

# **Hamelin Pool Stromatolites Conservation and Management**

**Adapting to ecosystem change in the Shark Bay World Heritage Site – June 6,  
2018**

**Erica P. Suosaari**



# Conserving our heritage by learning, protecting and inspiring

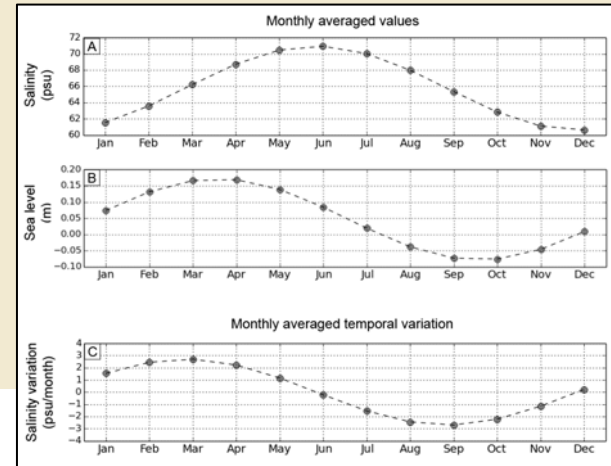
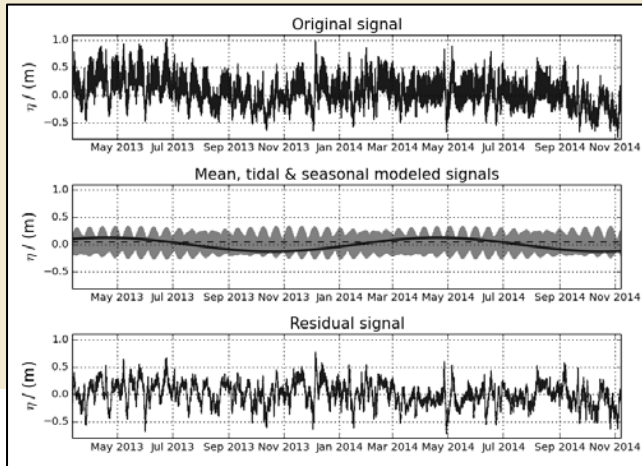
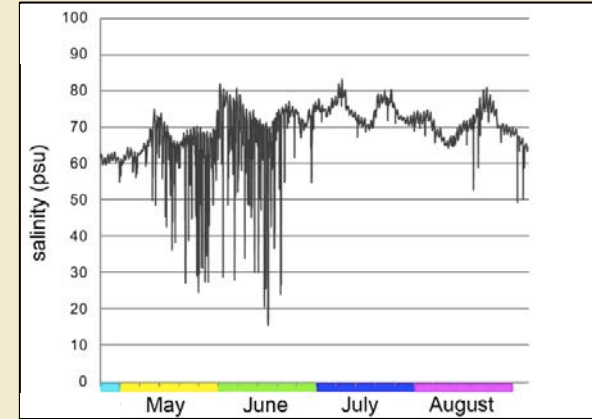
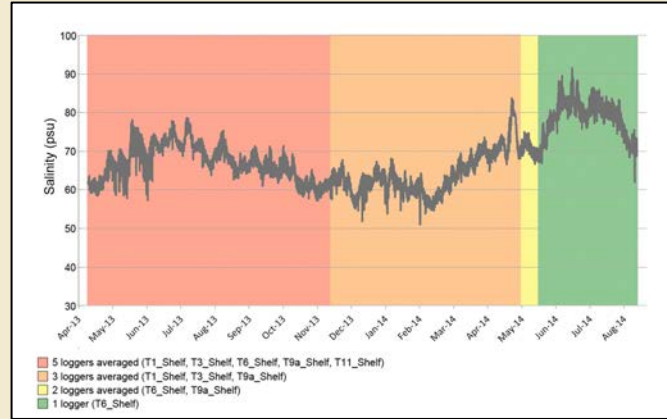
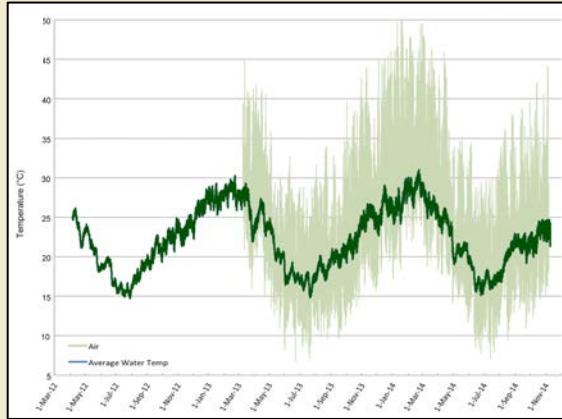


