Fore-C: Forecasting coral disease outbreaks across the tropical Pacific

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Corals reefs provide ecosystem services

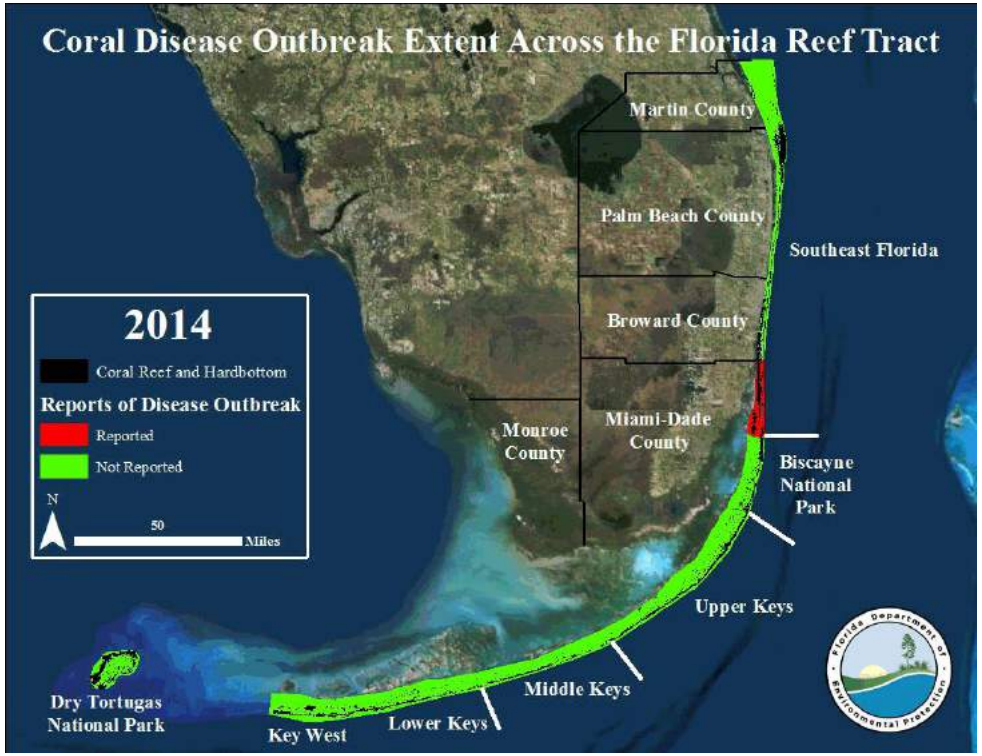
Tourism

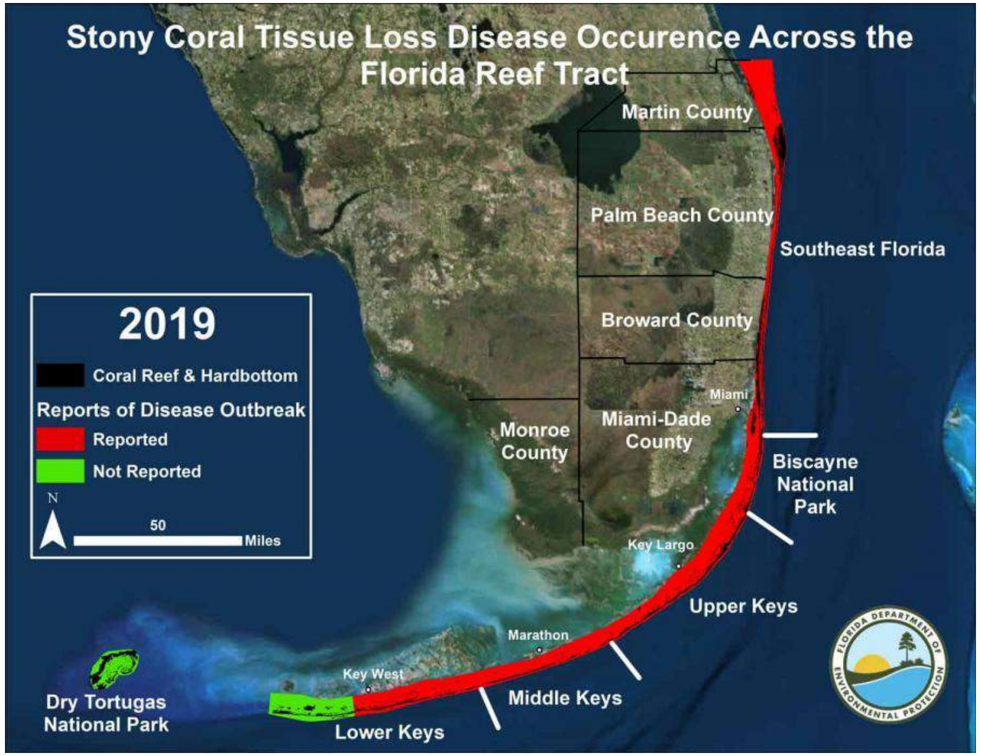
Food

Livelihoods

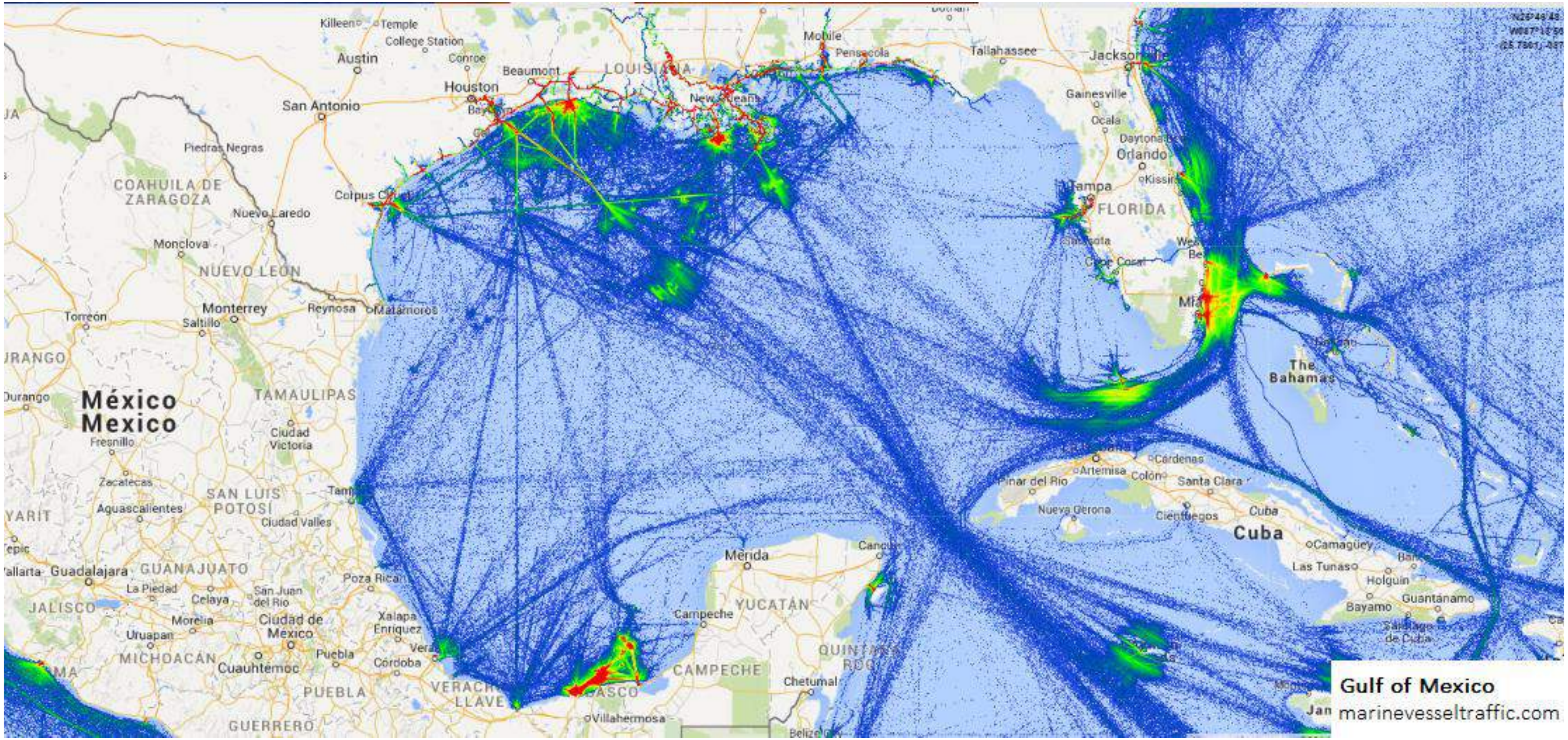
Coastline protection

Unprecedented & ongoing outbreak

