Telling a Better Story of Increasing Ocean Acidification in the Pacific Arctic with Improved Visualizations

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Science Visualization, Spring 2016

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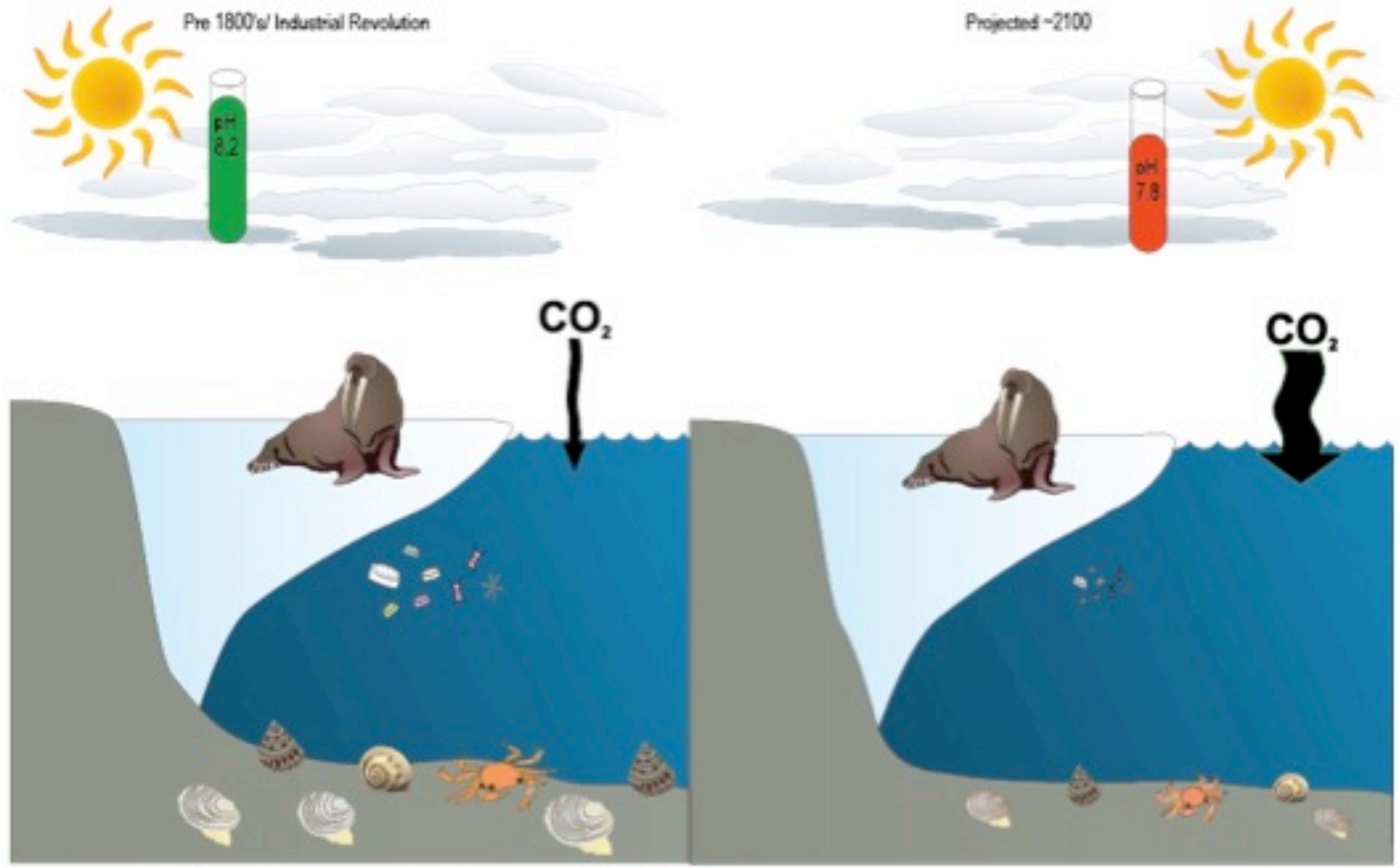
What tools to use: Contents