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# Long-term monitoring

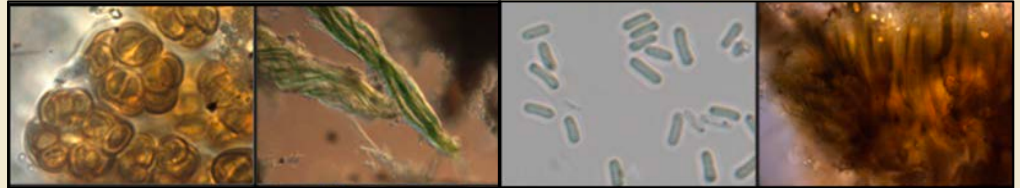
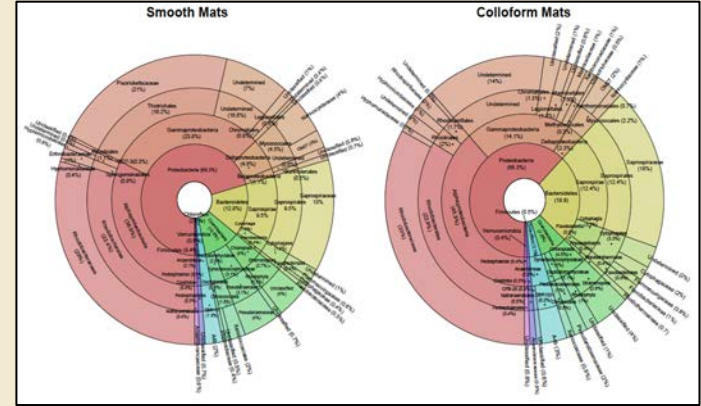


# Long-term monitoring

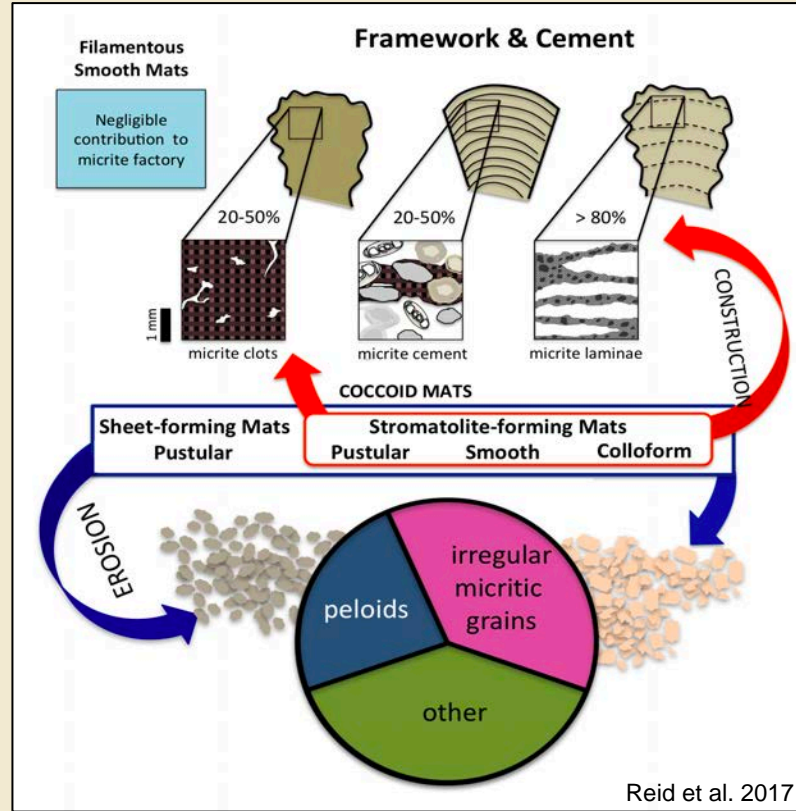
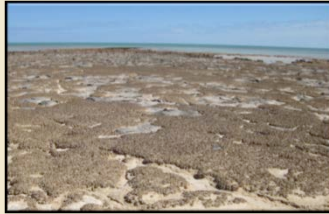
- Discrete measurements
  - pH
  - Alkalinity
  - TDS
  - Trace elements
  - Stable Isotopes
  - Saturation state modeling
  - Rare Earth elements
  - $^{87}\text{Sr} / ^{86}\text{Sr}$

# Long-term monitoring

- Microbial Mat monitoring
  - High-resolution drone imagery transects
  - Microscopy
  - Molecular
  - Geochemistry