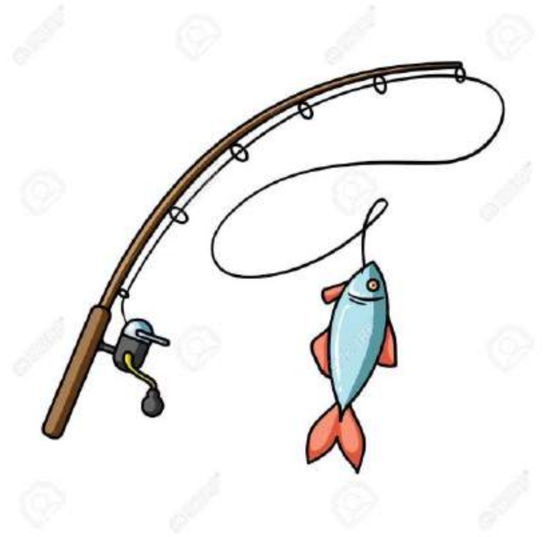




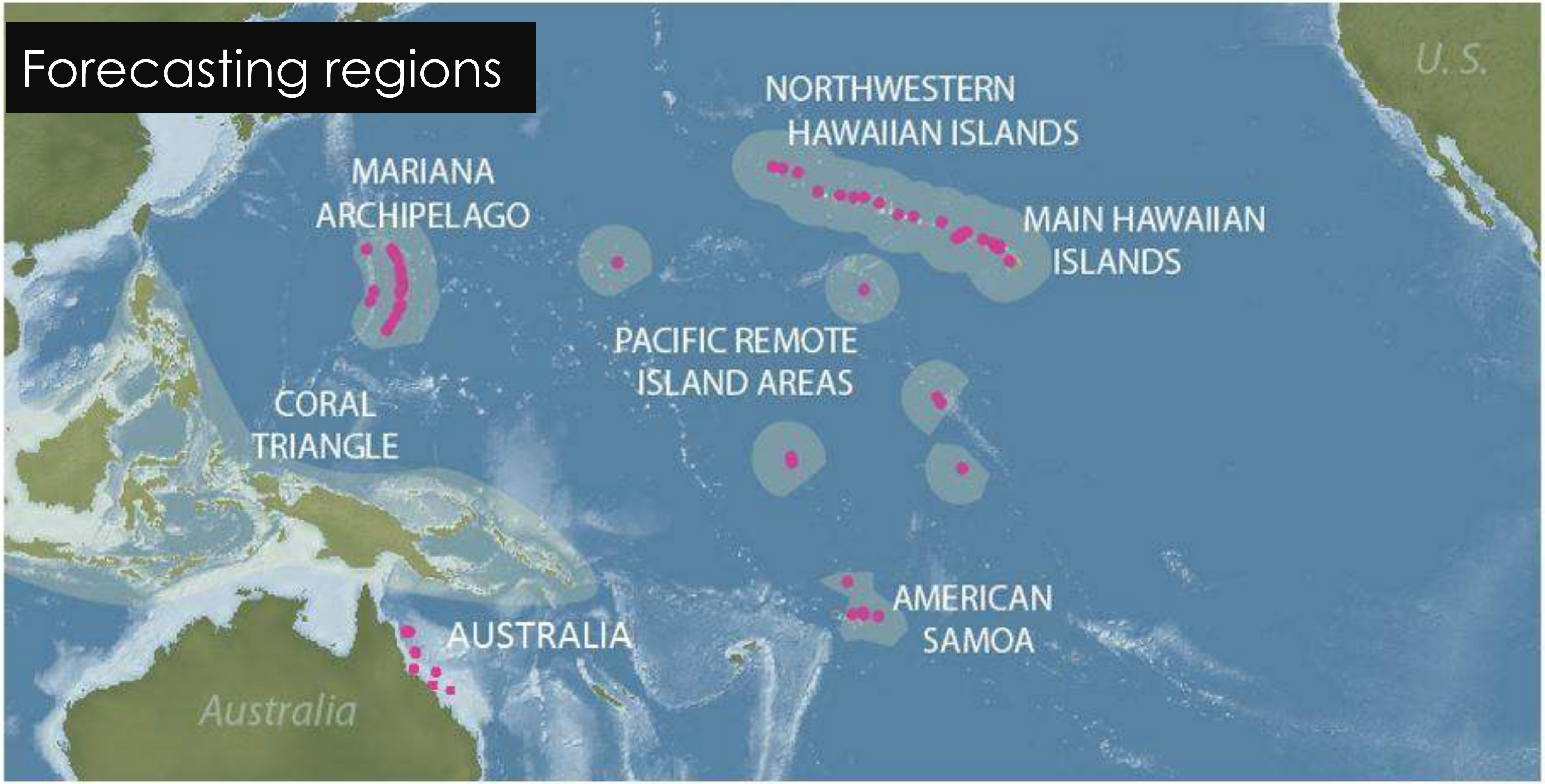
Unprecedented & ongoing outbreak



Drivers of coral disease spread



Overarching objective for Fore-C



Overarching objective for Fore-C

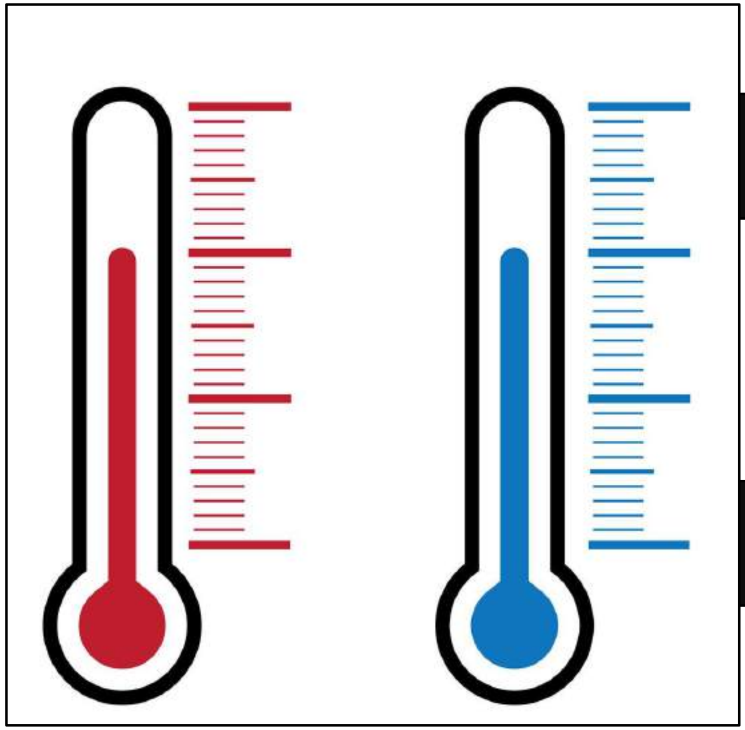
Tissue Loss

Black band

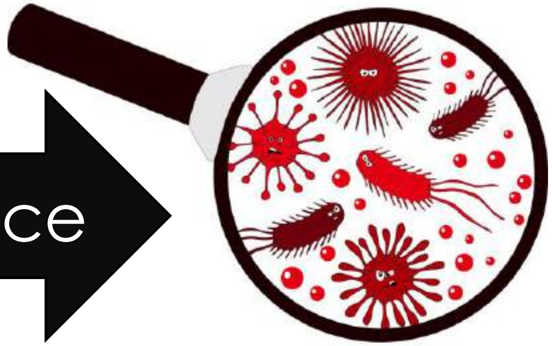
Growth anomalies

Photo: Bette Willis

