

Coral Diseases of West Hawai`i

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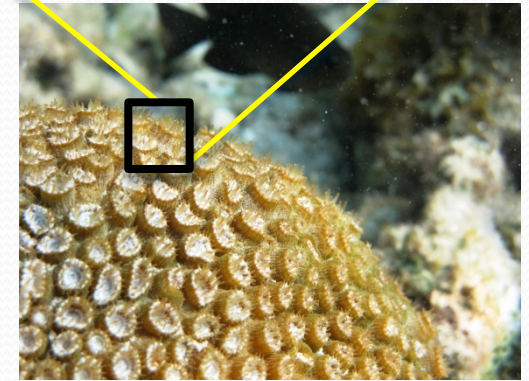
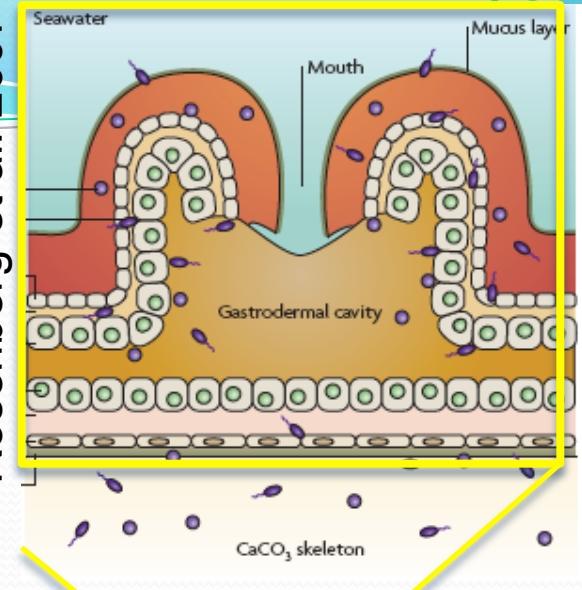
The Kohala Center



What is a Coral?

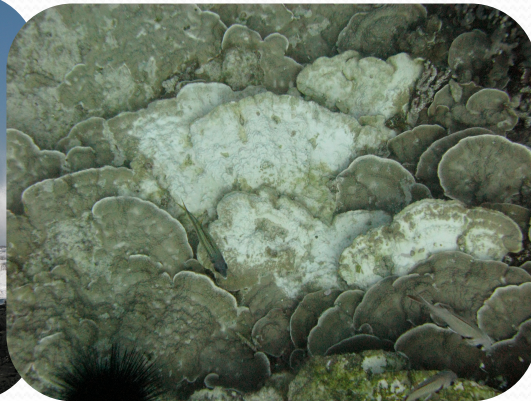
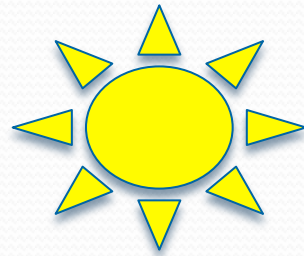
- Phylum: Cnidaria (related to jellyfish and anemones).
- Clonal organism made of thousands of polyps.
- Thin layer tissue, makes calcium carbonate skeleton that forms reefs.
- Where do they get energy:
 - Catch prey in tentacles & zooxanthellae
- Coral Holobiont:
 - Coral tissue
 - Zooxanthellae (supply 90% of energy)
 - Bacterial community
- 66 hard coral species in Hawai`i

Rosenberg et al. 2007

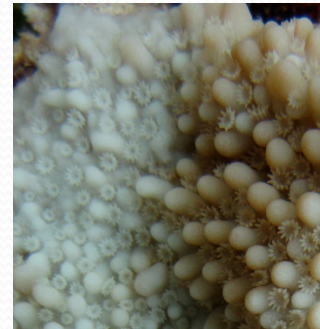


What Shapes Coral Reefs?