# Long-term monitoring



# Gaps in Knowledge

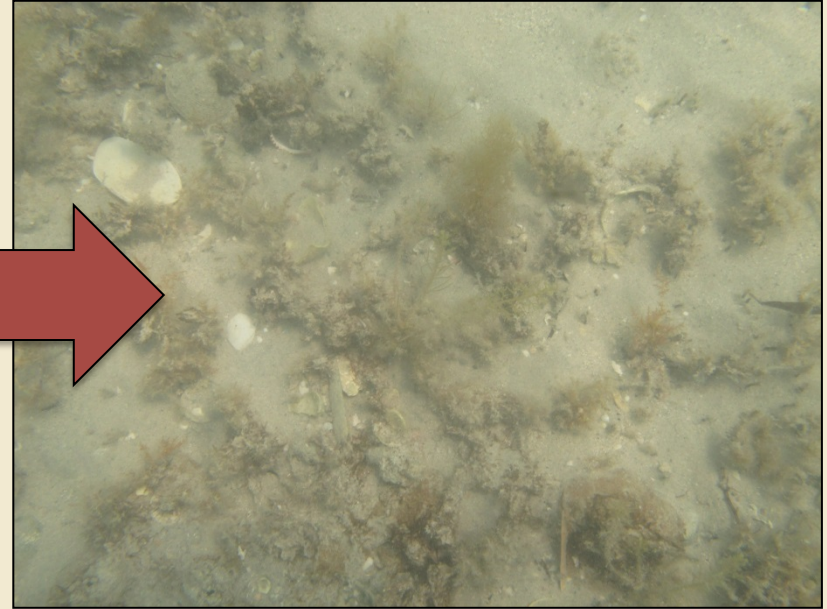
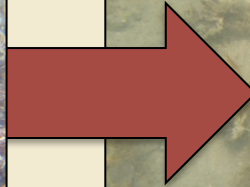
- What are the short and long-term patterns of temperature, salinity and water level in Hamelin Pool?
- Can the ground water source be determined?
- What additional information is needed to understand the hydrology of the area?
- Does water chemistry influence carbonate precipitation leading to syndepositional lithification in Hamelin Pool microbial mats?
- What is the totality of the microbes, genomes and environmental interactions of the stromatolite ecosystem in Hamelin Pool?
- Can we delineate gene activities within these communities and link them to mineral products and stromatolite formation?

# Gaps in Knowledge

- Is carbonate precipitation in microbial mats seasonal/episodic, and can it be linked to observed environmental parameters or microbial activity?
- Which microbial communities are responsible for making unique and distinctive cements?
- Are there changes in the benthic cover of habitat forming organisms such as macroalgae and seagrass?
- If there are temporal changes, what is the rate of change and what are the drivers?
- What environmental parameters are changing within Hamelin Pool and at what rate?
- How are/will changing parameters affect the stromatolites, seagrasses and faunal assemblage in Hamelin Pool?