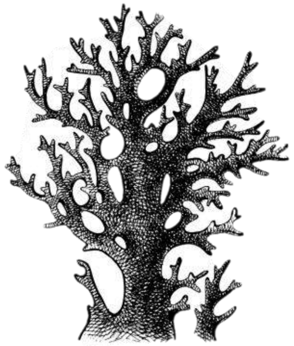
Temperature as a disease driver



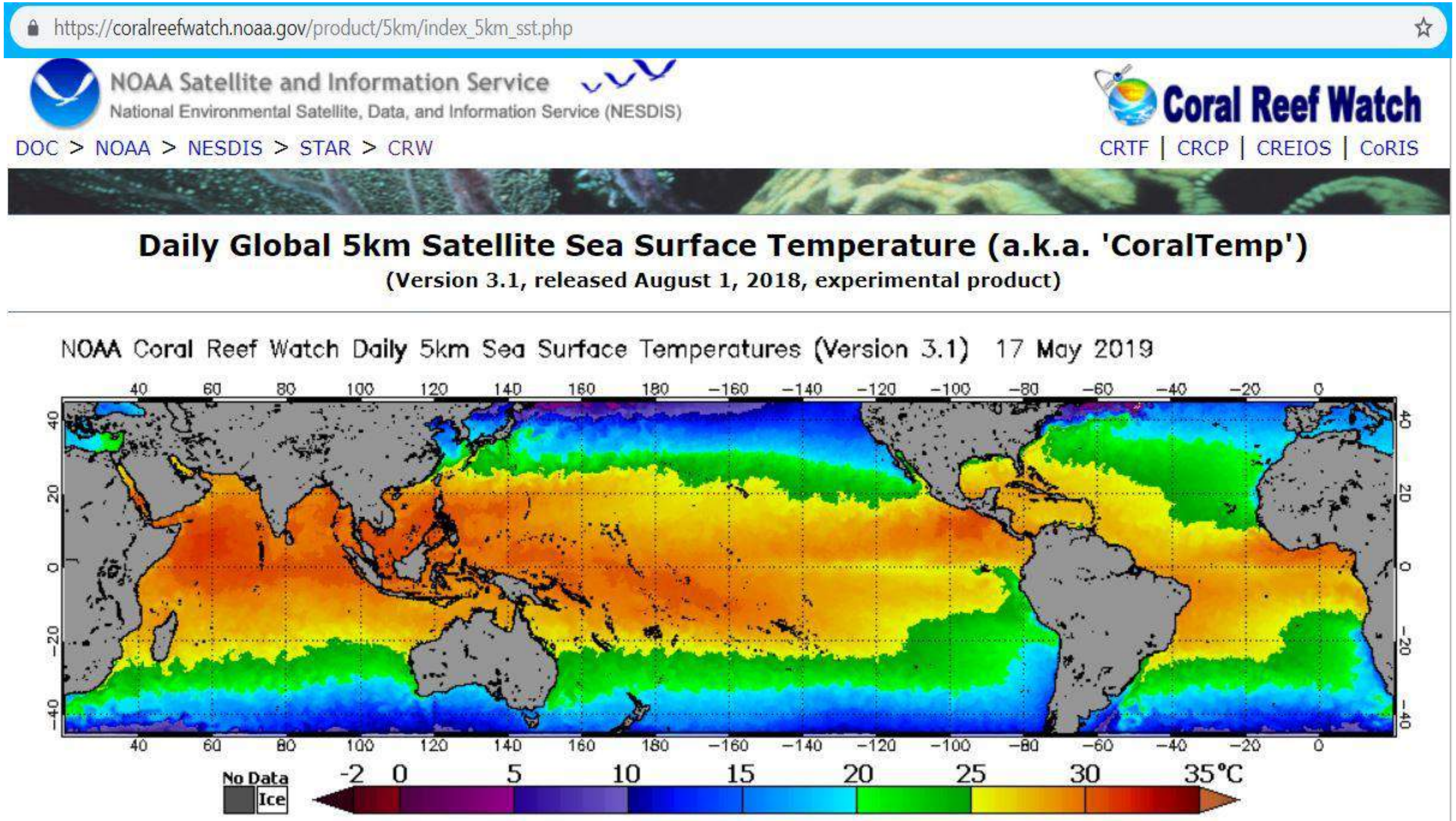
Pathogen survival, growth, virulence



Coral susceptibility



Temperature as a disease driver



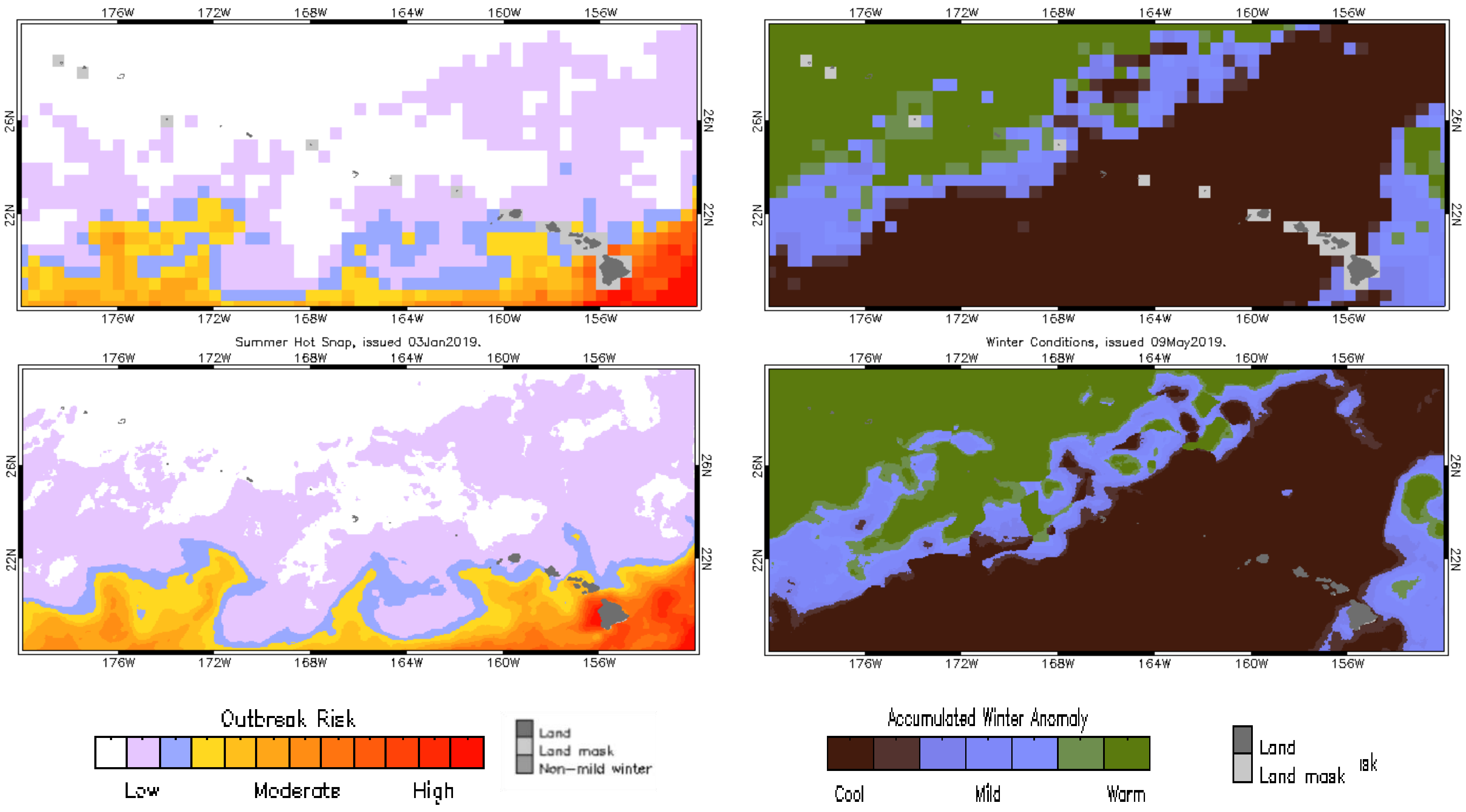
Temperature as a disease driver

Hot Snap

Winter Condition

50 km

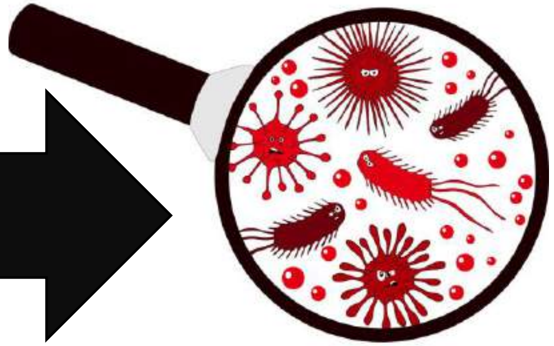
5 km