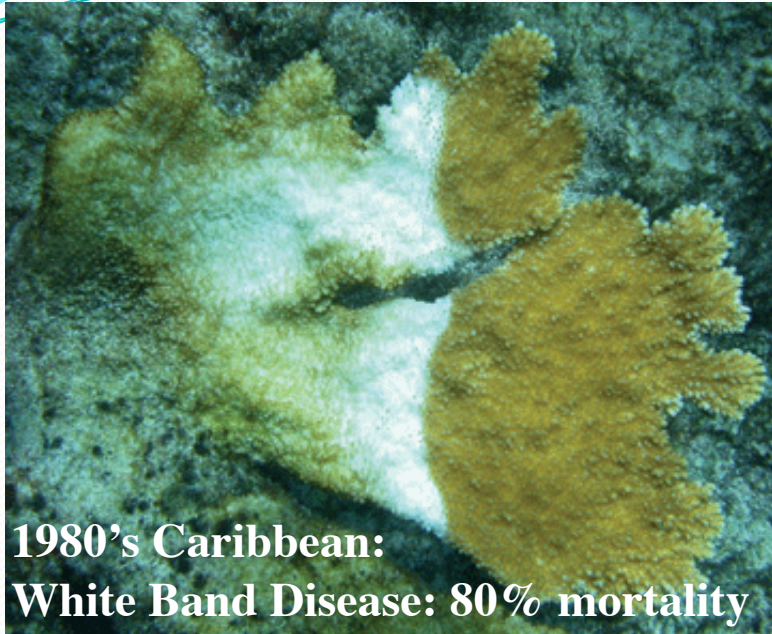
NATURAL PROCESSES



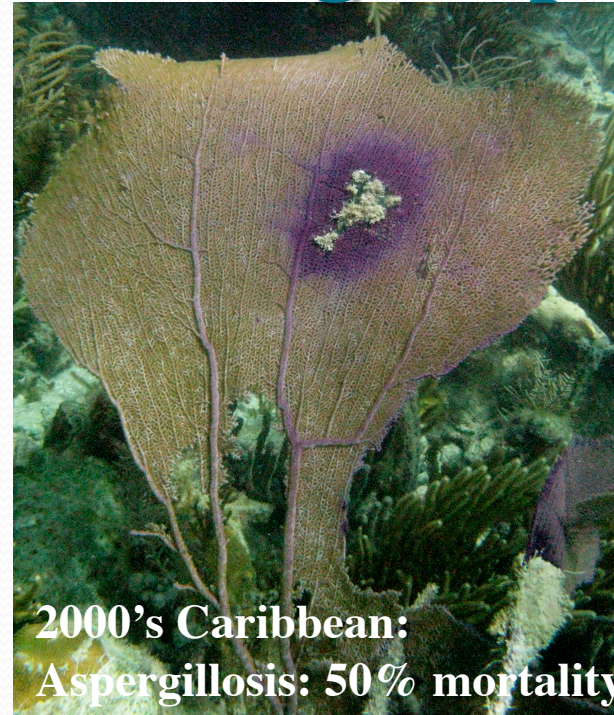
ANTHROPOGENIC PROCESSES



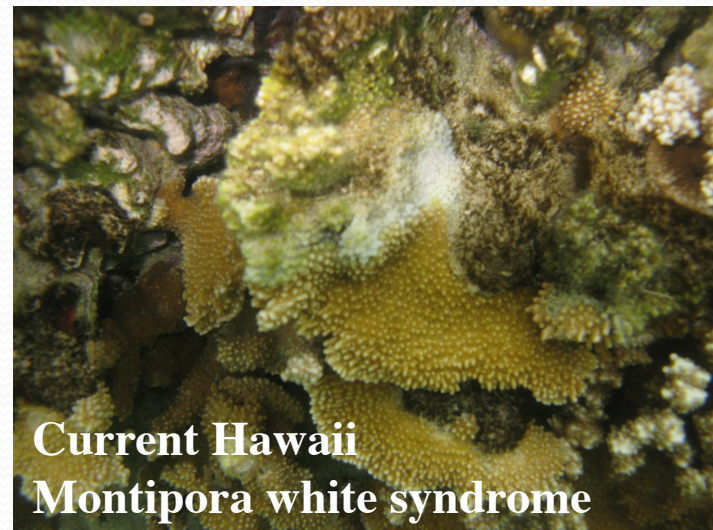
Coral Disease: an important ecological process



