Coral Disease Outbreak Investigation
Module 1

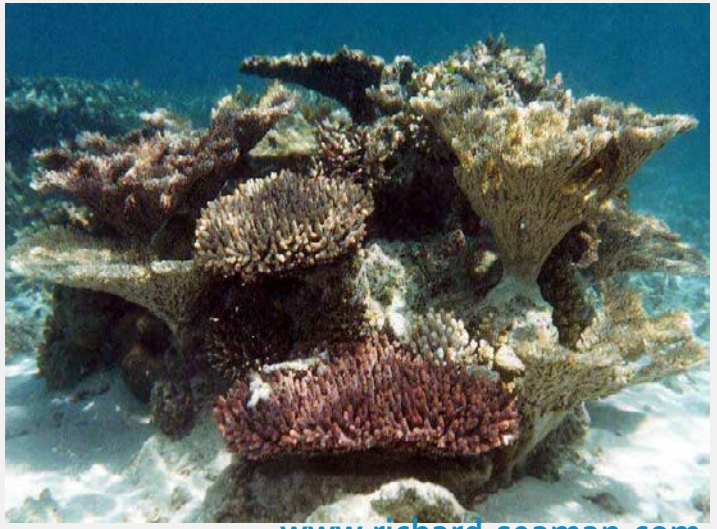
Course Content

The course has eight modules:

Module 1	Background, Definitions and Overview of the Process
Module 2	Structure and Function of the Response Network
Module 3	How do you recognize coral disease?
Module 4	Survey Methods for Defining Outbreak Area & Extent
Module 5	Methods for Collecting Tissue for Biological Analyses
Module 6	Sample Processing Methods for Biological Analyses
Module 7	Resolution of an Outbreak Investigation
Module 8	Special Considerations for Contaminant Sampling

Overview

- Brief Coral Disease Background
- Monitoring Vs. Disease Response
- Response Network
- Outbreak Investigation Steps



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Health is….

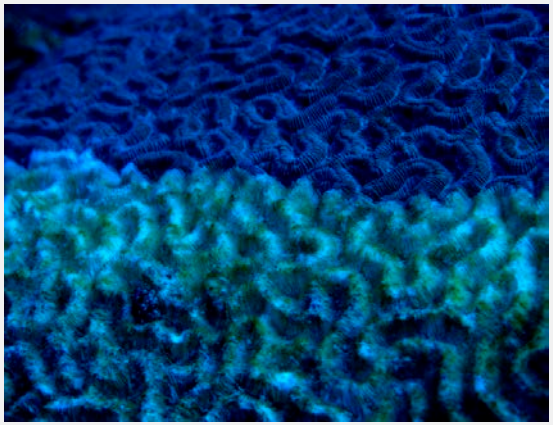
a <u>continuum</u> between *"… absolute health (a state in which all functions are optimal) and death, which occurs when functions are so severely compromised that life is impossible. Between the two points there is a region of relative health that blends imperceptibly into a region that we can define as disease."*