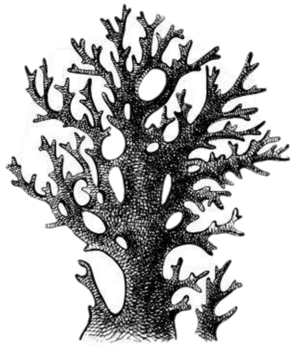
Water quality as a disease driver

Chlorophyll-*a*
Turbidity

Pathogen growth, transport

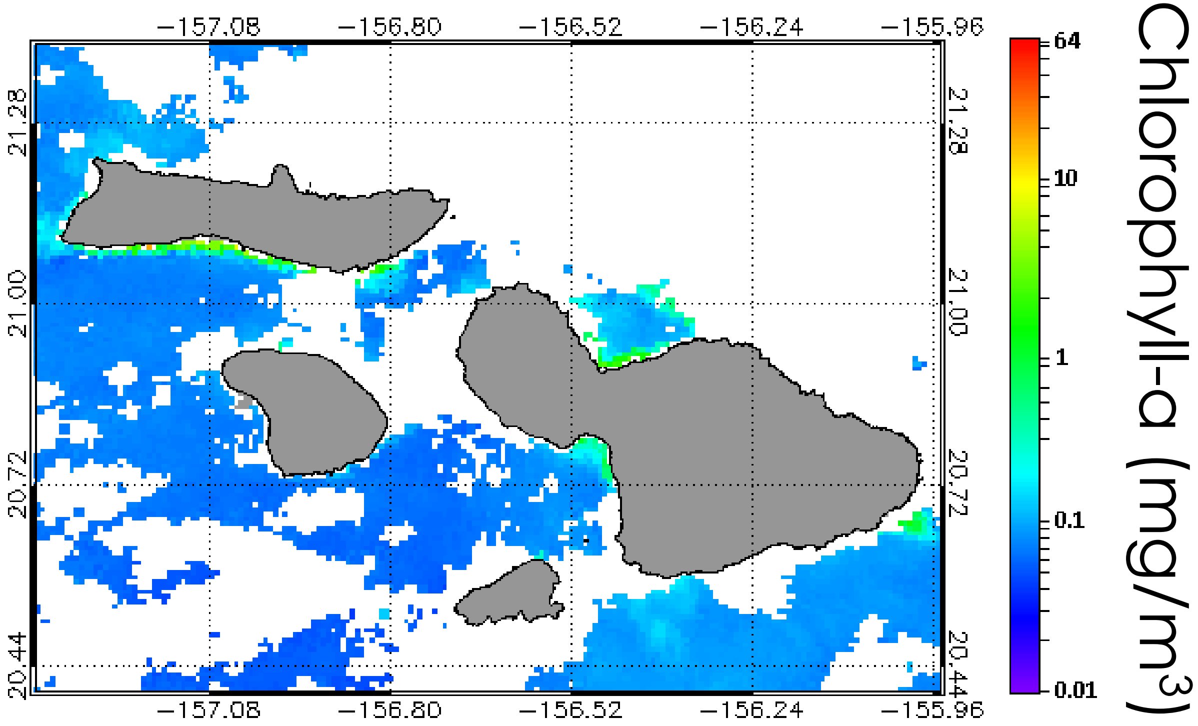


Coral susceptibility, feeding

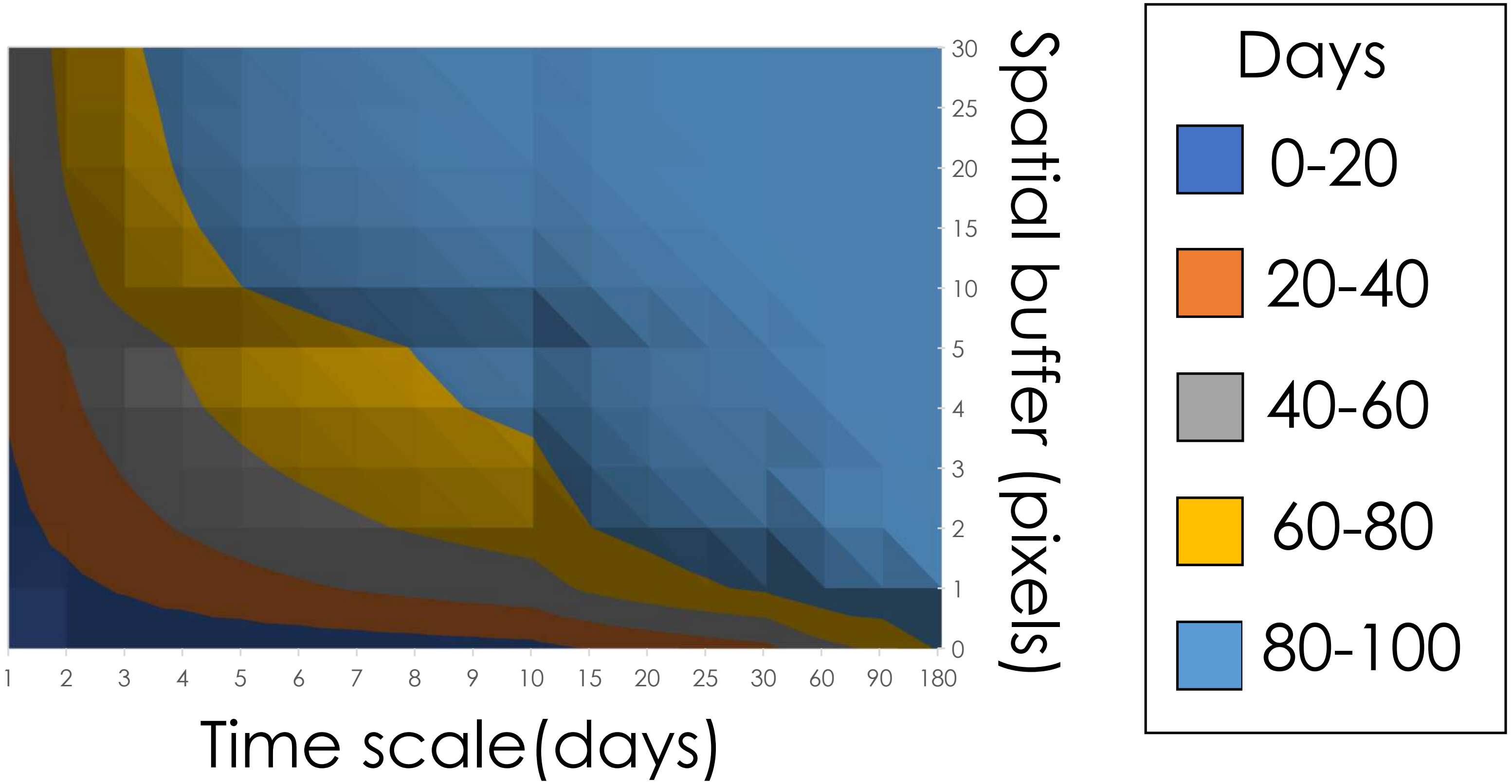


Water quality as a disease driver

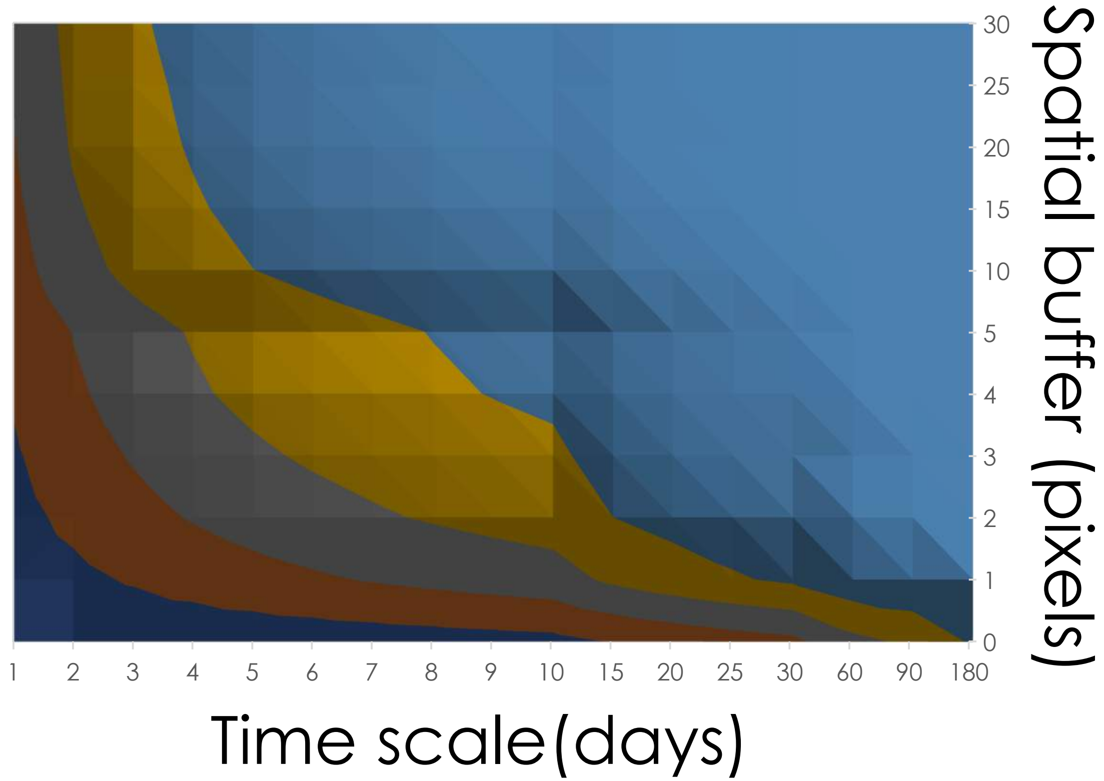
Maui Nui Daily VIIRS 750m
Chlorophyll-*a* (2019-05-03)

