Homework Assignment 1 – Climate Change
Ecosystem Ecology BIOL 5490
Due Tuesday Sept. 5 at midnight (typewritten, pdf format) – email to lae.Cobley@utah.edu

　　　The goal of assignments in this class is to introduce you to scientific literature, especially as related to current events in ecosystem ecology.　During these homework exercises you will also develop critical reading and thinking skills that allow you learn about a topic and head towards a conclusion based on the scientific method.　These skills go beyond ecosystem ecology, and can be applied to any information you to which to may be exposed.

The assignment:
Begin by reading the document "Climate Change Evidence & Causes: An Overview from the Royal Society and the US National Academy of Sciences" (2014), which you will find on the course website. Then **answer the following questions** completely and concisely (a few to several sentences for each).

1. How have scientists measured the earth's average surface air temperature? Why are scientists confident in indirect/proxy measurements?

2. Currently, what is the average CO_2 concentration of the planet? Have concentrations of CO_2 been greater historically or in the geologic record? Why are current concentrations considered unprecedented for society? Name three other important greenhouse gases.

3. Why are the Earth's oceans becoming more acidic, and at what rate? What are the implications for marine life?

4. What are the natural causes of climate variation, and why are they an inadequate explanation for recent climate warming? Include a short explanation of glacial and solar cycles.

5. Why are there uncertainties in flood and hurricane frequency predictions?

6. Explain how the greenhouse effect warms the Earth's surface. Which wavelengths of light are re-emitted by greenhouse gases?

7. Compare the extent of sea ice melt in the Arctic to the Antarctic. Why might we consider sea ice melt a "positive feedback"? Give another example of a climate related positive feedback.

8. Where are some of the major challenges for climate modelers? Explain two topics of uncertainty current models face.

9. Why are temperature changes of only a few degrees a cause for concern?

10. What should we do about climate change, if anything? Are there market-based solutions, new technologies, or regulations that can help? What solutions are available?

11. How would you communicate climate change to your family and friends? Fellow university students? Members of the general public with only a high school education?

12. Do you perceive a debate about the validity of climate change among scientists? Among the general public? If so, what are the underlying reasons for the disagreement?