Wobeser 2006

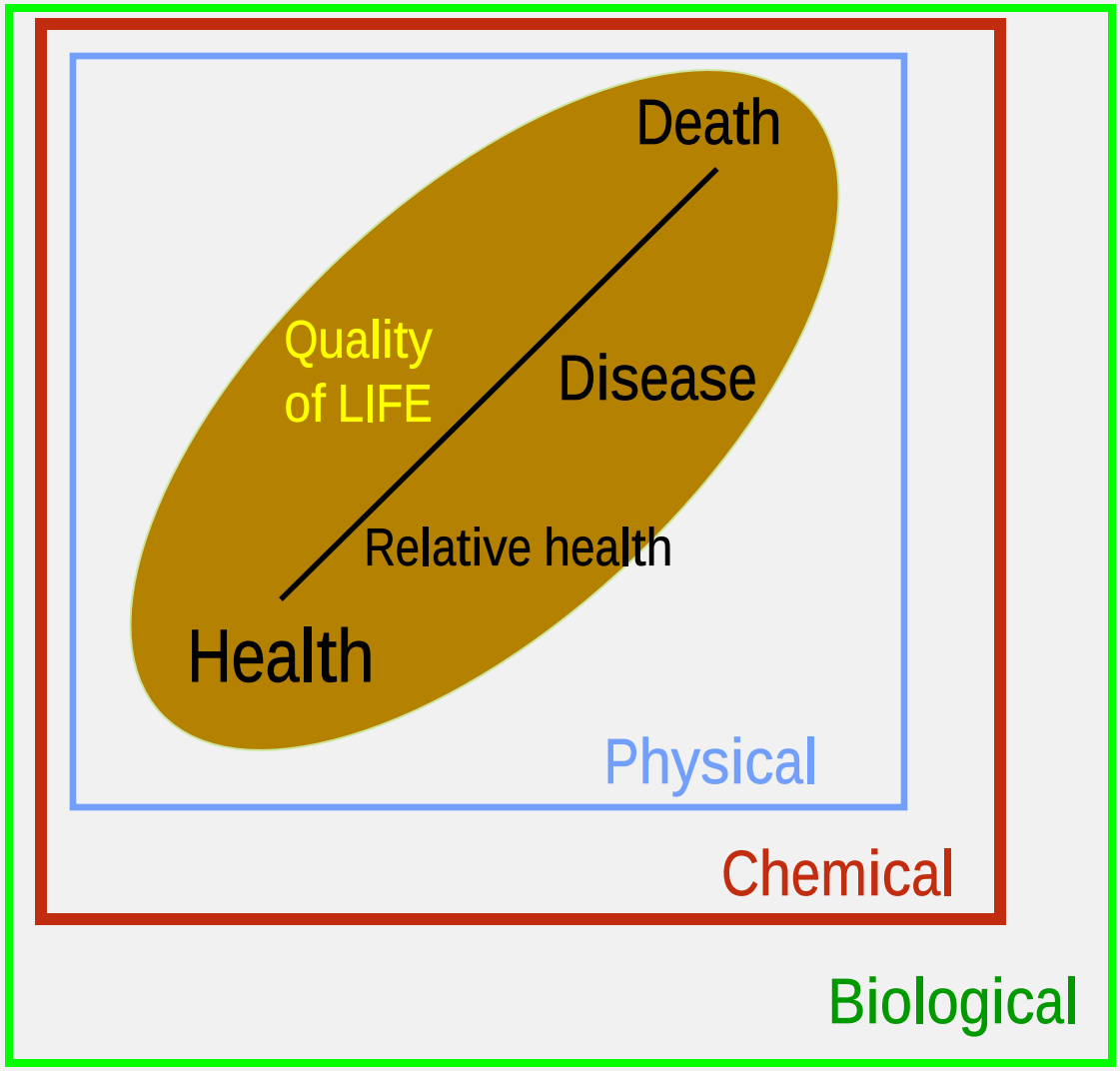
Disease is….

"any impairment that interferes with or modifies the performance of normal functions, including responses to environmental factors such as nutrition, toxicants, and climate; infectious agents; inherent or congenital defects, or combinations of these factors"

Wobeser 1981.



