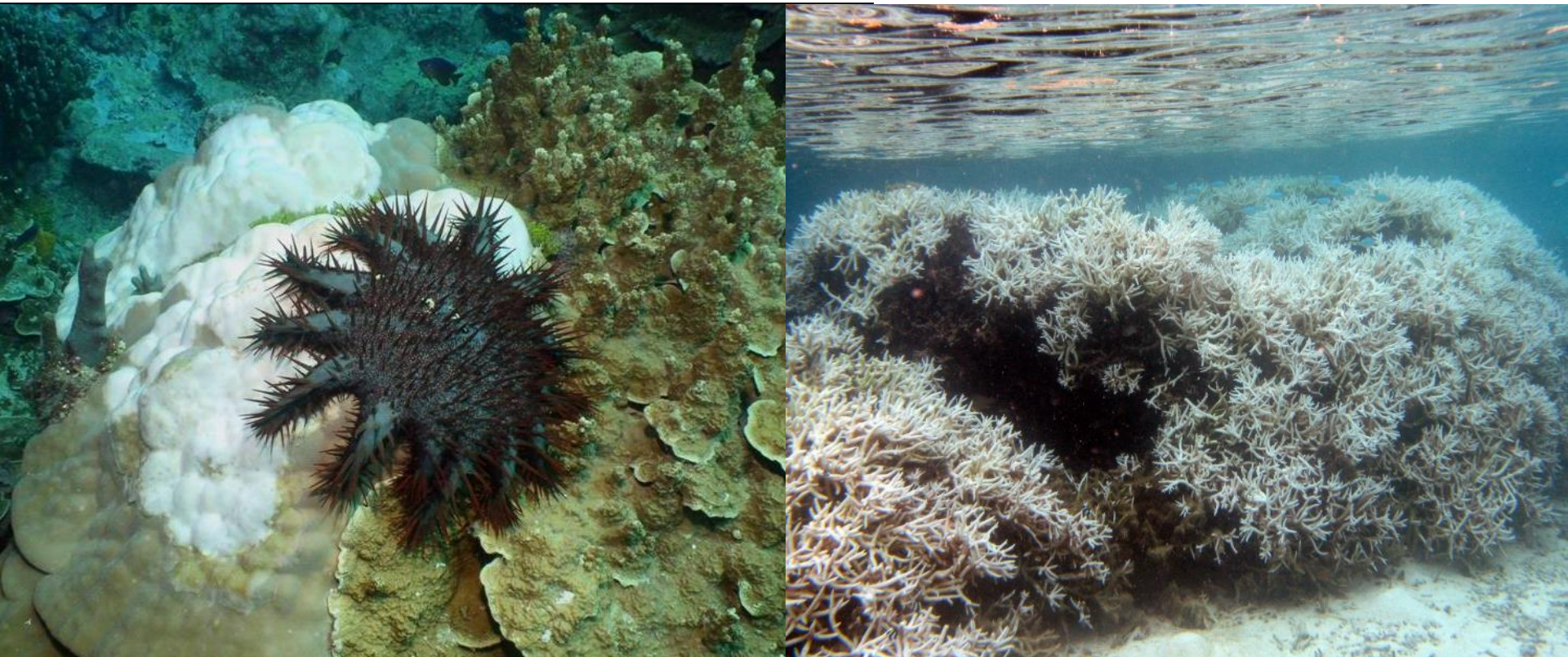


The Status of Guam's Shallow Coral Reefs:



36th U.S. Coral Reef Task Force Meeting

**Dave Burdick, Research Associate
University of Guam Marine Lab**



Nearshore reef types and area

- Fringing, barrier, patch

- Reef area:
 - Guam: 105 km² (41 mi²)*

 - CNMI: 203 km² (78 mi²)*
 - Saipan, Tinian, Rota: 105 km² (41 mi²)**

 - Palau: ~1500 km² (580 mi²)



**NOAA NCCOS-CCMABB (2012), to ~30 m depth

**NOAA PIFSC-CREP (2012), to ~30 m depth

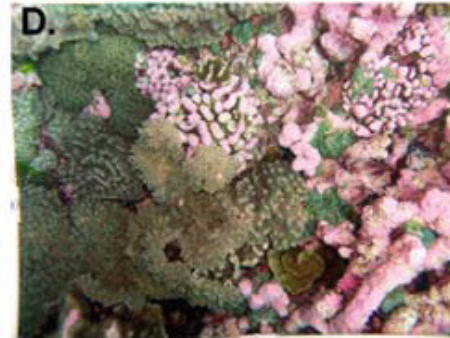
Kingman Reef



Pristine

Population: 0
Pop. Dens.: **0 ind/km reef**

Palmyra Atoll



Good

Population: 20
Pop. Dens.: **0.5 ind/km reef**

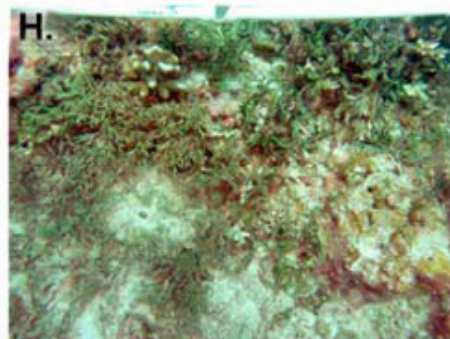
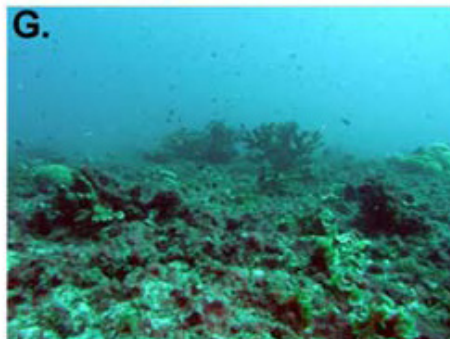
Tabuaeran