- **And…But…Therefore (ABT) statement:**
  - Objectives and Introduction- where are you going in the presentation
- **Conceptual Diagrams:**
  - Introductions/overarching themes
- **Maps:**
  - Methodology, where did your work take place?
- **Photography:**
  - Methodology, how was your work set up? What did it look like in the field?
- **Data Visualizations:**
  - Results, what did you find?
- **Storyboarding:**
  - Bringing it all together, posters for conferences and more

Beginning your narrative with “and… but…therefore”

- Orient the audience to the big takeaway of your presentation with one/two sentences
- Before
  - Increased atmospheric anthropogenic carbon dioxide concentrations are leading to ocean acidification **and** the high latitude regions are more susceptible than temperate areas, **but** how important prey items in the Arctic and Antarctic will respond to these chemical changes are generally unknown. **Therefore,** we are examining the physiological and growth effects of acidification on three Arctic clam species that act as prey for many marine mammals, including the Pacific walrus.
- After
  - Many integral prey items, including clams, in the Pacific Arctic produce calcium carbonate shells **and** these structures are under threat from decreasing oceanic pH; **but**, how acidification will specifically affect characteristics like growth, shell production, and oxygen consumption of these calcifying Arctic prey is largely unknown. **Therefore,** we are measuring and analyzing changes in growth and physiological processes under acidified conditions on three Arctic prey clam species.

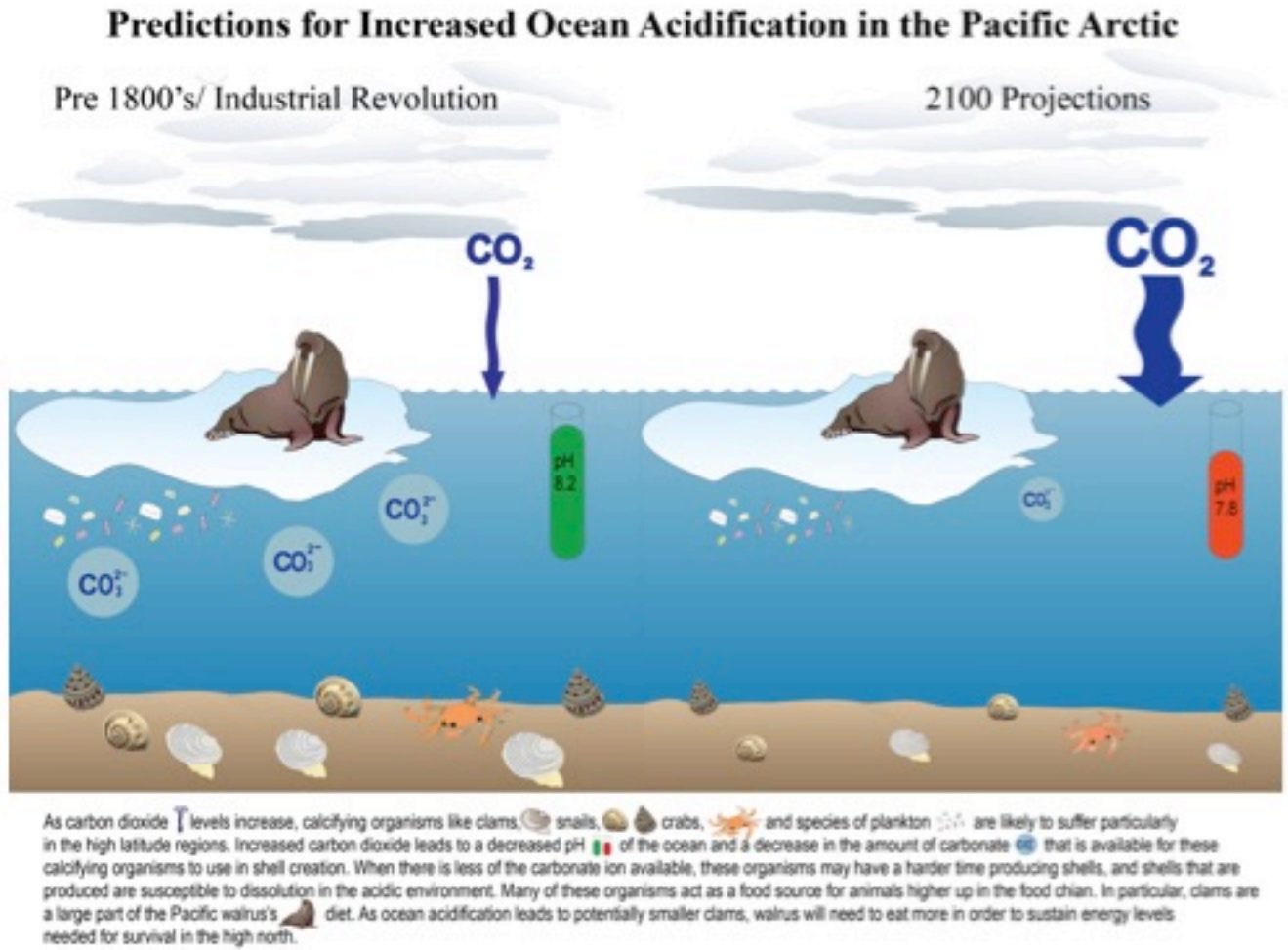
What is the big concept?