Threats to Coral Health



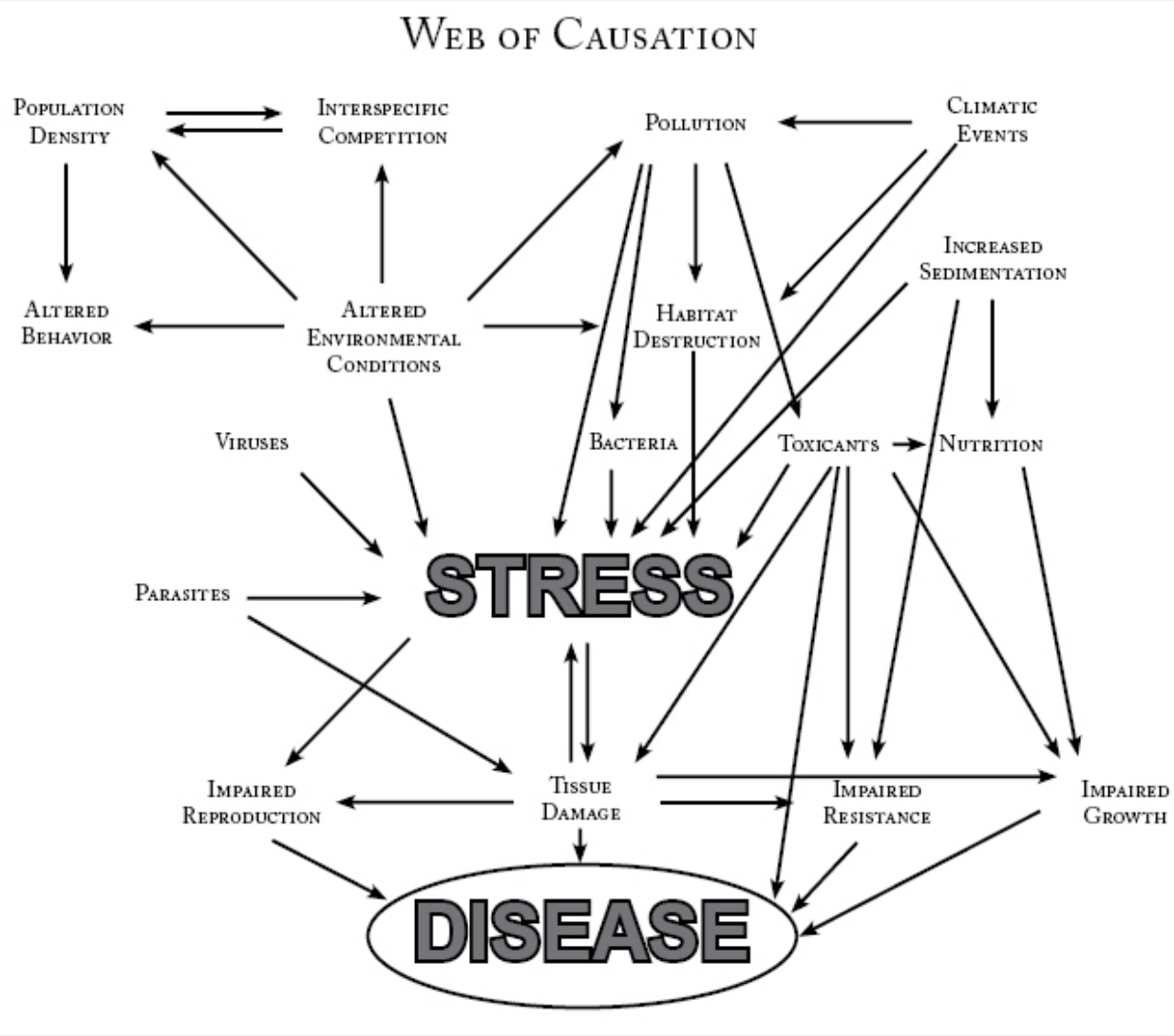
Anthropogenic Factors Impacting Coral Health

Module 1

- Coastal Development and runoff
- Coastal Pollution
- Tourism and recreation
- Fishing
- Trade in coral and live reef species
- Ships, boats, and groundings
- Marine debris
- Aquatic invasive species
- Security training activities
- Offshore oil and gas exploration
- Global Warming/Sea Surface Temp

Web of Causation

Module 1



Categories of Coral Disease

- Bleaching: loss of zooxanthellae
- Non-infectious: physiological & morphological changes
  - Toxins
  - Physical damage
  - Environmental stressors

- Parasitic: protozoans & metazoans
- Growth Anomalies: tumors
- Infectious agents: bacterial, fungal & viral

Monitoring

- *Local* involvement
- *Routine* observation and/or sampling to track current conditions
  - Apparently healthy coral
  - Non-threatening disease
- *Data taken/Sampling* methods vary
- ***Severe disease outbreak has not been reported***

Monitoring Goals

- Establish baseline condition & natural rates of change
  - *e.g. healthy/diseased*
- Incorporate surveillance measures
- Identify possible cause & effect relationships
- Evaluate existing prevention/ management measures
- Measure effects of anthropogenic & natural stressors
- Identify anomalies

Outbreak Investigation

- National network of available responders
- Unusual outbreak has been reported
- Sample collection is standardized
- Disease appears to be unique in location and/or magnitude
- Usually involves a species of particular interest/concern

ccmaserver.nos.noaa.gov/.../coral_disease.html

Investigation Goals
The Big Questions

- What is it?
  - Old
  - Emerging
- Where did it come from?
- How is it spreading?
- Can it be controlled?
- How can it be managed?

Why Create a Response Network?

- Develop coordinated effort among agencies that traditionally work independently
- Provide an organized response to a major disease outbreak incident
- Provide disease information that can be built into a long-term database
- Improve coral disease diagnoses
- Advance knowledge of coral disease

Outbreak Investigation Steps

1. Establish existence of the outbreak; develop case definitions
2. Confirm that the case is "real"
3. Est. background rate of the disease
4. Characterize the 'who,' 'when,' and 'where'
5. Examine the descriptive epidemiological features

Outbreak Investigation Steps

6. Generate a tentative hypothesis
7. Test the hypothesis
8. Collect/ test environmental samples
9. Prepare a written report
10. Implement control/ management strategies

Executing a Response

- How will our Response Network be organized?
- What steps are taken prior to a "Response?"
- What are the criteria for an Outbreak Investigation?
- What survey/sampling techniques will be implemented?