Fair

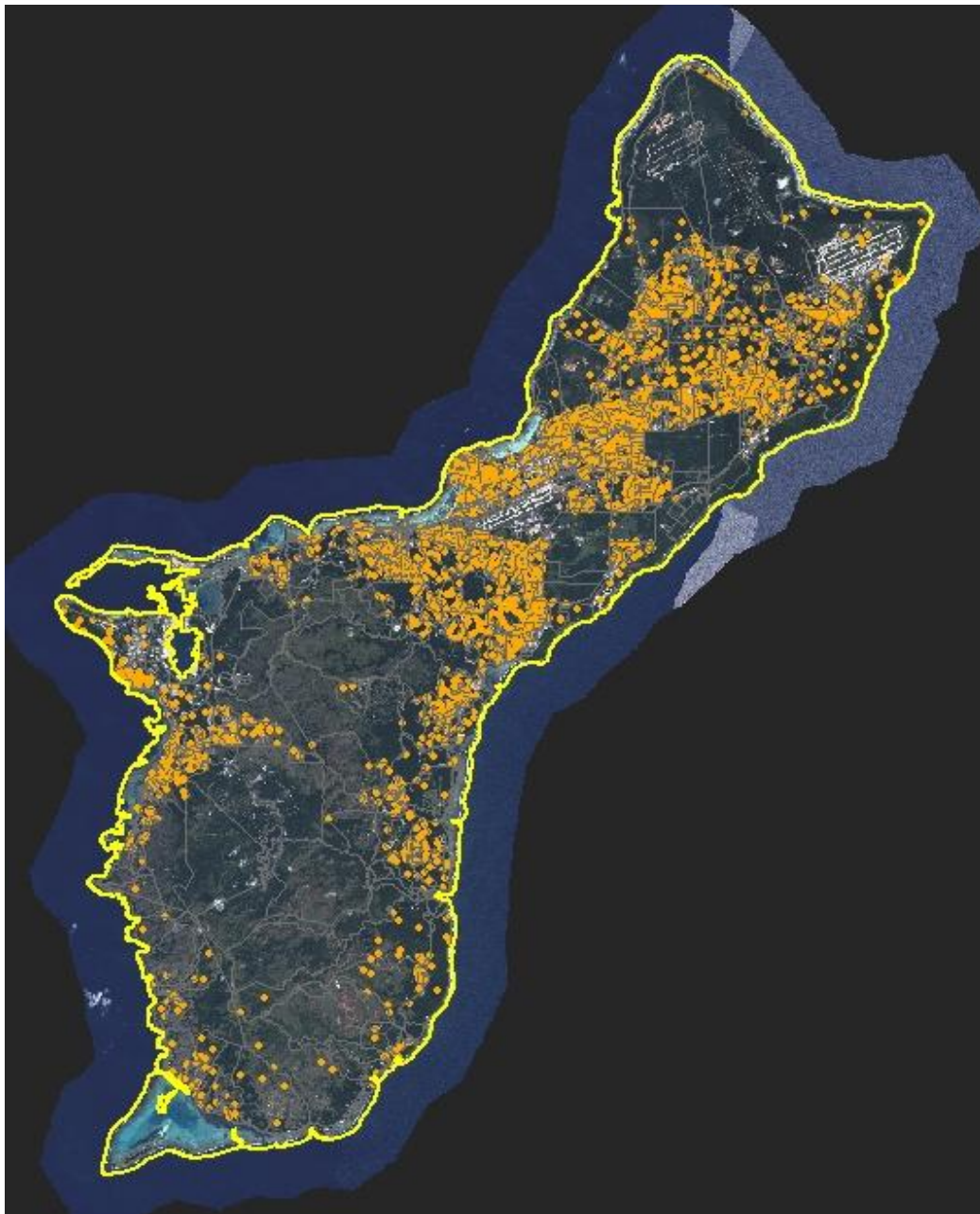
Population: 2539
Pop. Dens.: **62.2 ind/km reef**

Kiritimati



Poor

Population: 5115
Pop. Dens.: **108.9 ind/km reef**
Commercial fishing



- Population: ~160,000
 - Pop. Dens.: ~730 ind/km reef
 - 7x density of “Poor” scenario
- + >1.3 million tourists/yr

Status of Guam's Reefs: Seaward slope

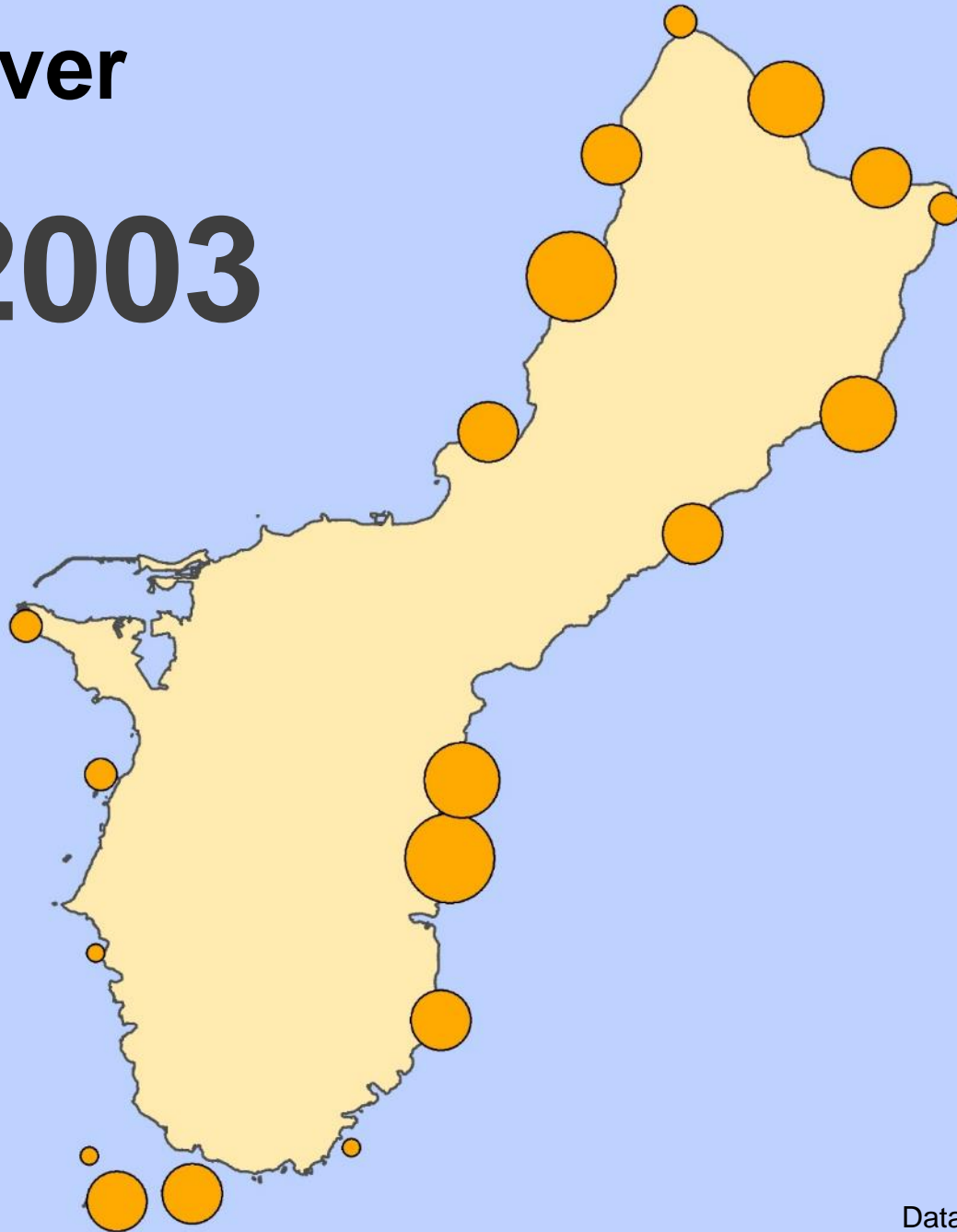
- An estimated **80% decline** in amount of living coral along seaward slope since 1960s
 - 1960s-1990s: ~50% to ~25%*
 - 2003-2014: 16% to 10%**
 - but change not statistically significant at island-scale
 - ~10% cover since 2009