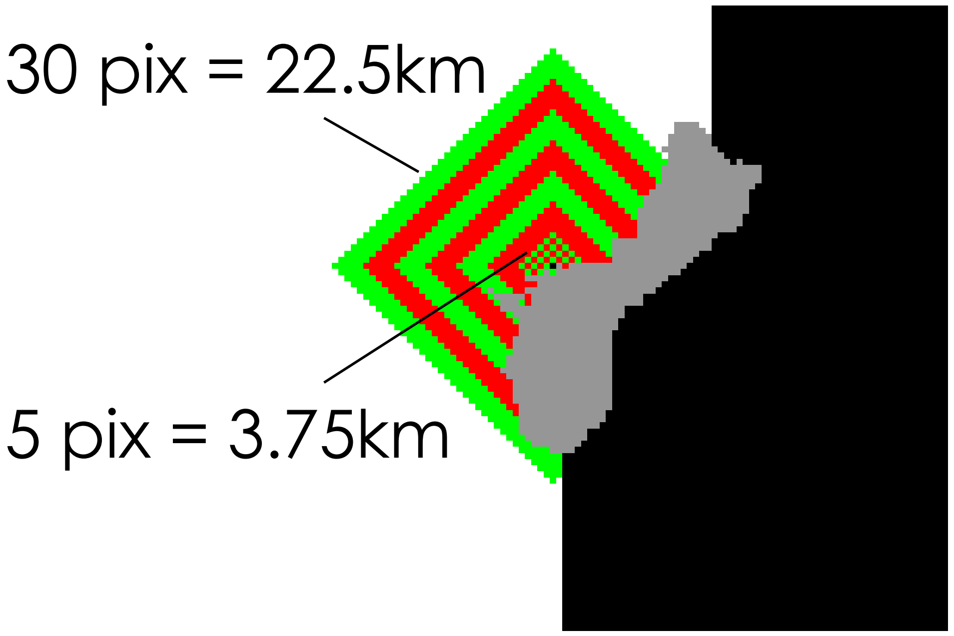


Water quality as a disease driver

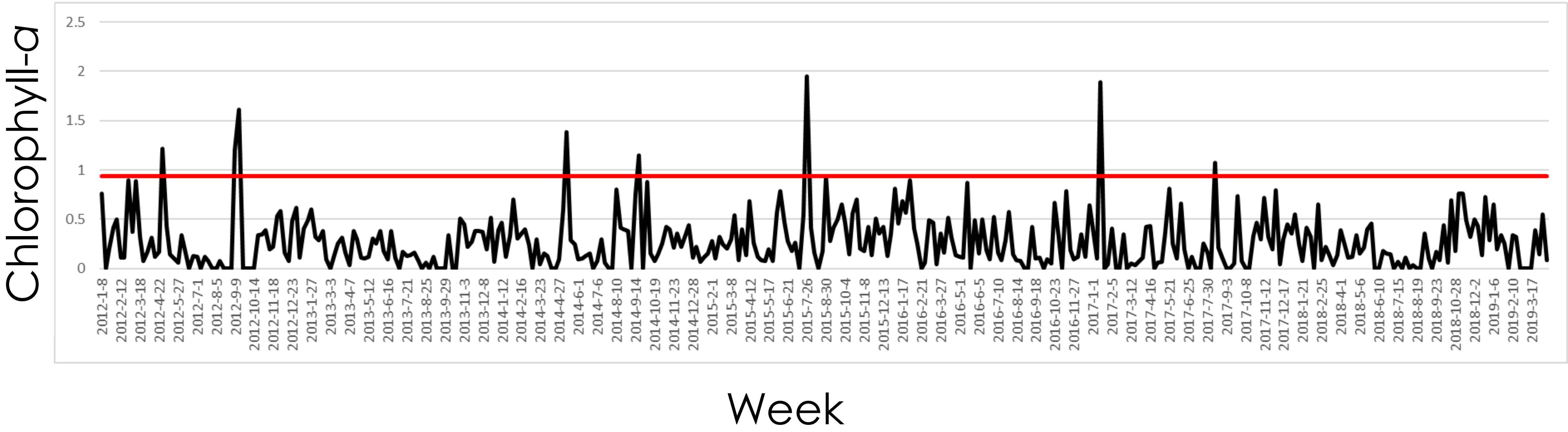


Water quality as a disease driver





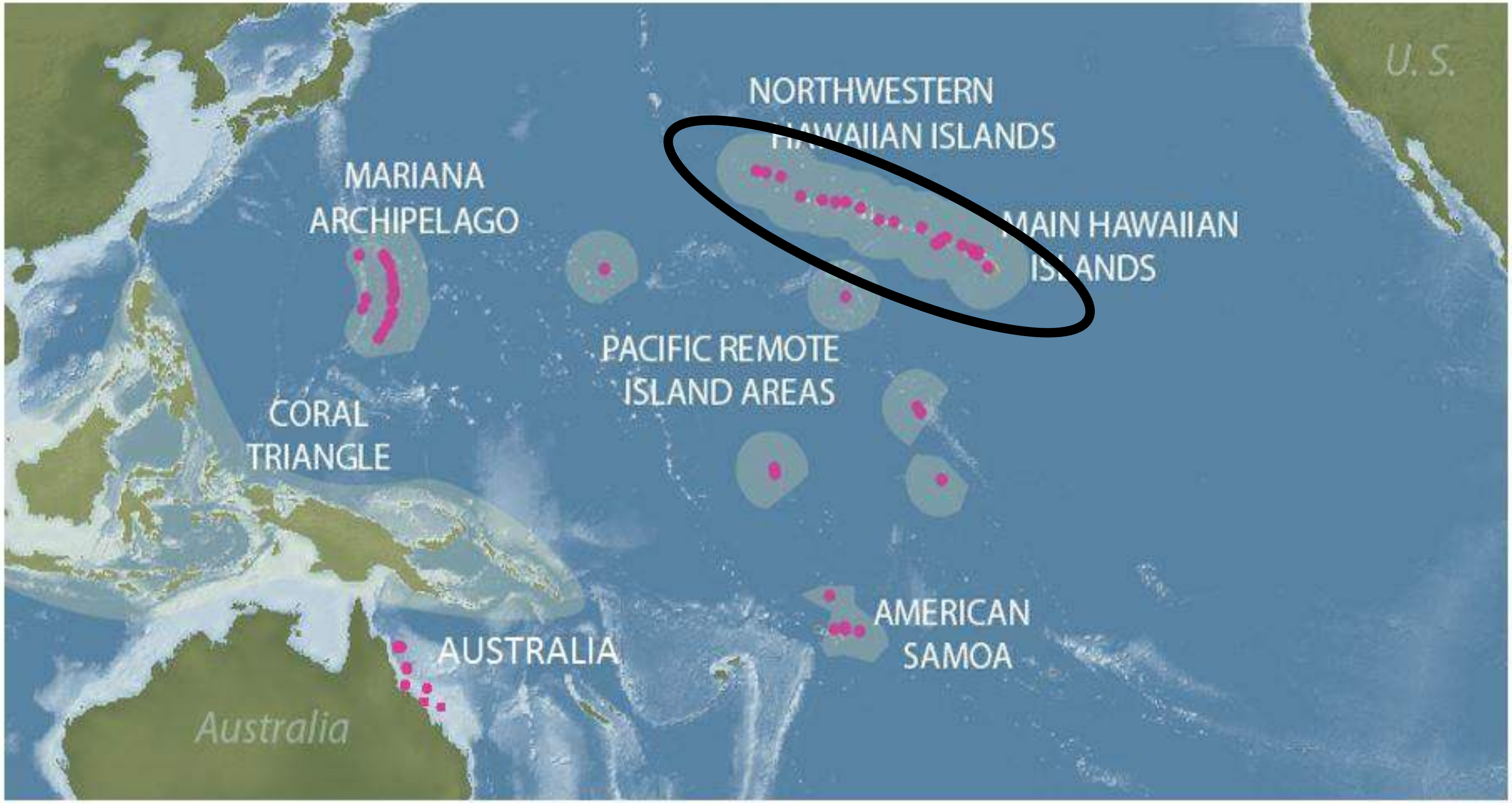
Water quality as a disease driver



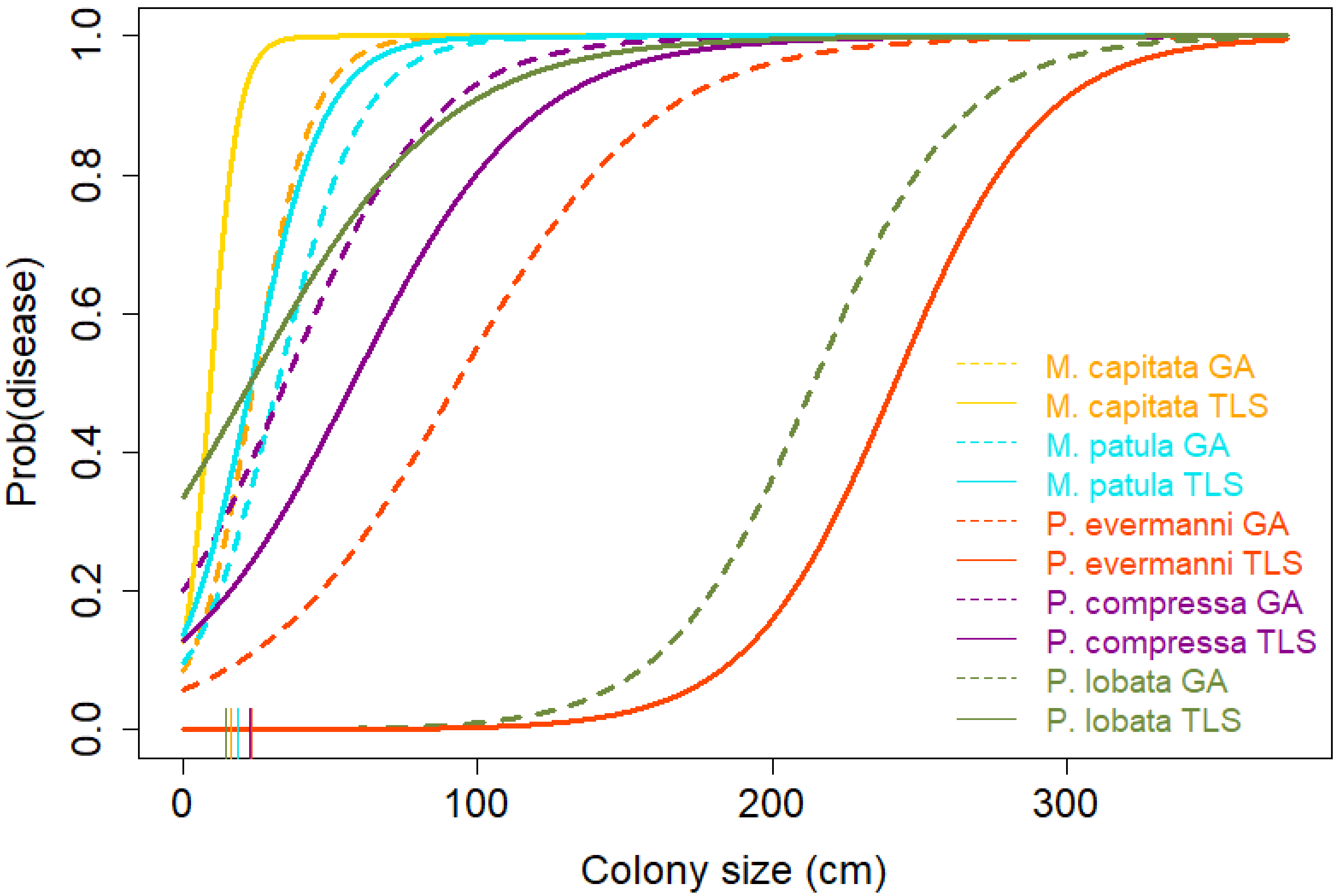
Other disease drivers

- Colony size
- Coral density
- Coral community composition
