

Assignment for next class meeting

- Activate your CPS clicker OR contact me to get a time extension. (I will take attendance Thursday using the clickers)
 - Instructions at course website - www3.uakron.edu/biology/mitchell/ecology/ and on springboard
 - Class code **N64974C555**
- Read Chapter 5 (Temperature Relations), be prepared to apply that information to an example in class

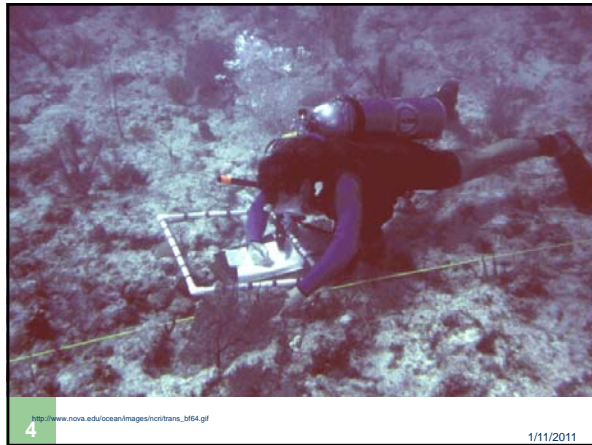


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Coral Reefs

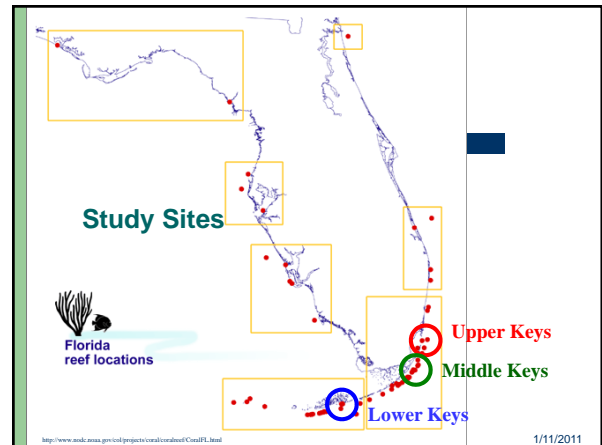


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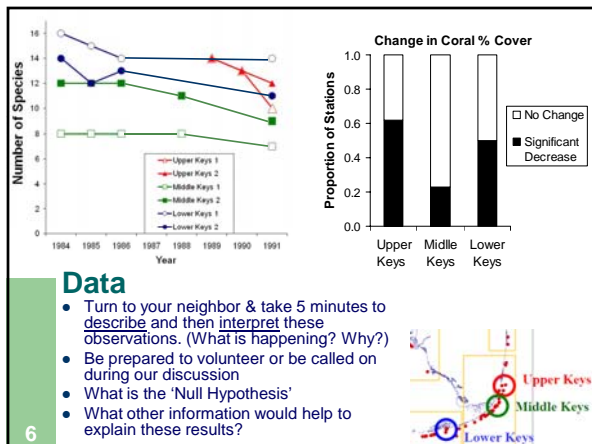


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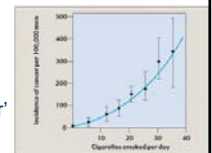
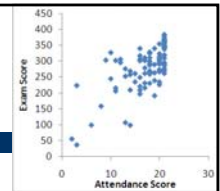
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Null Hypothesis

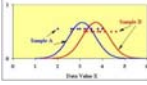
- The explanation you are setting out to disprove. The 'default' position
- For example
 - 'Attendance does not influence Exam Score'
 - 'Smoking does not cause cancer'
- Because there is often a lot of variability in real data, usually tested using statistics



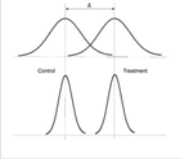
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Use the word 'Significant' carefully in science



- Means that the difference is reliable
 - (unlikely to have occurred by chance).
 - Doesn't** mean 'important'
- Best to use the term only in regard to **Statistical Significance**.
 - Depends on things like
 - Variability within groups
 - Difference between groups ('**Biological Significance**')
 - Sample size
- A small effect might be statistically significant but **not** biologically significant



8 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1450121/> <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1450121/> <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1450121/> <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1450121/> 1/11/2011

Other Clues

Black Band disease



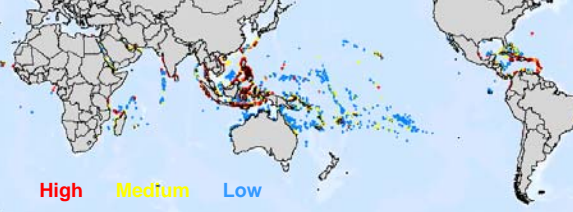
9 http://ourworld.compuserve.com/homepages/mccarty_and_peters/coral/C-niro.htm 1/11/2011

Coral Bleaching



10 <http://www.science.solver.edu/~granthol/bleach.htm> 1/11/2011

Estimated Risks to Coral Reefs



High Medium Low

Suspected Causes:

- Poor Water Quality
- Pollution
- Salinity
- Acidification
- Climate Change
- Overexploitation

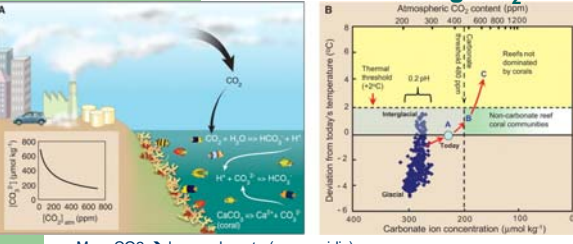
11 Data Source: World Conservation Monitoring Centre <http://www.wri.org/indicators/status.htm> 1/11/2011

What can be done?



12 <http://www.sciencemag.org/cgi/content/full/318/5857/1712> 1/11/2011

Effects of increasing CO₂



A $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{HCO}_3^- + \text{H}^+$
 $\text{H}^+ + \text{CO}_3^{2-} \rightleftharpoons \text{HCO}_3^-$
 $\text{CaCO}_3 \rightleftharpoons \text{Ca}^{2+} + \text{CO}_3^{2-}$ (corals)

B Atmospheric CO₂ content (ppm): 200, 300, 400, 600, 800, 1200
 Deviation from today's temperature (°C): 2, 4, 6
 Thermal threshold (°C): 2
 Today: 15°C
 Interpolated pH: 8.1
 0.2 pH
 Reefs not stimulated by corals
 Non-carbonate reef coral communities
 Glacial: 18000 ppm, 10°C
 Carbonate ion concentration (μmol kg⁻¹): 300, 200, 100

- More CO₂ → less carbonate (more acidic)
- Less carbonate means corals can't build CaCO₂ skeletons
- Blue dots are for observations over last 420,000 years (ice cores)
- Atmospheric CO₂>480ppm will cause coral skeletons to dissolve
- Temperatures above the thermal threshold cause symbiotic zooxanthellae to abandon the coral

Science, December 14 2007

13 <http://www.sciencemag.org/cgi/content/full/318/5857/1737> 1/11/2011