*Status of the Coral Reef Ecosystems of Guam: 2008

**NOAA PIFSC-CREP

Coral cover

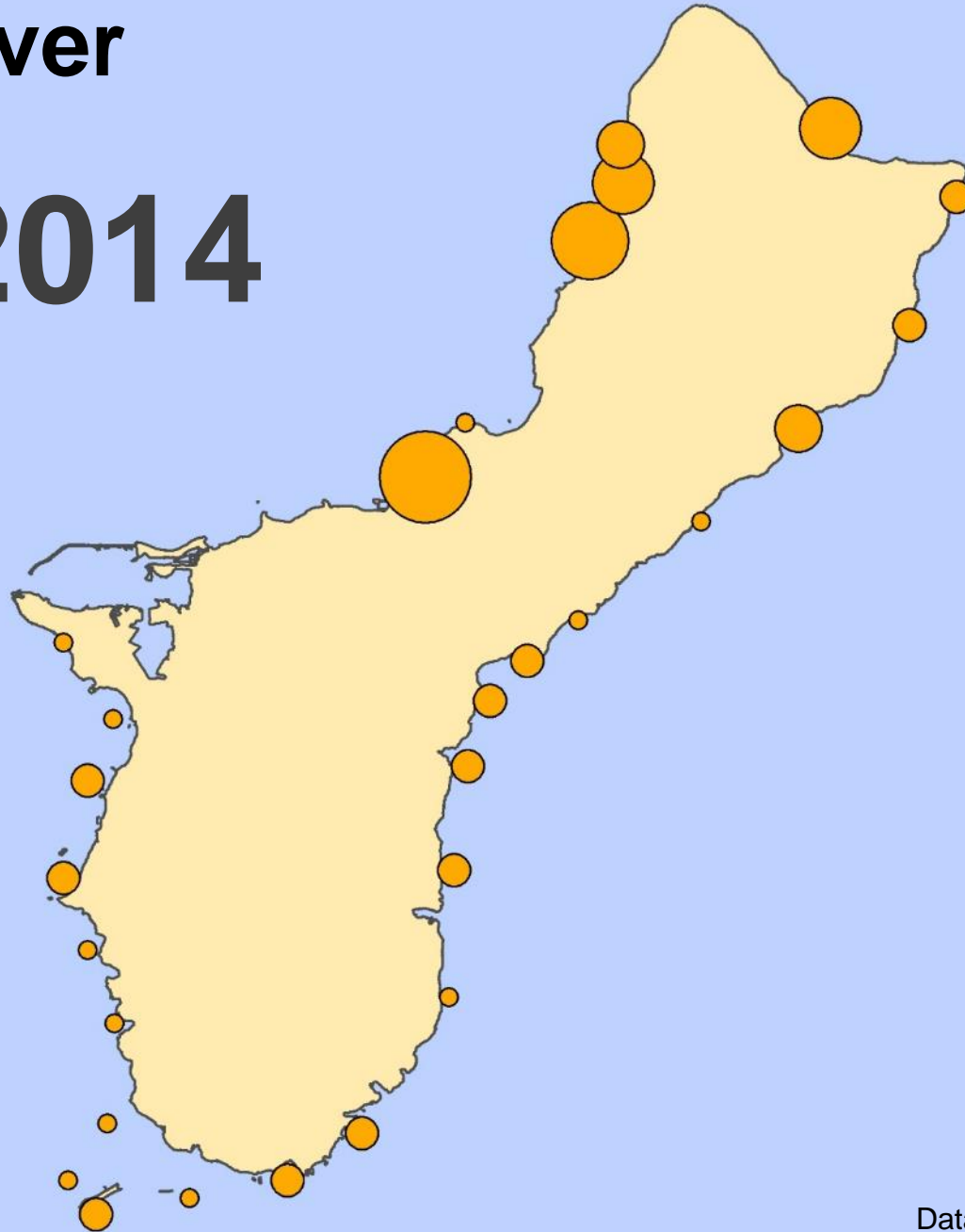
2003



Data source: NOAA PIFSC-CRED

Coral cover

2014

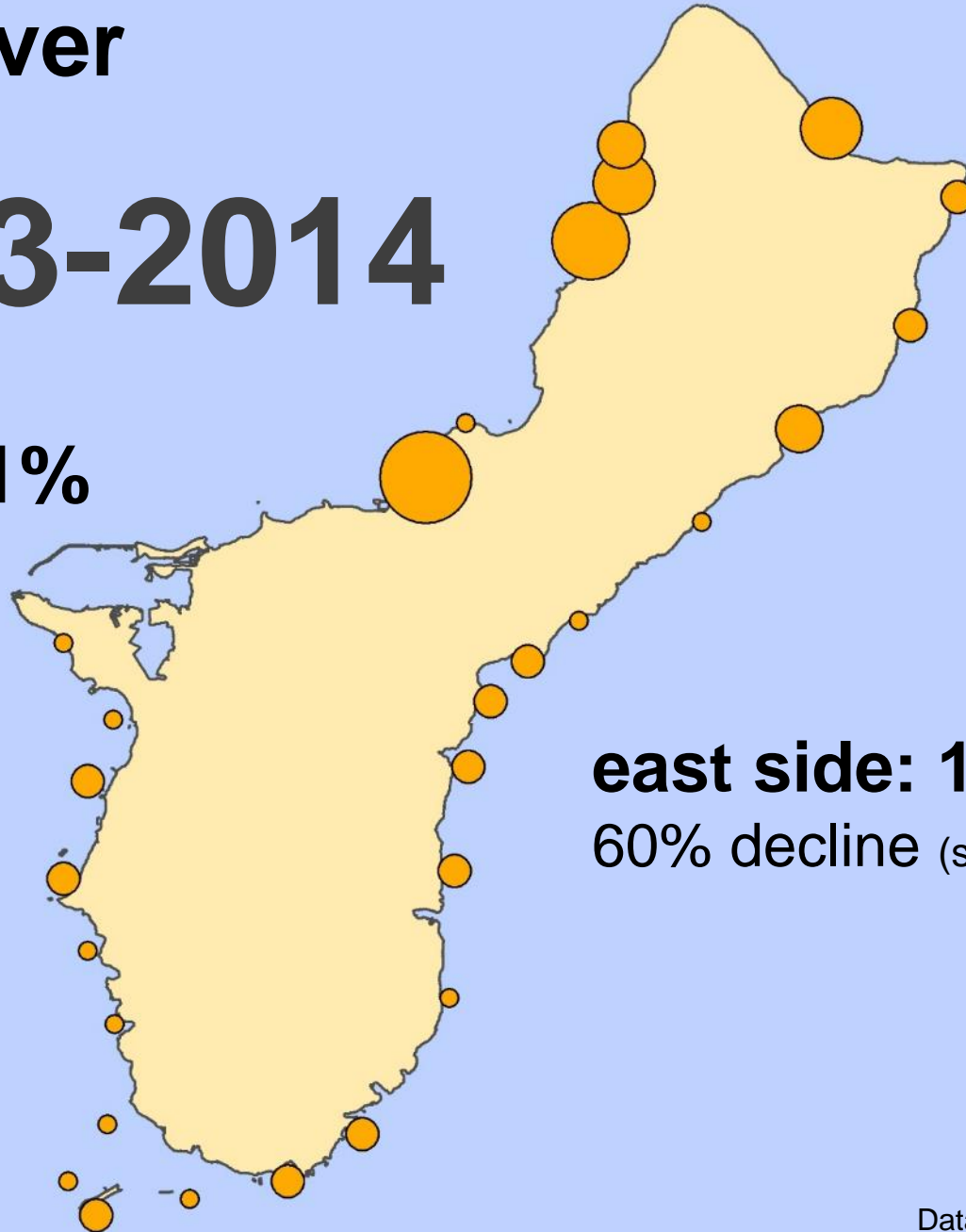


Data source: NOAA PIFSC-CRED