As CO2 levels increase, calcifying organisms like clams, snails, crabs, and species of plankton are likely to suffer particularly in the high latitude regions. Increased CO2 leads to a decreased pH of the ocean and a decrease in the amount of carbonate that is available for these calcifying organisms to use in shell creation. When there is less of the carbonate ion available, these organisms may have a harder time producing shells, and shells that are produced are susceptible to dissolution in the acidic environment. Many of these organisms act as a food source for animals higher up in the food chian. In particular, clams are a large part of the Pacific walrus's diet. As ocean acidification leads to potentially smaller clams, walrus will need to eat more in order to sustain energy levels needed for survival in the high north.

Changes for a better conceptual diagram

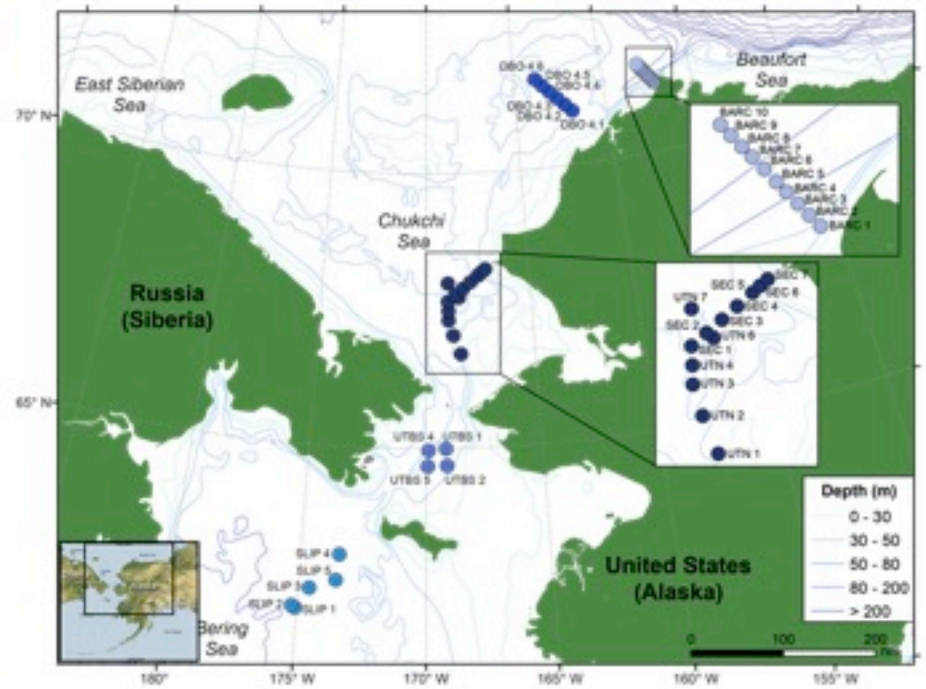
1. Add a title
2. Remove the sun
3. The pH of the water is changing, not the air
4. Add the carbonate ion
5. Expand the water