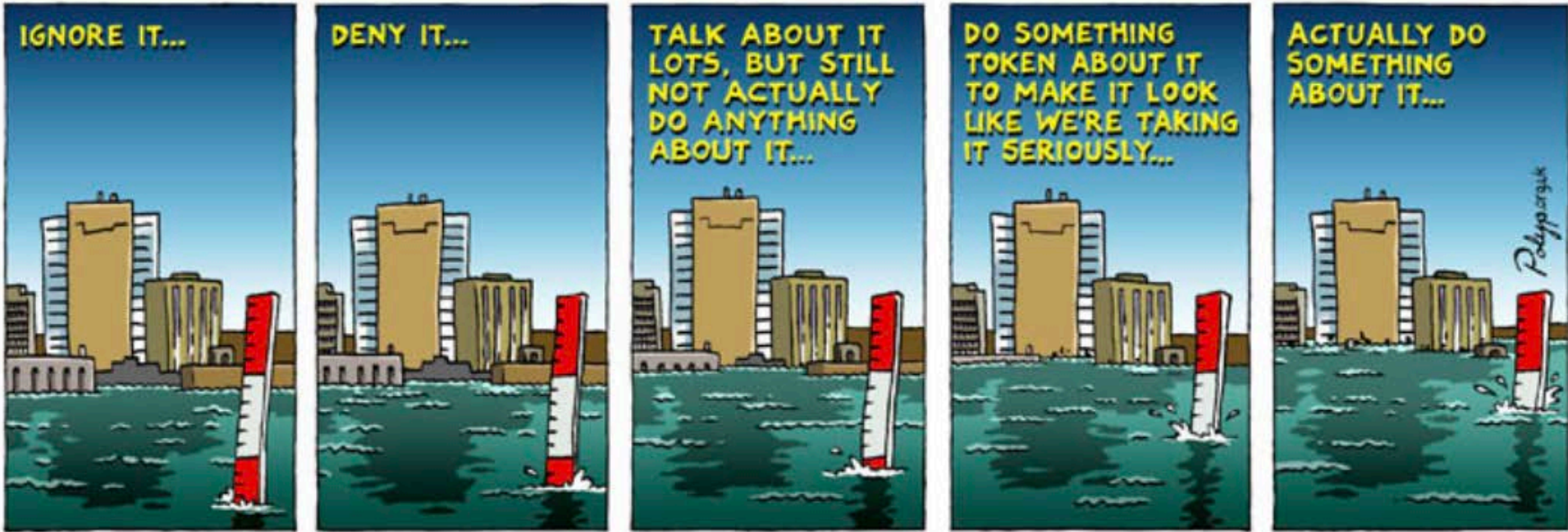
# Gaps in Knowledge & Threats



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# Gaps in Knowledge & Threats



'RISING TIDE'



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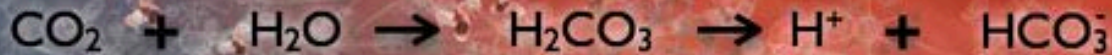
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# OCEAN CARBON STORAGE

WILL THE OCEAN SINK FOR FOSSIL FUEL CO<sub>2</sub> CHANGE WITH TIME?

CO<sub>2</sub> absorbed from the atmosphere



carbon  
dioxide



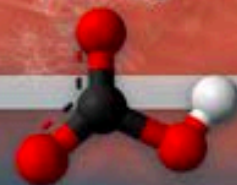
water



carbonic  
acid



hydrogen  
ion (acidity)



bicarbonate  
ion

CO<sub>2</sub> + water makes bicarbonate

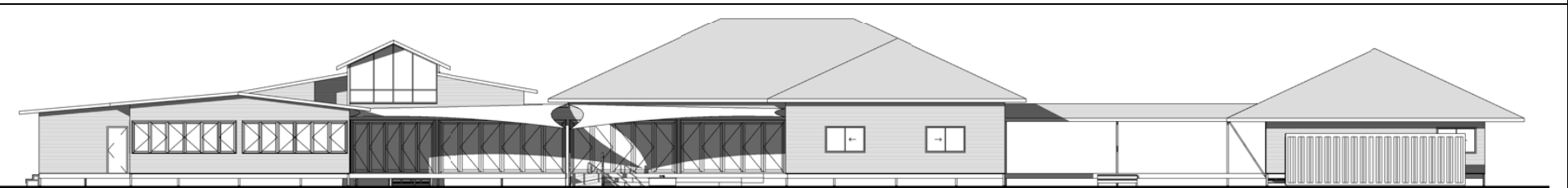
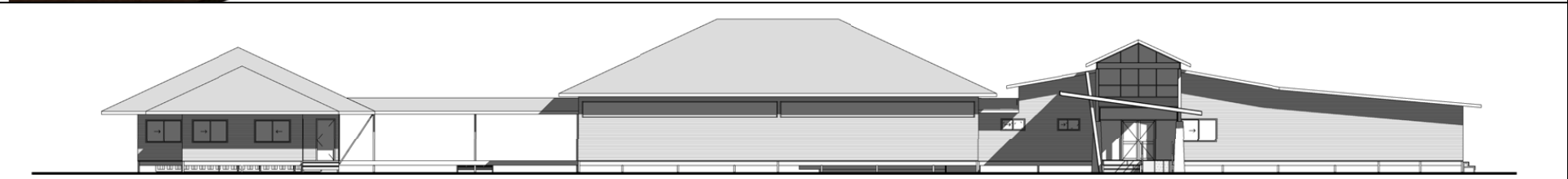
Bicarbonate stored in the ocean interior