- Depth
- Irradiance
- Wave exposure
- Stream exposure
- Coastal development
- Agriculture and golf runoff
- Human population size

Results from Hawaii



Large corals = higher disease risk



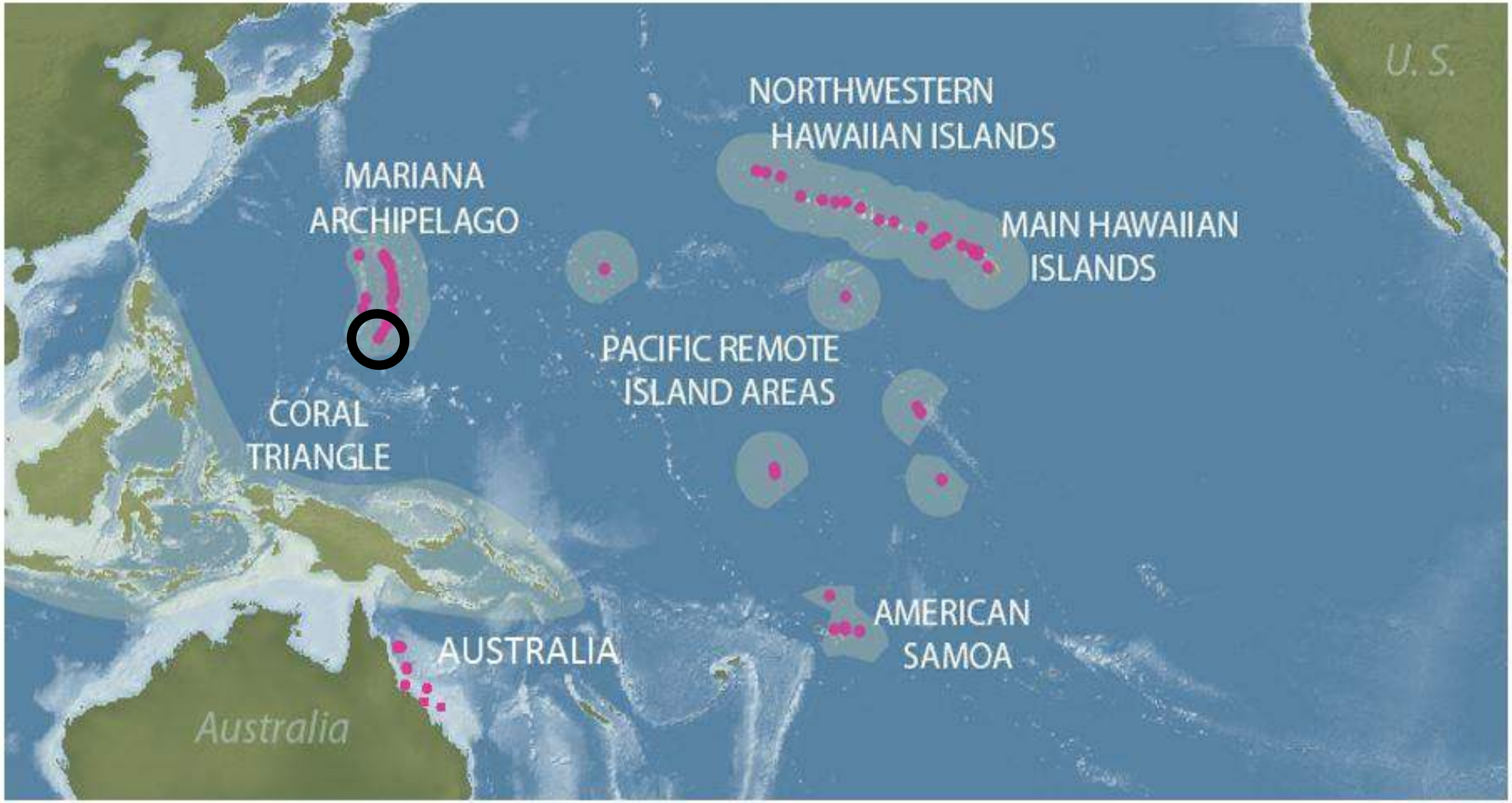
Growth anomalies

Associated with **human activities** in watersheds adjacent to **shallow, semi-protected** coral reefs