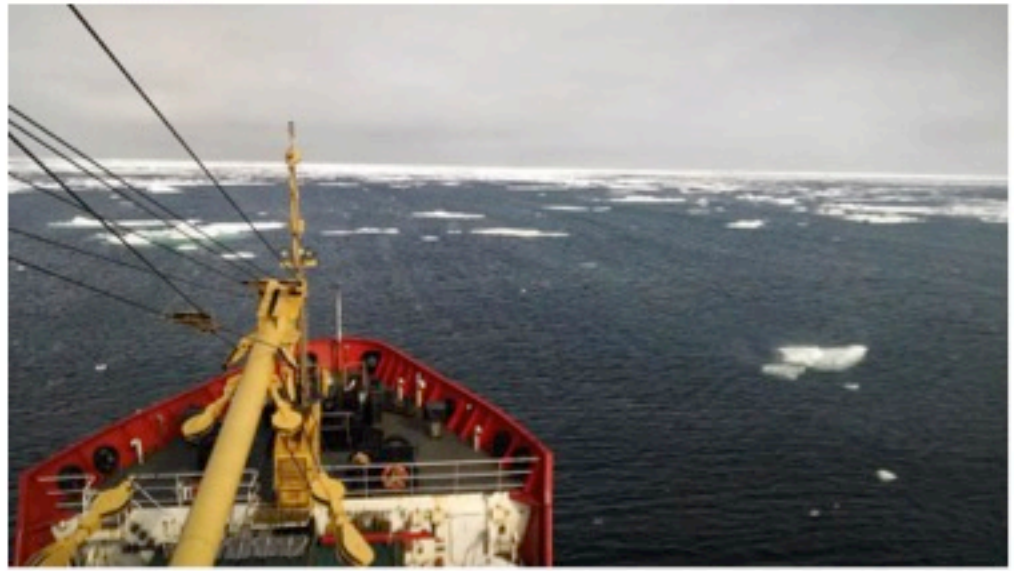
Where did you collect your samples?: Maps

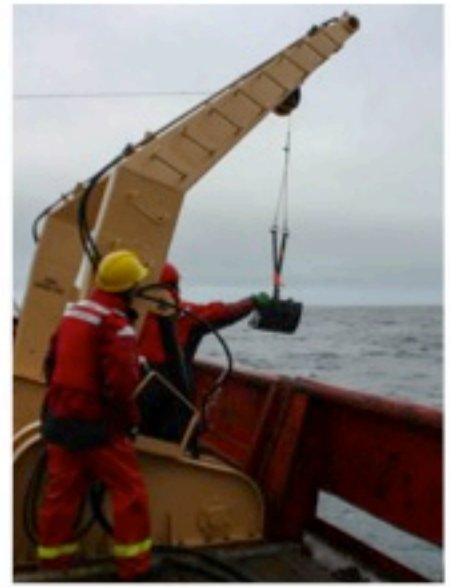
Where is Canada?

