Speciation Sleuthing

Greetings fellow scientists!

You are an evolutionary biologist with a special interest in speciation. The goal of your PhD project is to untangle the complicated web of data surrounding a closely related group of organisms. In some cases, you suspect that two currently separate species may in fact be one species. In other cases, you suspect that one species may actually be well on its way to evolving into two separate species.

Choose your own Evolutionary Adventure

1a. You are interested in working in the arctic.	Go to *Ursus* spp.
1b. The cold really isn't your thing.	Go to #2.
2a. You are interested in working in the temperate zone	Go to #3.
2b. You would rather work somewhere warm, like the tropics.	Go to *Heliconius* sp.
3a. You have a background in marine or freshwater ecosystems.	Go to *Gasterosteus aculeatus*
3b. You prefer to work on dry land.	Go to #4
4a. You have a background in botany.	Go to *Helianthus* sp.
4b. You have a background in ornithology.	Go to *Troglodytes* spp.

Criteria

Working with your chosen Evolutionary Adventure species, your task will be as follows:

1. Classify your organisms according to Linnaeus' 7 taxonomic categories.
2. What is the common name of your organisms?
3. Find a picture and outline the important morphology of your organisms.
4. Identify the range of your organisms. You must find a map that shows this range.
5. What is the conservation status of your organisms?
6. Read the article(s) detailing the interesting story of these species.
    a. Summarize the article(s).
    b. In your own words describe the current situation of these organisms.
7. Search the Beaty Biodiversity Databases to see if there is a preserved specimen of the species you are interested in.
    - How many specimens did you find?
    - Where are the specimens from?
    - When was the specimen collected?
    - If you could not find a specimen, what does this mean?
    - How could specimens be used?
8. Come up with an experimental design that will let you test if these organisms belong to multiple species or one species. Make sure to refer to a species concept. What would have to occur and/or what evidence would you have to find in order to convince yourself these organisms belong to one species?
9. Cite your references using http://www.bibme.org in APA format.

Your Research - Specific Website Resources

1. *Ursus arctos* (Brown Bear) and *Ursus maritimus* (Polar Bear)
    - National Geographic – Grizzly-Polar Bear Hybrid Found – What Does It Mean? http://news.nationalgeographic.com/news/2006/05/polar-bears_2.html
    - BBC News – Polar bear plus grizzly equals? http://news.bbc.co.uk/earth/hi/earth_news/newsid_8321000/8321102.stm

2. *Heliconius cydno* subsp. *alithea* (Cydno Longwing Butterfly)
    - National Geographic Phenomena – Discriminating butterflies show how one species could split into two http://phenomena.nationalgeographic.com/2009/11/05/discriminating-butterflies-show-how-one-species-could-split-into-two/
    - Tree of Life – *Heliconius cydno* http://tolweb.org/Heliconius_cydno/72251
    - Learn about Butterflies: *Heliconius cydno* - http://www.learnaboutbutterflies.com/North%20America%20-%20Heliconius%20cydno.htm

3. *Gasterosteus aculeatus* (Three-spine Stickleback) – benthic and limnetic forms
    - National Geographic Phenomena – Stickleback genome reveals detail of evolution's repeated experiment http://phenomena.nationalgeographic.com/2012/04/05/stickleback-genome-reveals-detail-of-evolutions-repeated-experiment/
    - National Geographic Phenomena – Manimals, Sticklebacks, and Finches http://phenomena.nationalgeographic.com/2006/05/22/manimals-sticklebacks-and-finches/

4. *Helianthus petiolaris* (Prairie Sunflower)
    - Beaty Biodiversity Museum: Researchers Revealed – Kate Ostevik http://www.beatymuseum.ubc.ca/researchers-revealed http://www.beatymuseum.ubc.ca/sites/default/files/Kate%20Ostevik.pdf
    - United States Department of Agriculture – PLANTS http://plants.usda.gov/java/

5. *Troglodytes hiemailis* (Winter Wren) and *Troglodytes pacificus* (Pacific Wren)
    - Blog: Biological Ramblings – The Winter Wren is multiple species! http://slybird.blogspot.ca/2008/07/winter-wren-is-multiple-species.html
    - Vancouver Province – Song birds reunite after icy split http://www.canada.com/theprovince/news/story.html?id=fc78fa92-26ee-45b3-a688-fbf6c173dd50#__federated=1
    - Beaty Biodiversity Museum: Researchers Revealed – Dr. Irwin and Wrens (Video) https://www.youtube.com/user/beatymuseum , search "Irwin" http://www.beatymuseum.ubc.ca/researchers-revealed

Your Research - General Website References for all Organisms

- International Union for Conservation of Nature and Natural Resources - http://www.iucnredlist.org
- Encyclopaedia of Life – http://eol.org
- Tee of Life Web Project - http://tolweb.org/tree/phylogeny.html

Specimen Search - Beaty Biodiversity Museum Research Collections

1. Tetrapods (Mammals, Birds, Reptiles, and Amphibians)
    - UBC Beaty Biodiversity Museum Collection Data:
      http://www.beatymuseum.ubc.ca/tetrapod-collection
      http://portal.vertnet.org

2. Fish
    - UBC Beaty Biodiversity Museum Collection Data:
      http://www.beatymuseum.ubc.ca/fish-collection
      http://fishbase.us/museum/SearchFishCollections.php

3. Insects
    - UBC Beaty Biodiversity Museum Collection Data:
      http://www.beatymuseum.ubc.ca/entomological-collection
      http://www.biodiversity.ubc.ca/entomology_pictures/

4. Plants
    - UBC Beaty Biodiversity Museum Collection Data:
      http://www.beatymuseum.ubc.ca/herbarium
      http://bridge.botany.ubc.ca/herbarium/search.php?db=vwsp.fmp12