Tissue Loss

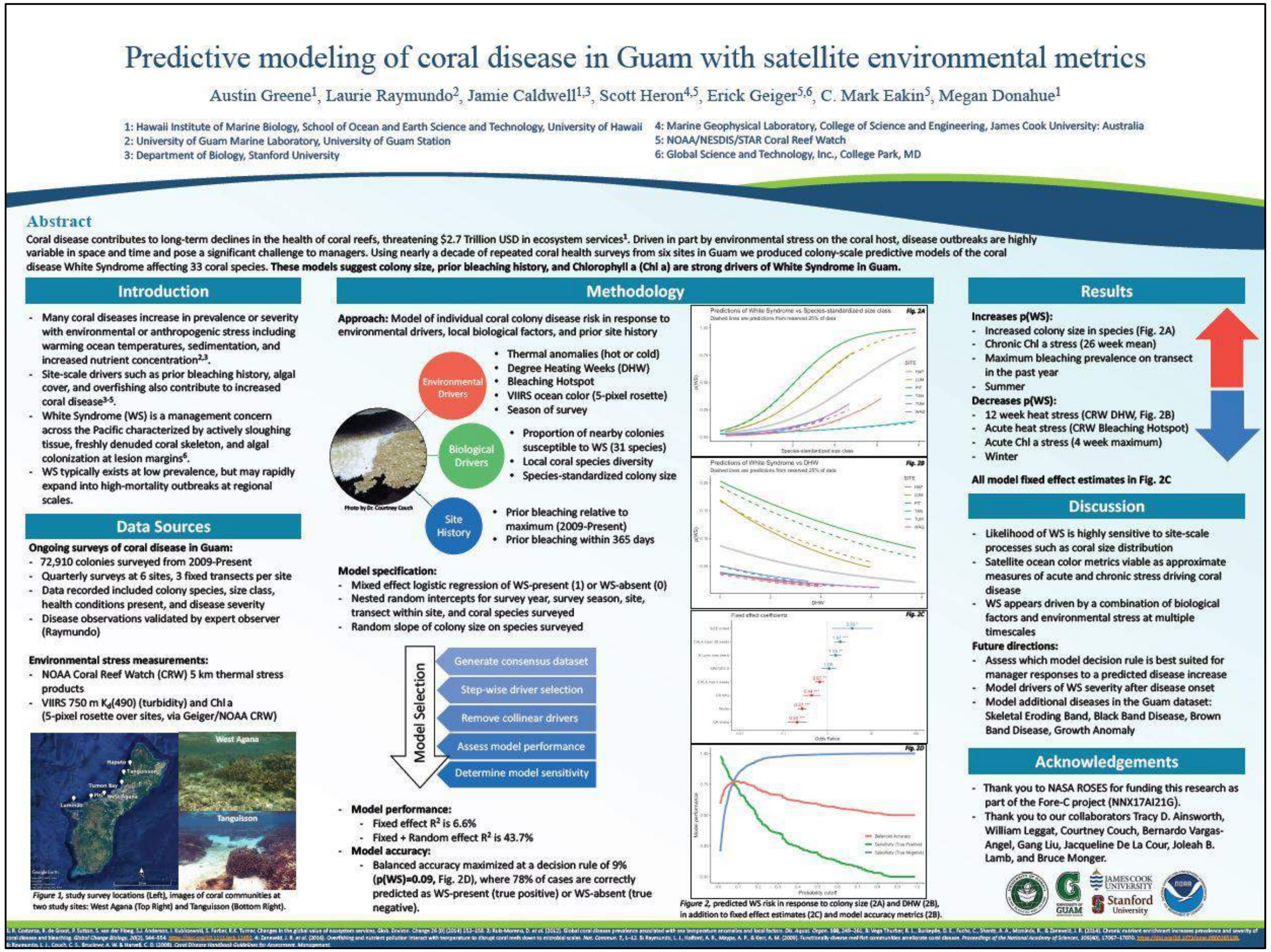
Associated with **reef structure**, **water motion**, and **temperature exposure**

Preliminary results from Guam

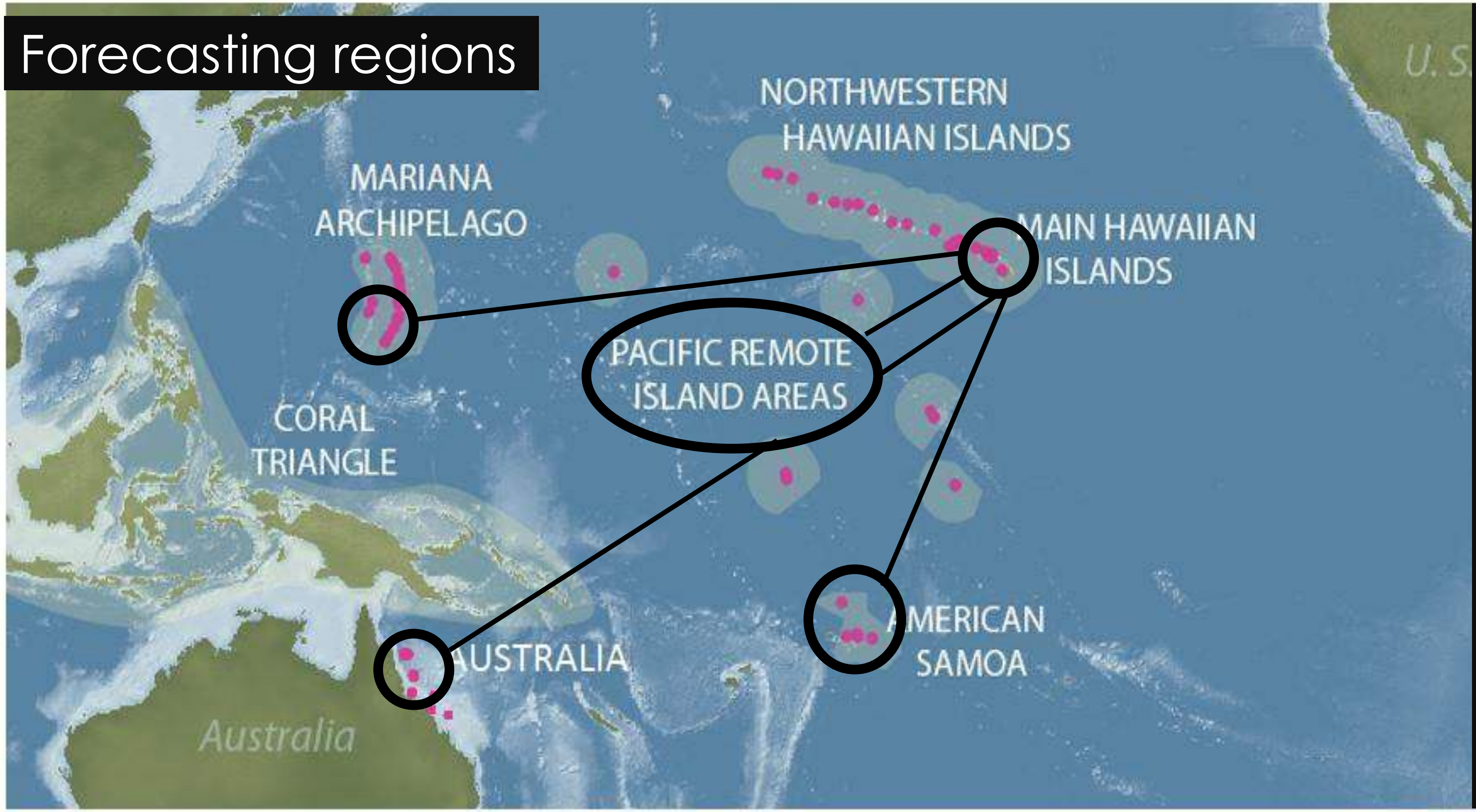


Disease risk influenced by **colony size**, **beaching history**, **chlorophyll-*a***