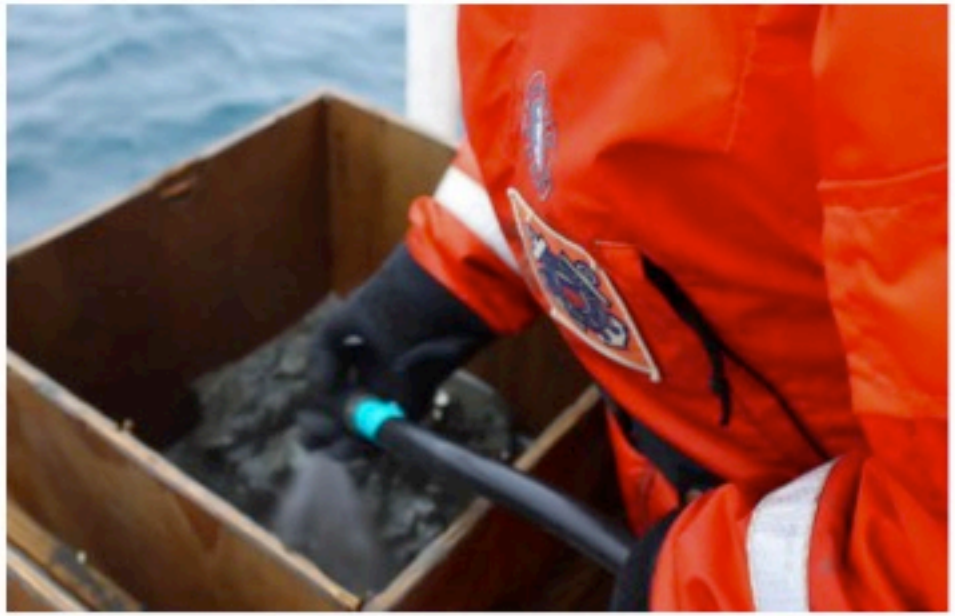
Answer: Add an inset map



What did it look like?: Photography

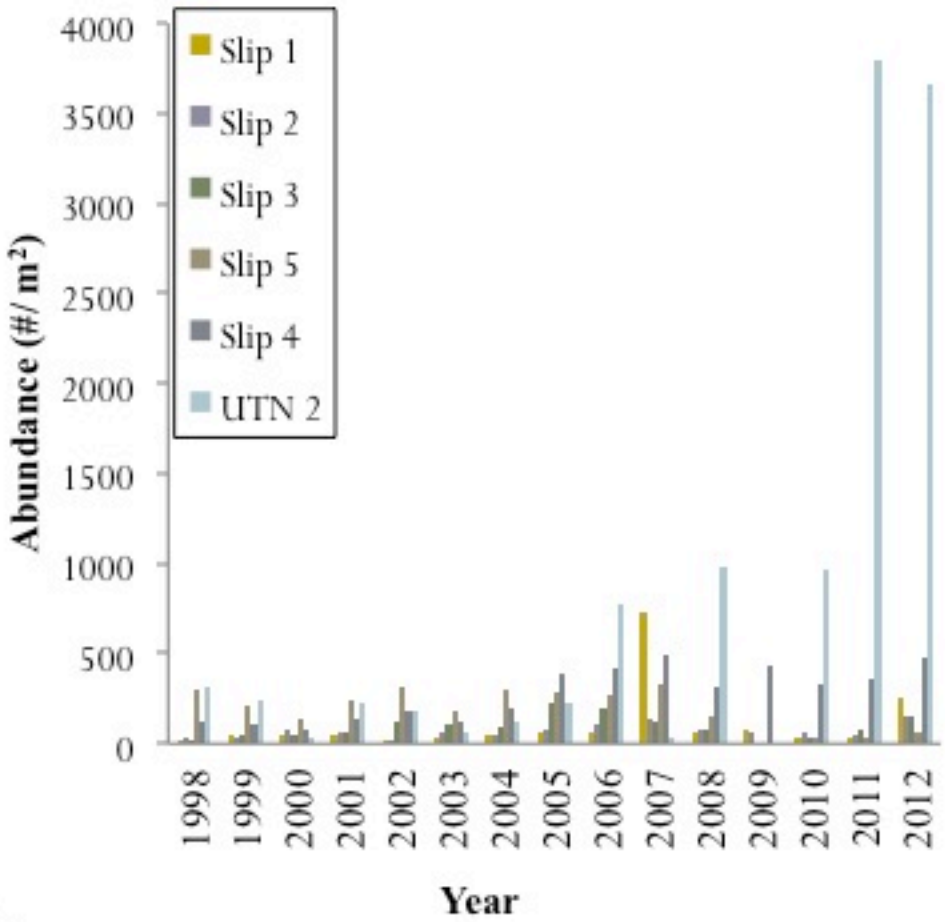