Coral cover

2003-2014

west: ~11%



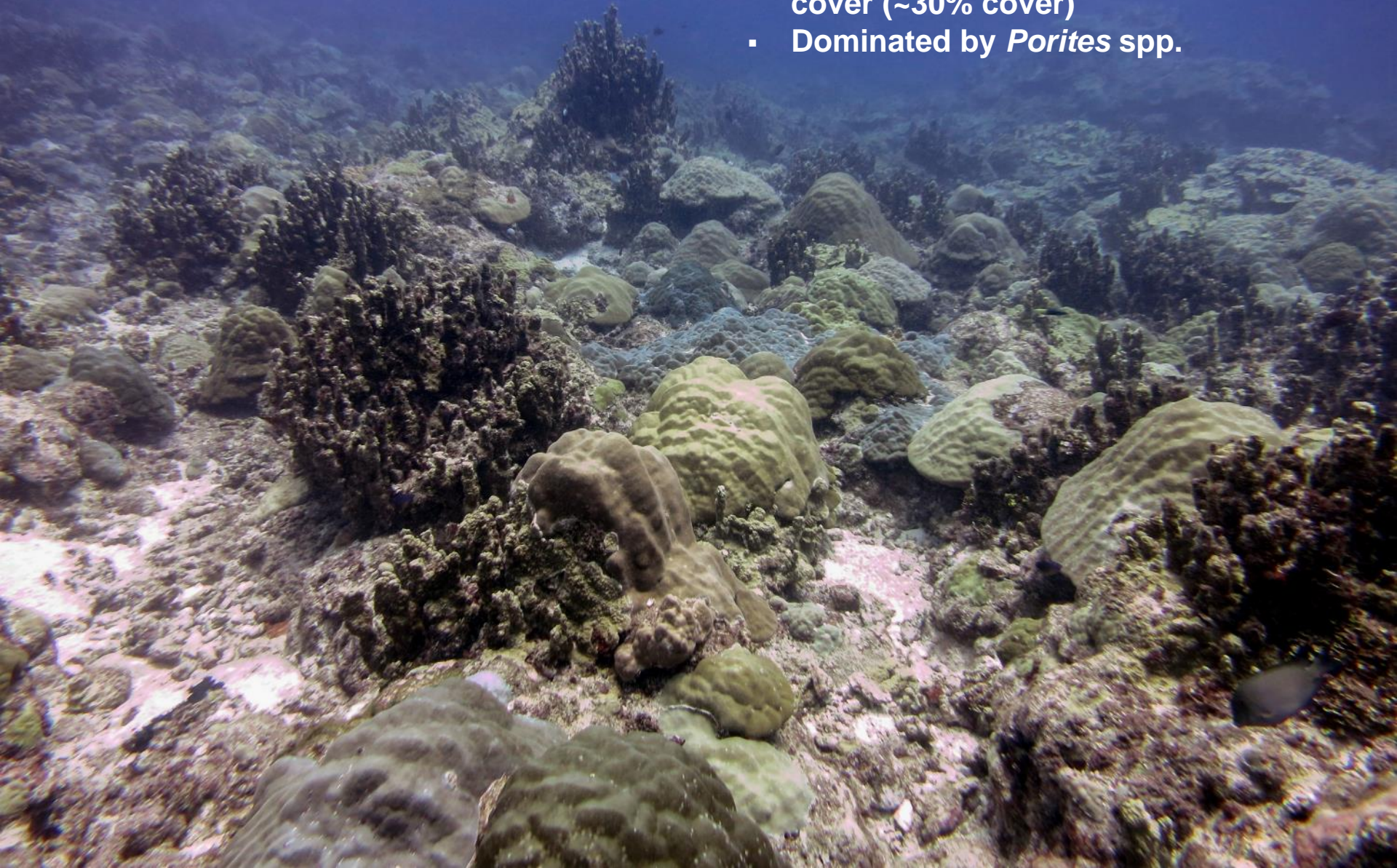
east side: 17% to 7%
60% decline (statistically significant)

NW

Tumon Bay

LTMP data:

- 2010-2015: Little or no change in coral cover (~30% cover)
- Dominated by *Porites* spp.