Pmel.noaa.gov

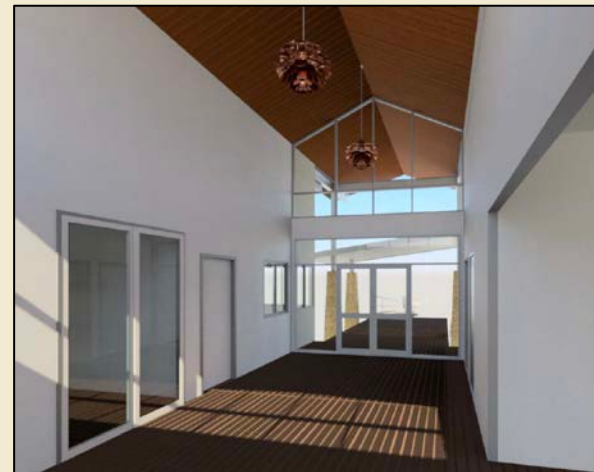


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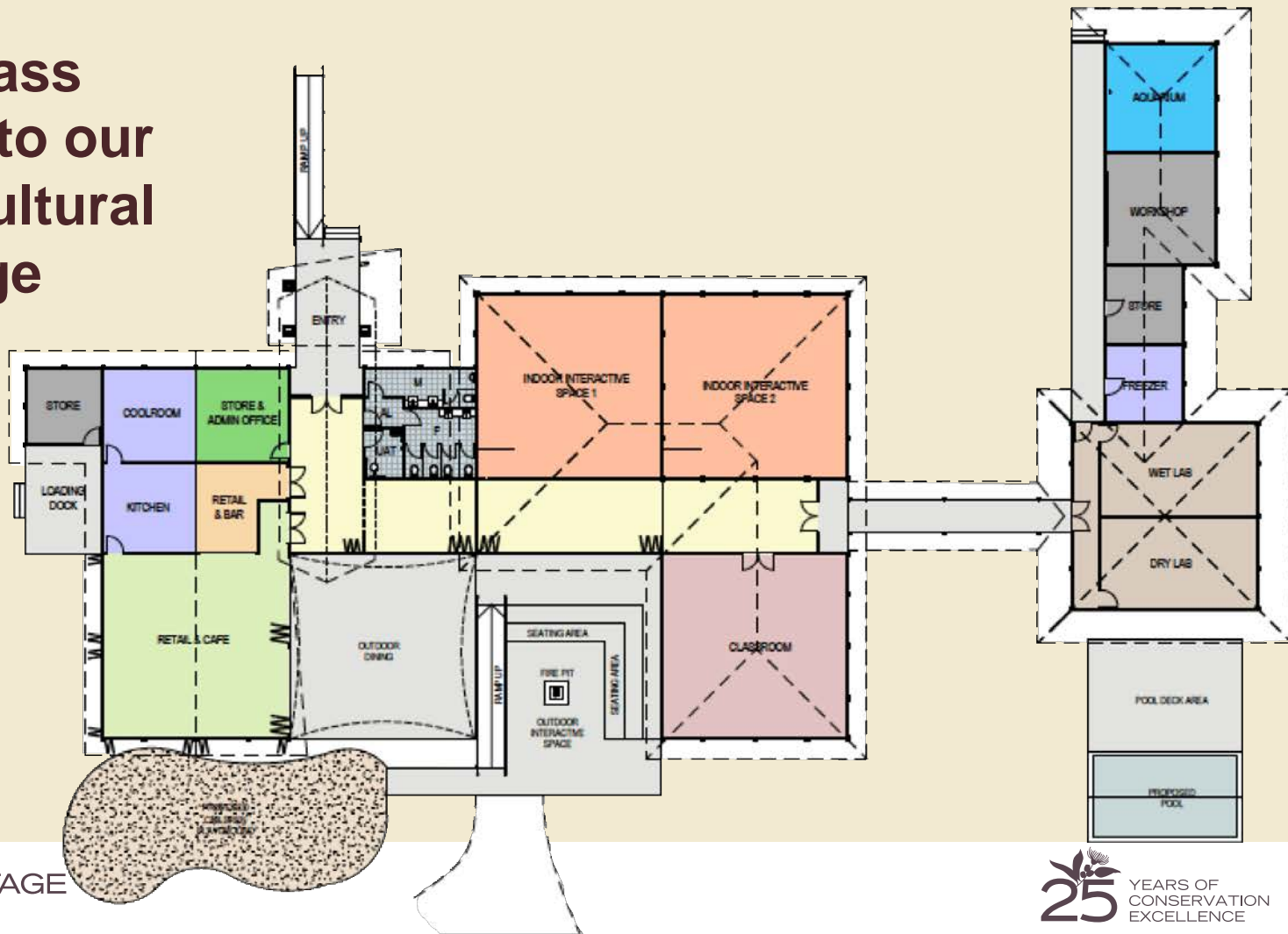
Climate Change Related Threats - Ocean Acidification







# World class research into our natural & cultural heritage



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# Objectives

- Trying to fill gaps in knowledge through research and monitoring
- Establishing long-term monitoring
  - allows detection of issues and changes
  - comparisons to other areas
- Collected information can feed into future planning

“The whole is greater than the  
sum of its parts.”  
-Aristotle