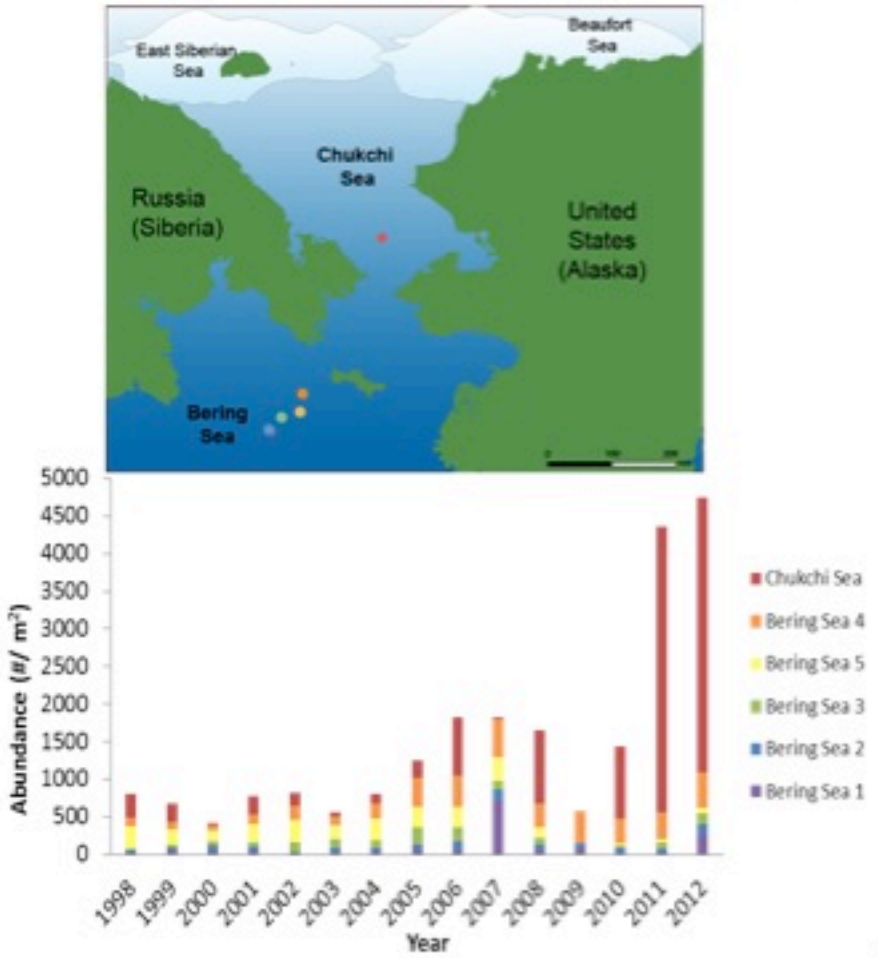


Providing more context in graphs: Data visualizations

Abundance of *M. calcarea* in the NE Bering Sea and SE Chukchi Sea from 1998-2012