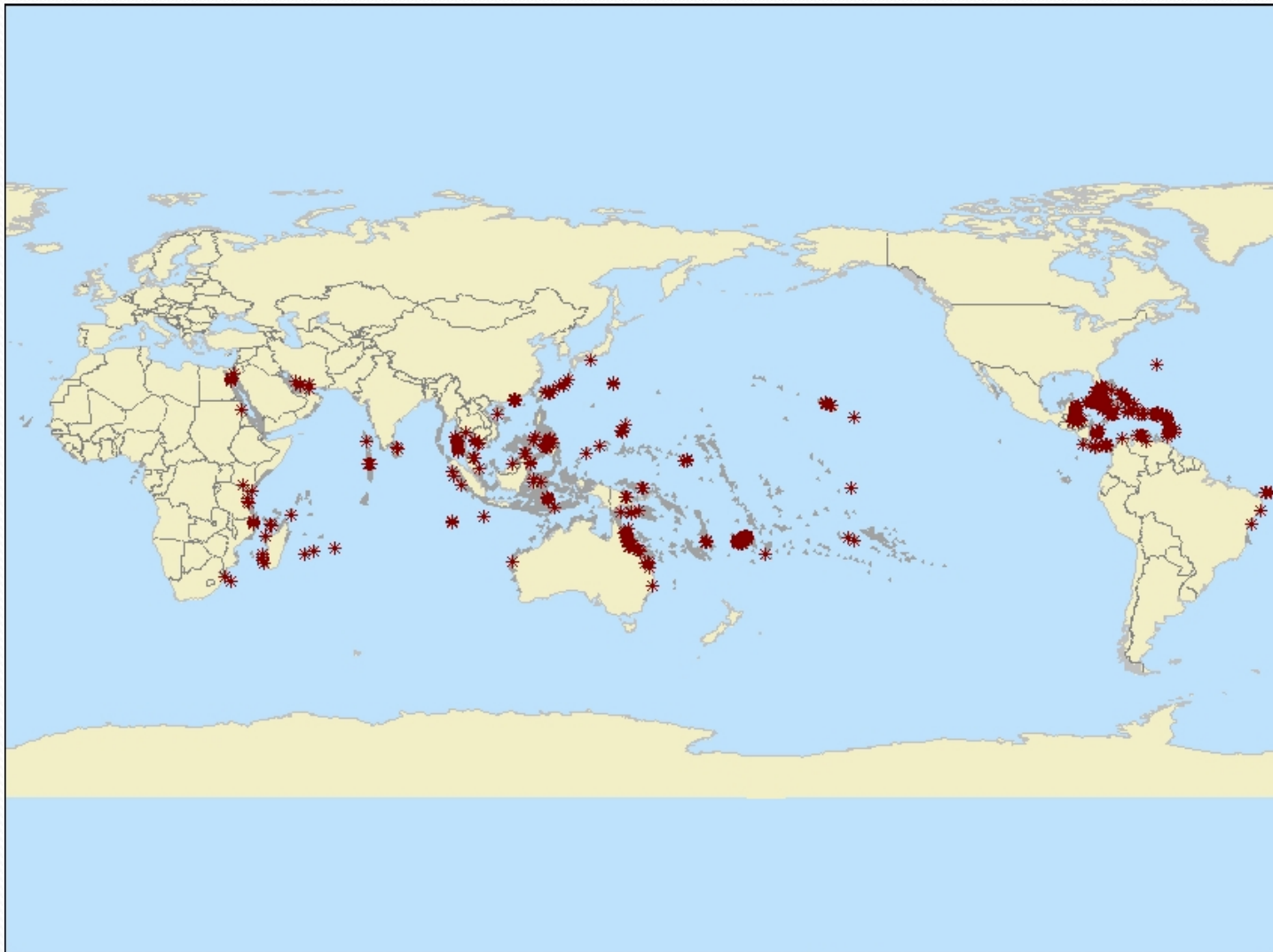
**1980's Caribbean:
White Band Disease: 80% mortality**