SE

Achang MP

LTMP data:

- 5% coral cover in 2014
- Mainly *Porites* spp.





SW

Fouha Bay

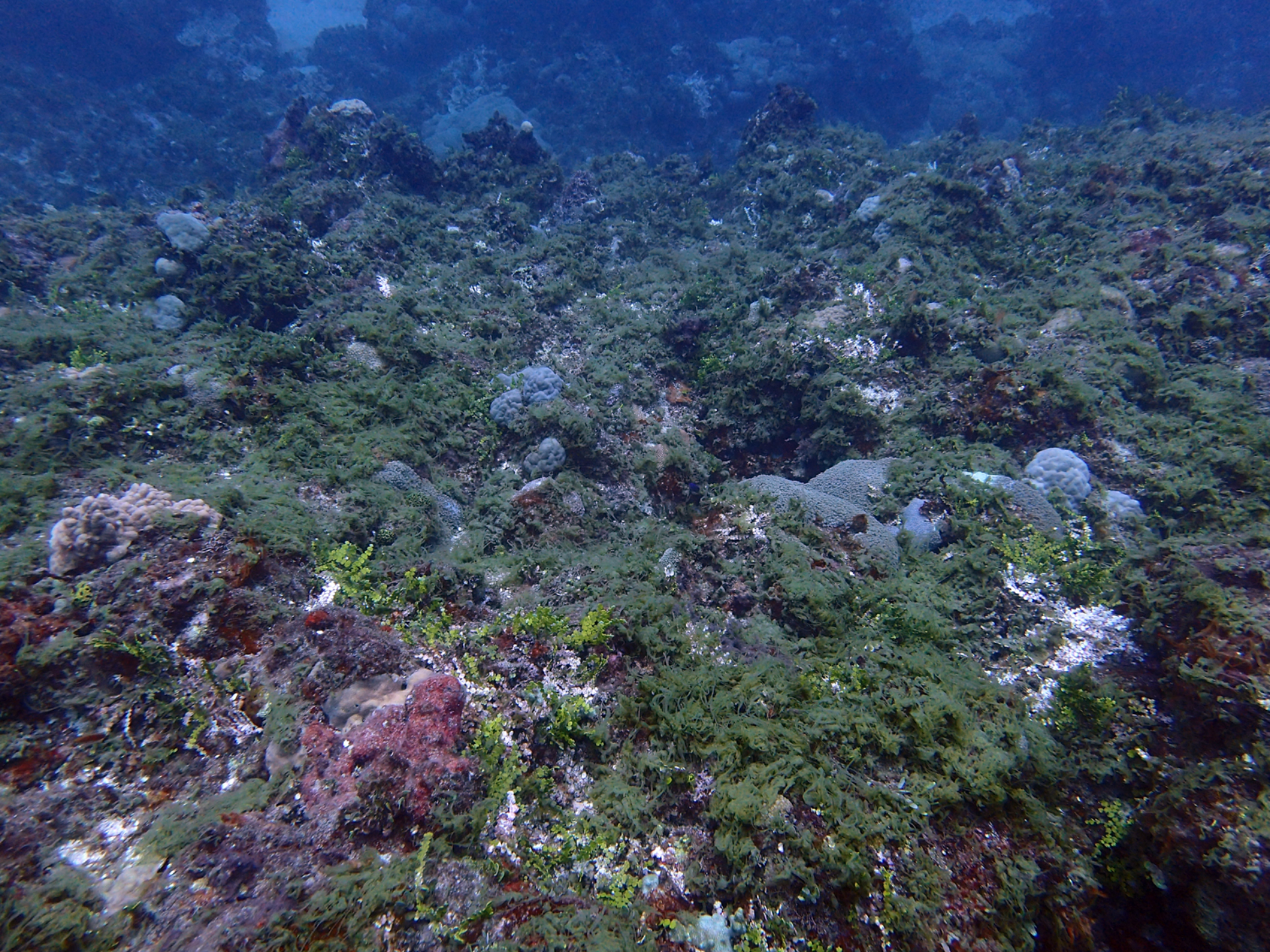
LTMP data (2015)