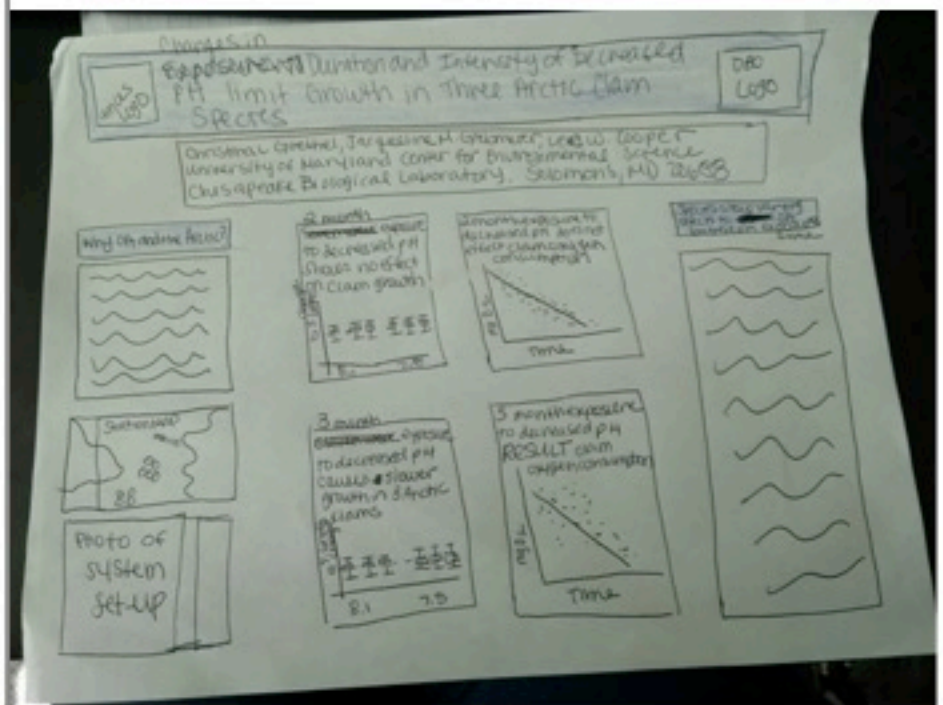


Increasing abundance of the Arctic clam *M. calcarea* at northern sites from 1998-2012

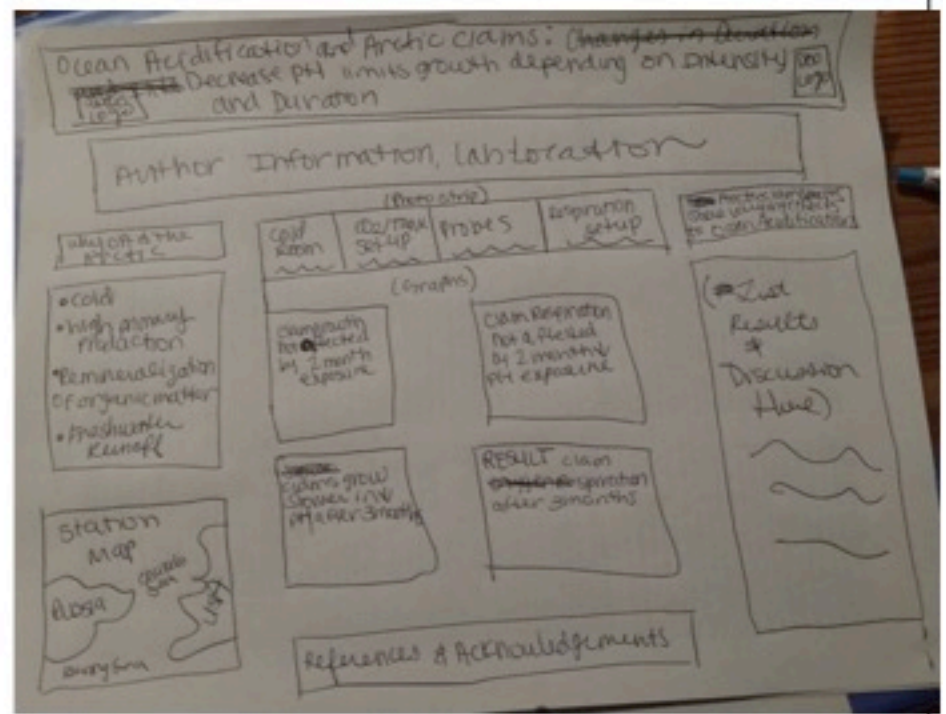


How to put it all together: Storyboarding

Before



After



Then in to InDesign...

Lessons learned: Conclusions

- I created visuals and used them in a presentation to tell the story of increasing ocean acidification in the Pacific Arctic, but my original visuals were missing key elements and had unnecessary pieces in the form of "chart junk". Therefore in order to better inform other scientists and the public on ocean acidification in the Arctic, I took the science visualization course to improve my skills in both visual and oral scientific communication.