**2000's Caribbean:
Aspergillosis: 50% mortality**



**Current Hawaii
Montipora white syndrome**



2000-2010

Data Sources

<http://reefgis.reefbase.org>





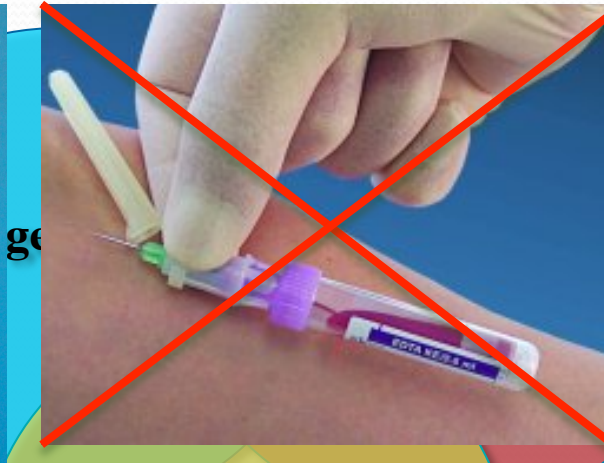
What questions to we ask?

- How prevalent and severe is the disease?
- Is is it spreading to surrounding colonies?
- How is transmitted?
- What is the pathogen?
- How are the disease processes affected by environmental factors?

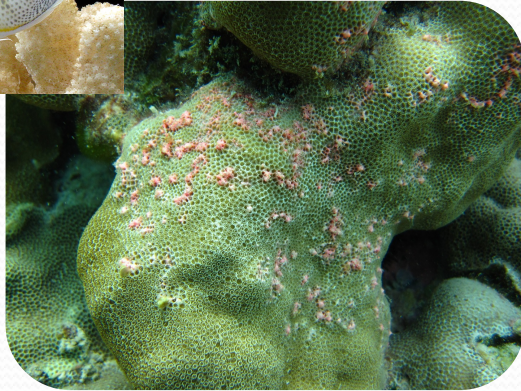
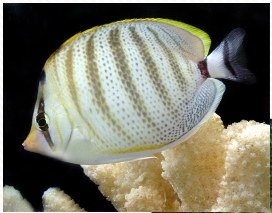
How do we study coral disease?

Disease: abnormal condition that disrupts normal bodily function

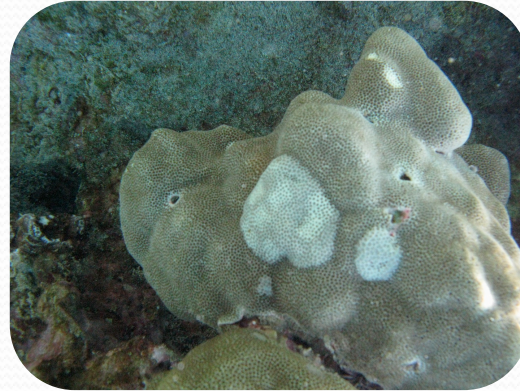
Pathogens: biological agent that causes disease