- Inner: 18% coral cover (mostly *Porites*)
- Outer: 2% coral cover



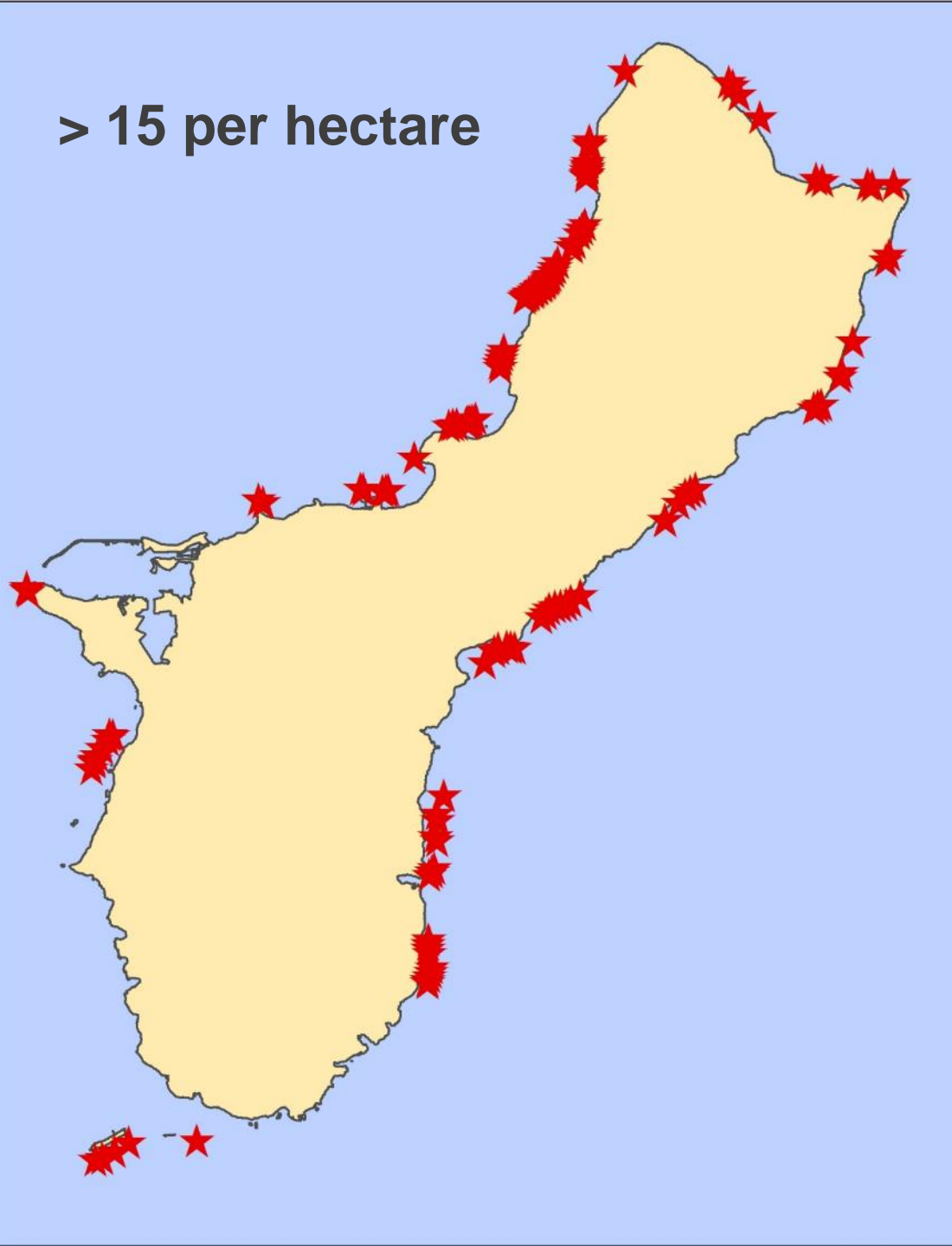
**Primary driver of recent coral loss
on seaward slope: COTS**





COTS outbreaks: 2003-2014

NOAA CREP towed-
diver surveys



Status of Guam's Reefs: Reef front

- ❑ 2013: Avg of ~25% coral cover island-wide
- ❑ Post-2013/2014 bleaching events?
 - At least 20% coral lost (still to be confirmed)





Status of Guam's Reefs: Reef flats/lagoons

- 2013/2014: Lost ~50% of staghorn corals island-wide*
- 2015/2016: Observed additional mortality, not yet quantified

*Raymundo et al. (In review)