Learn more at Austin’s poster



Outbreak response network

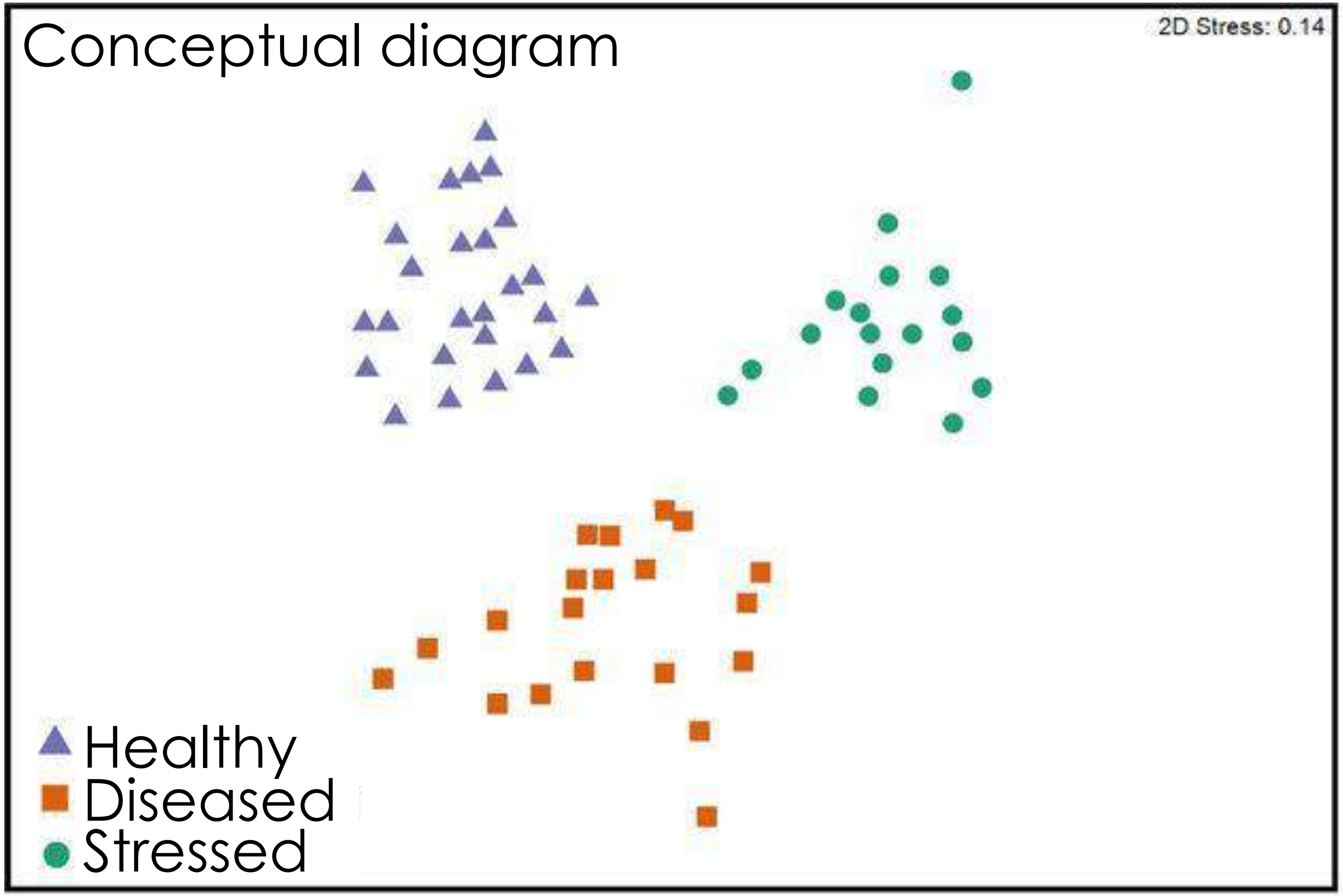


Partners
TNC
NOAA ESD
CRAG/DMWR
NPS
GBRMPA
U of Guam

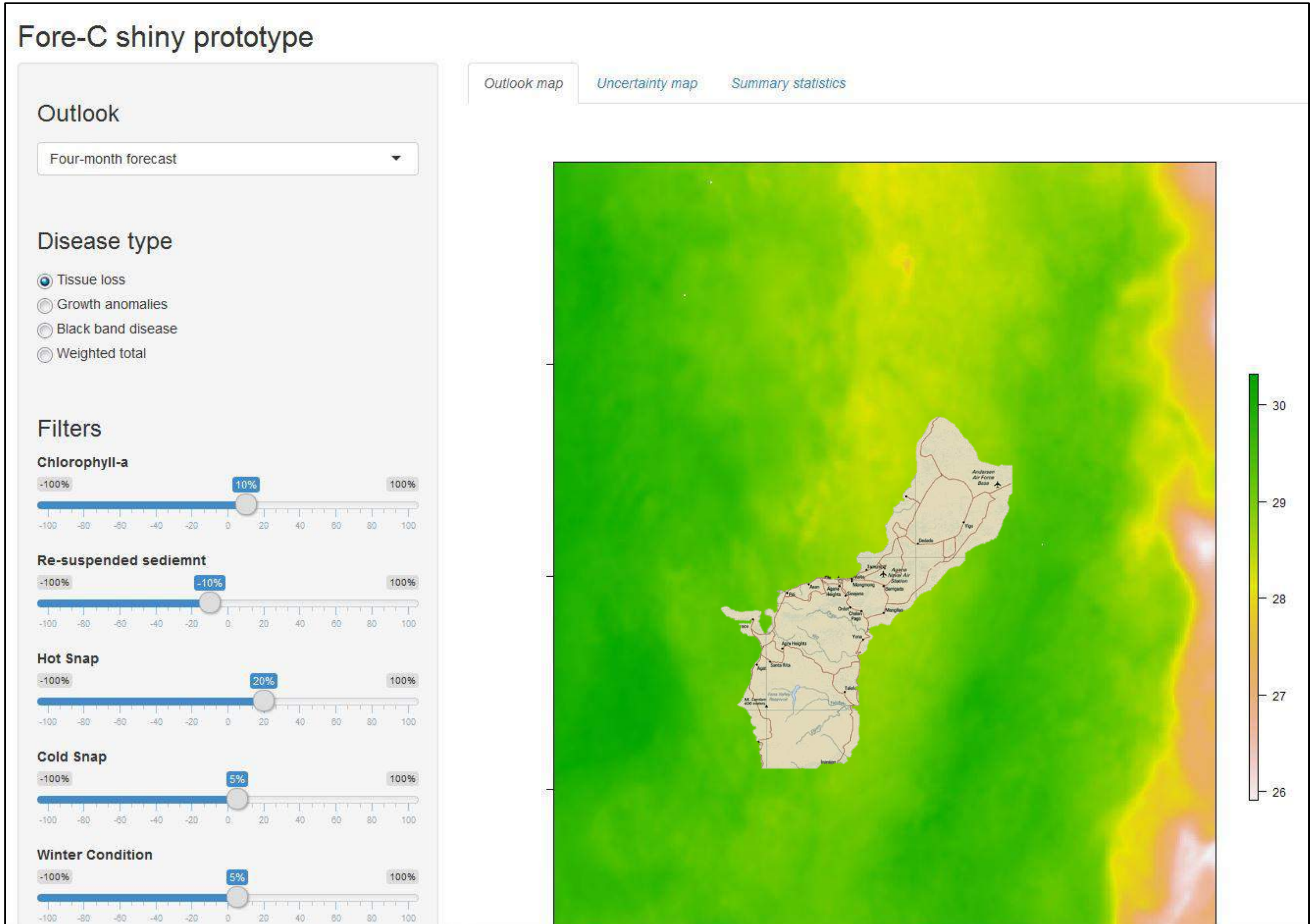
Guam outbreak

Photos: Laurie Raymundo

Guam outbreak



Initial prototype



Beta rollout:
July 2020

International Coral Reef Society

Thank you

NASA

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE

NOAA CORAL REEF WATCH

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