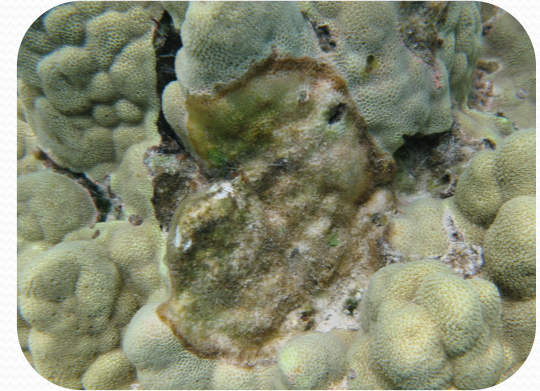
Hawaiian Coral Diseases



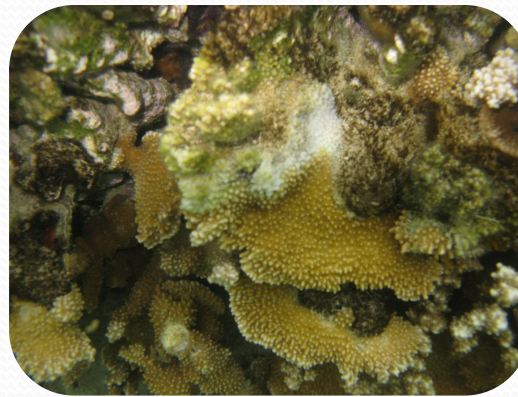
Trematodiasis



Growth anomalies



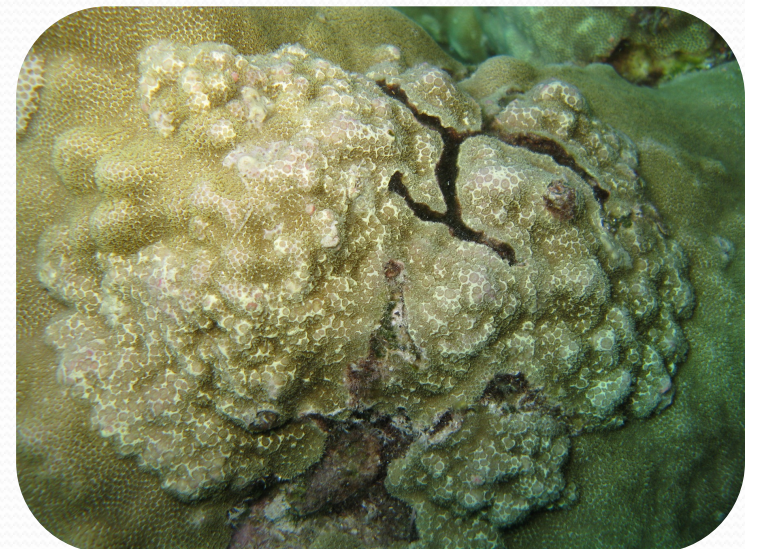
Tissue Loss syndrome



Montipora white syndrome

Why study growth anomalies?

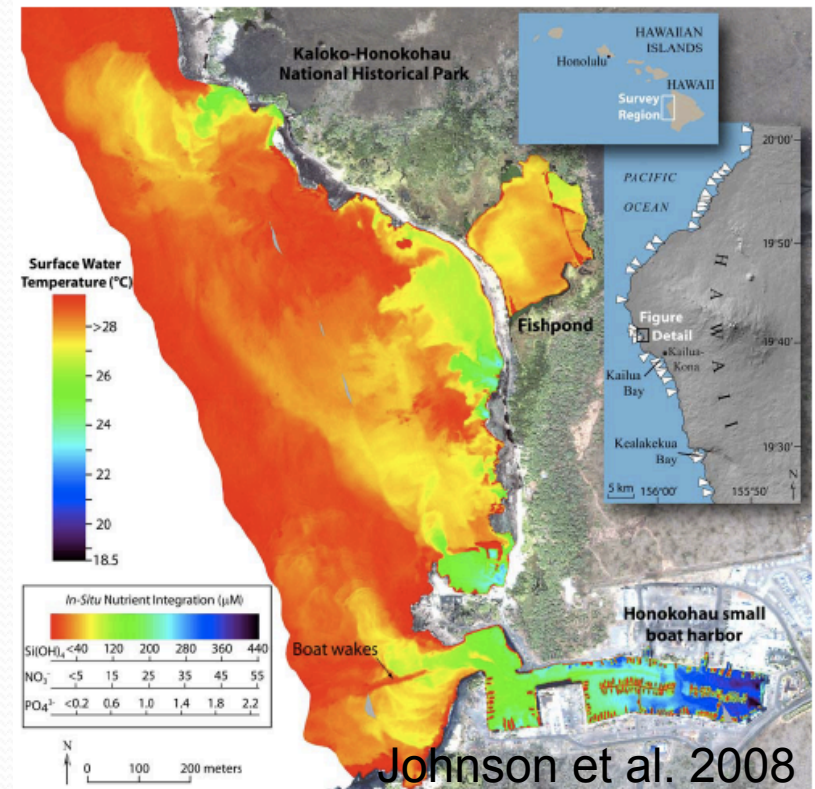
- Growth anomalies is the most prevalent disease on West Hawai`i.
 - Affects coral physiology: reduced colony growth, fewer polyps and zooxanthellae, decreased reproduction, and partial or complete mortality.
 - Causes: *largely unknown*
 - Environmental stress and UV light
 - ↑ GA prevalence near cities



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Water Quality and Submarine Groundwater Discharge

- Very few persistent streams along west Hawai`i.
- Most freshwater from SGD- some areas $\sim 8,600 \text{ m}^3/\text{day}$
- Naturally carry elevated levels of nutrients, but easily contaminated.