**Impaired water
quality: affecting
multiple reef
zones**

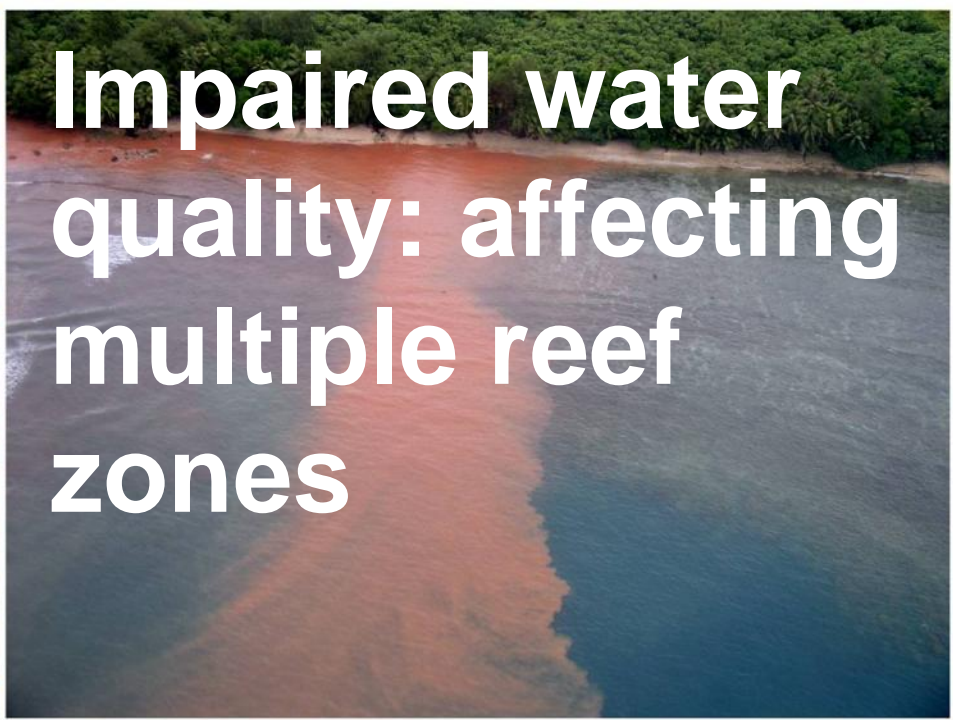






Photo: Mark Defley



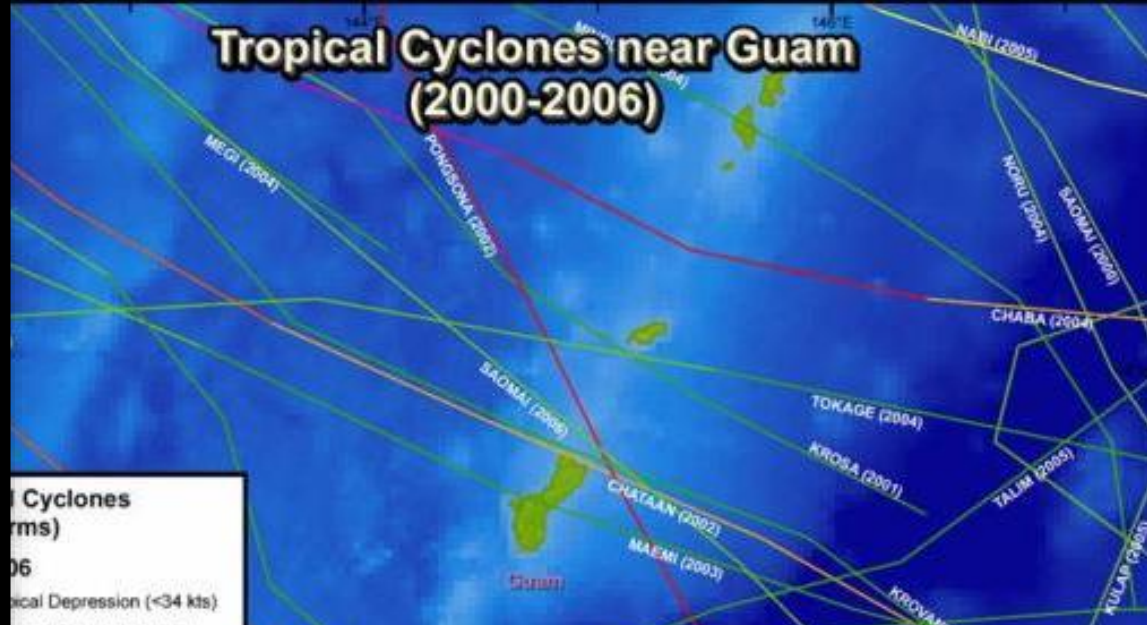


Photo: Guam DAWR



Photo: Guam EPA

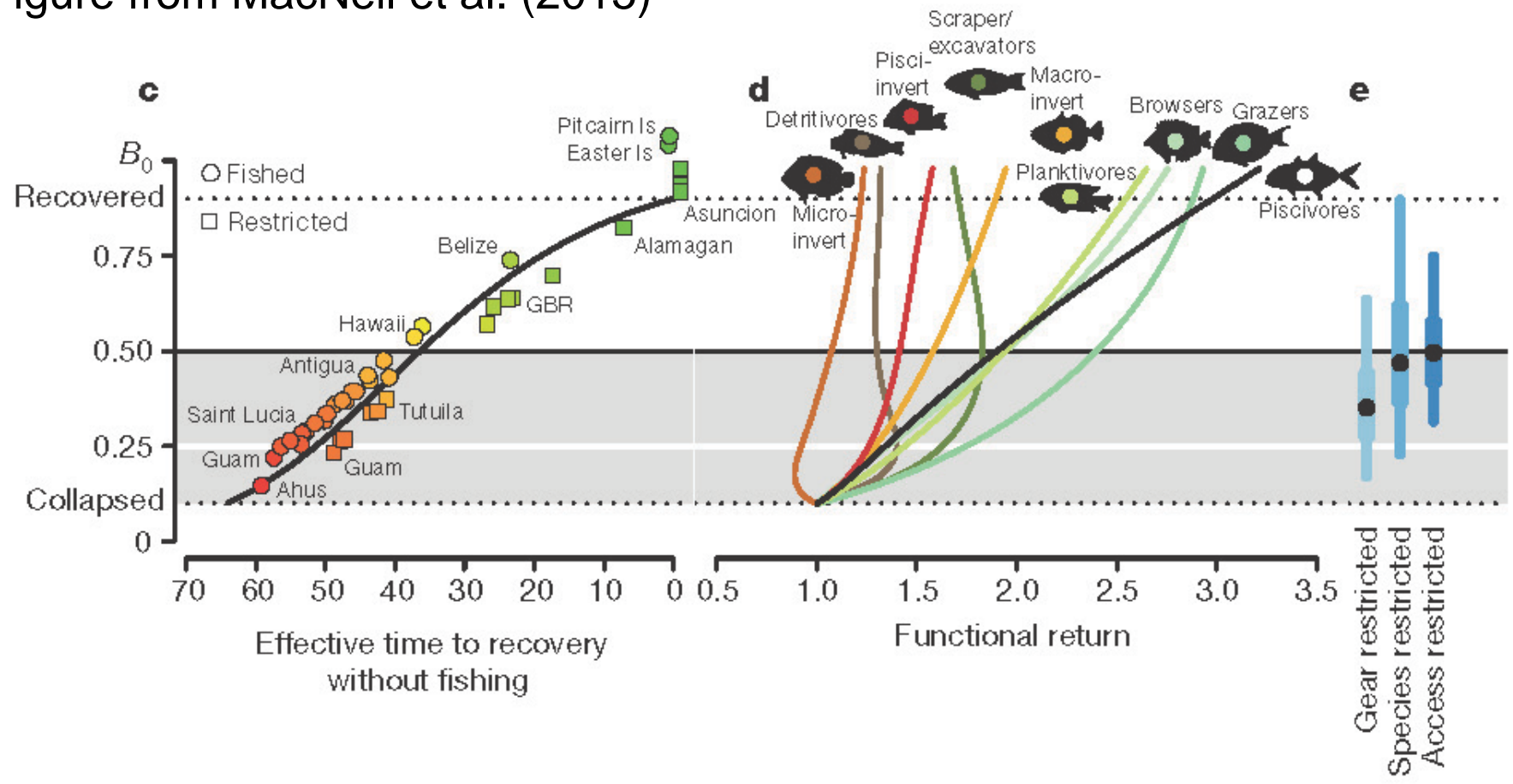


Inhibiting reef recovery:

- ❑ Chronically impaired water quality
- ❑ Limited coral recruitment / heavy reliance on self-seeding
- ❑ Few large herbivorous fishes
 - Mostly smaller parrotfishes
 - 2014 CREP: 92% of ind/~70% of biomass