Question:

How does growth anomaly prevalence change with proximity to submarine groundwater/nutrient input?

Hypothesis:

Lobe coral growth anomaly prevalence increases with proximity high submarine groundwater discharge/elevated nutrient input.

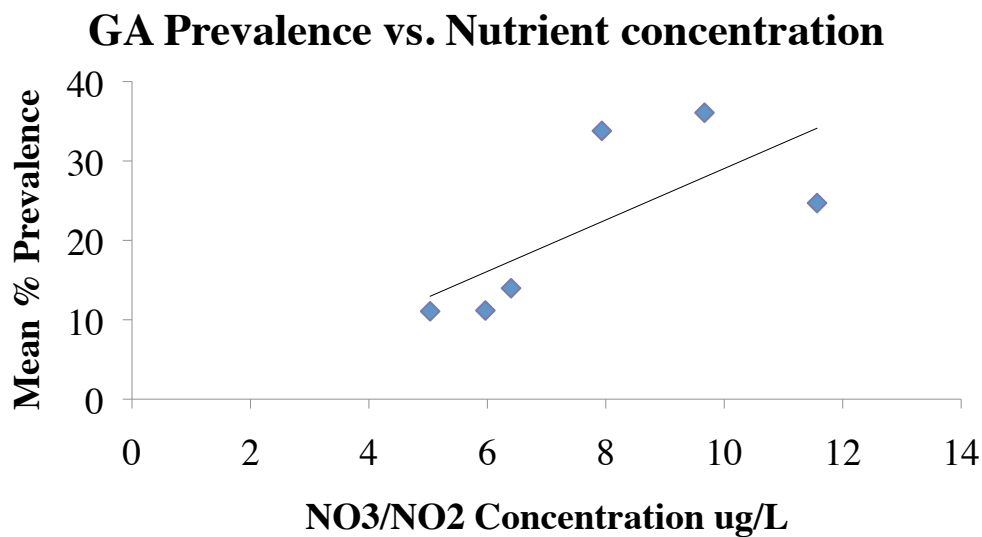
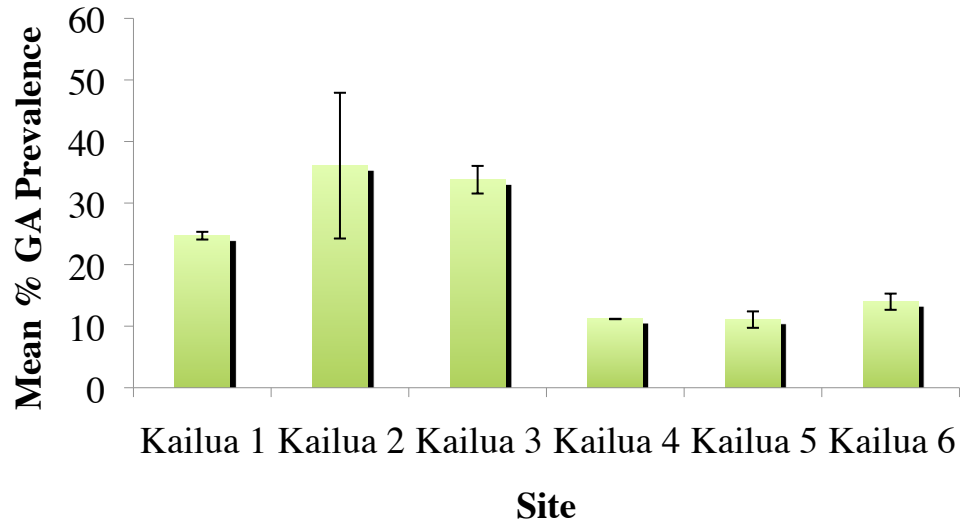
Methods & Experimental Design

- 6 sites in **Kailua Bay**
- 2 transects/site
- What we measured:
 - growth anomaly prevalence
 - water quality (salinity, temperature, nutrient concentration)



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Preliminary Results



Map ©Google Earth



Conclusions

- Coral disease increasing around the globe.
- Many factors may affect coral disease patterns.
- Growth anomalies #1 disease in Hawaii.
- Environmental factors such as nutrients may affect disease.
- Investigating potential pathogens.

We need you!