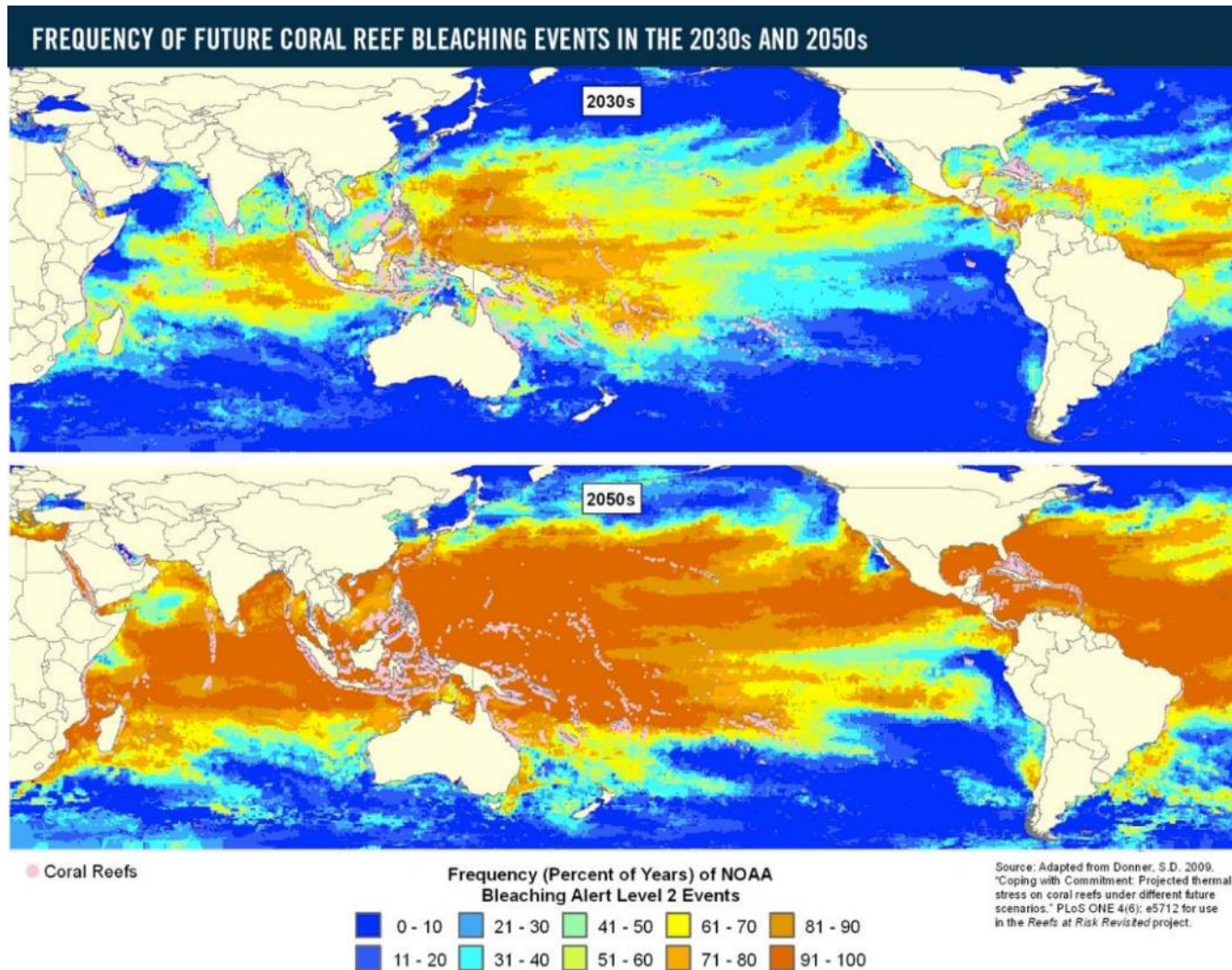


Figure from MacNeil et al. (2015)



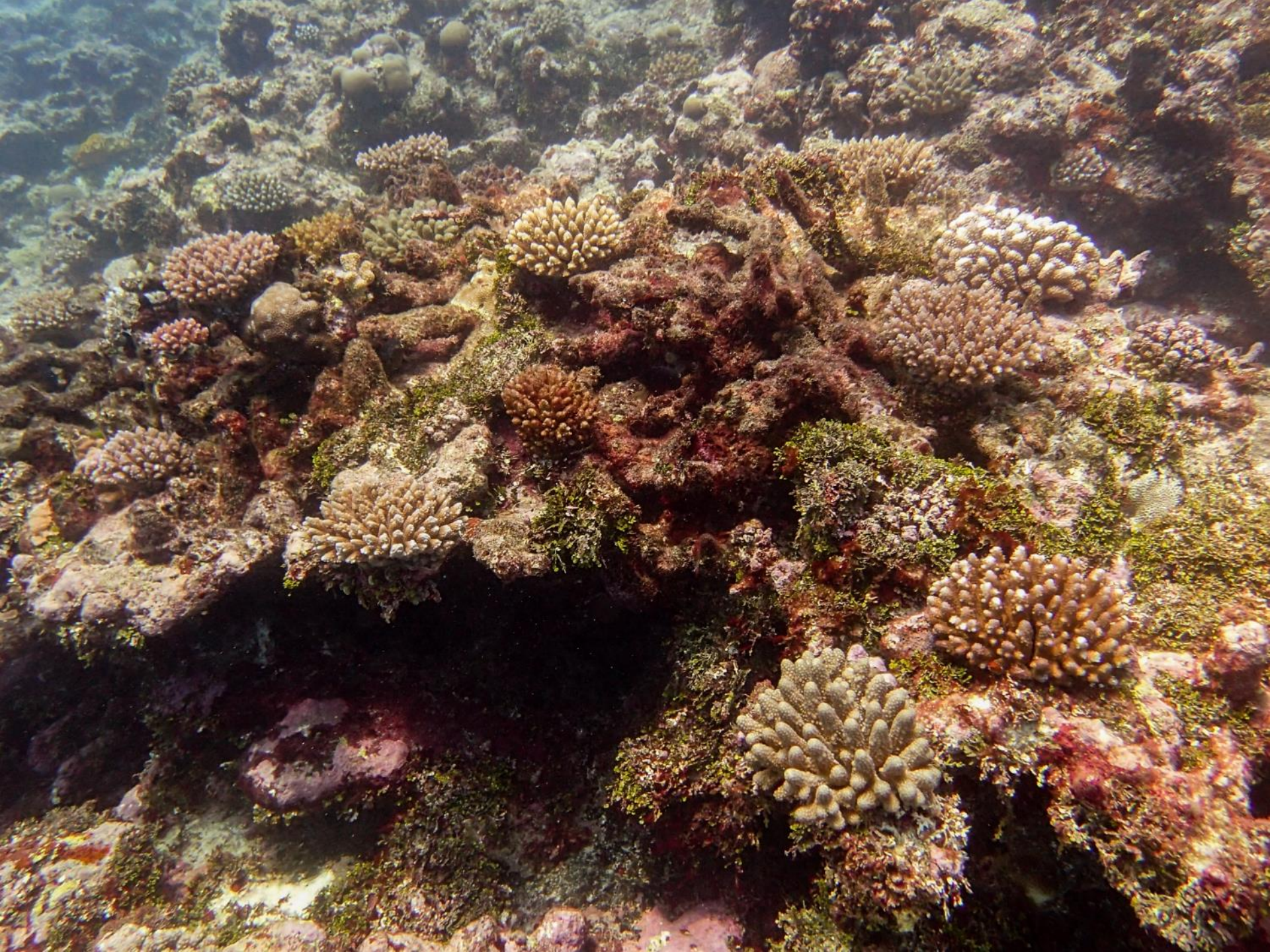
2014 CREP fish data: Mean total fish biomass = ~210 kg/hectare

Near-annual mass coral bleaching events by 2030









Global temperature change (1850–2016)

