Responding to a Changing Climate:
How Vernal Pool Plant Communities React

by

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Part I – Plant Responses to Climate Change

Your name: _____   Home Group #: _____

Your assigned climate change topic: _____

Task 1 – Acquiring Expertise

You have read a paper detailing a major plant response to climate change. After reading your assigned paper you are now the expert on that topic in your group. Answer the following questions to prepare for the next task in class.

1. What is the main point of this study?

2. Describe a secondary, but still important, point.

3. Describe one graph in detail:
    a. Which figure did you choose?   _____
    b. What is the graph depicting?

    c. How does it help the story?

4. Explain one statistical analysis utilized in the article to help support the main take home point(s):
    a. Did they use a specific analysis for this?

    b. What is the evidence saying?

    c. How does it help the story?

Task 2 – Sharing Expertise

As an expert on your particular topic, you are now tasked with explaining everything you discussed with the other members of your "home" group. Remember, the members in your home group did *not* read the paper you did and while they are experts in other topics, they don't know yours so it is your responsibility to explain:

- The primary and secondary take home points of the paper.
- Your chosen graph from the paper.
- Your chosen statistic from the paper and why it is important for the story.

Each expert will be given approximately five minutes to explain their topic to the group. Pay close attention to the other experts in your home group as they explain their papers because you will have to ask each one of them a unique question after they have finished their explanation. Write your questions in the space provided below. (If you are the expert for the given topic, you are not required to ask a question of yourself; just write "Expert" next to the heading below.)

Questions for the Experts

Range Shifts:

Phenology:

Community Shifts:

Biodiversity:

To conclude the task we will reconvene as a group and discuss what people learned and how this process went.

And that's it for Part I of the case—nice work!

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Part II – How Vernal Pool Plant Communities Respond

Task 1 – Transient Patterns

Before coming to class, read Collinge and Ray (2009) and write a brief summary of the article (two or three paragraphs) on a separate sheet of paper to be handed in at the start of class.

Task 2 – Predictions

So far you have seen that there are many different ways that plants can and will respond to climate change globally, including changes in bud bursts, range shifts, community composition, etc. Understanding these responses is a very hot topic in the scientific literature. While every ecosystem has its own set of concerns and constraints our focus now will be on how climate change can impact vernal pool plant species.

You have just read the Collinge and Ray (2009) paper describing what vernal pools are and an experiment on how these plant communities may be organized. For this task build off our previous class activities and the Collinge and Ray (2009) paper and come up with *3–4 predictions on how vernal pool plants may respond to climate change:*
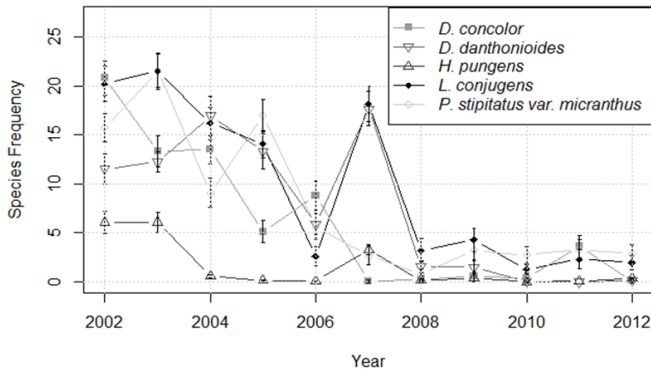
1.

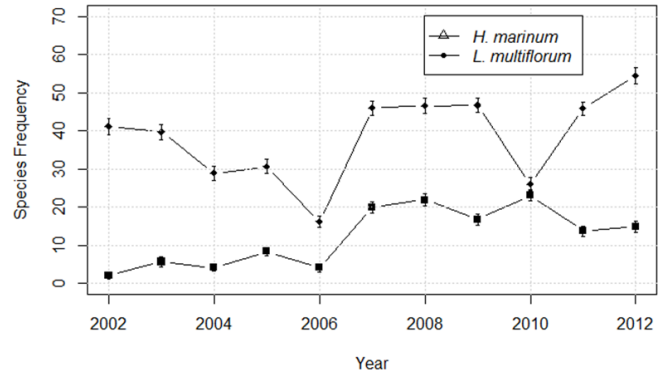
2.

3.

4.

Task 3 – Weather Variability

For this next task we will look at two graphs modified from Javornik and Collinge (2016). The data for these graphs and the ones that follow and that appear in the PowerPoint presentation shown in class detailing vernal pool plant responses to weather variability were collected from a single research site located on Travis Airforce Base near Fairfield, CA. This research site is detailed in Collinge and Ray (2009). The data were collected over a ten-year period (2002–2012) by the Collinge Lab, University of Colorado, Boulder.

Below each graph write a 1–2 sentence description on what it is showing. Be sure to get big picture ideas from the graph and speculate on why there might be such fluctuations in frequency across the years.

Native Species

Legend:
- D. concolor
- D. danthonioides
- H. pungens
- L. conjugens
- P. stipitatus var. micranthus

Non-Native Species
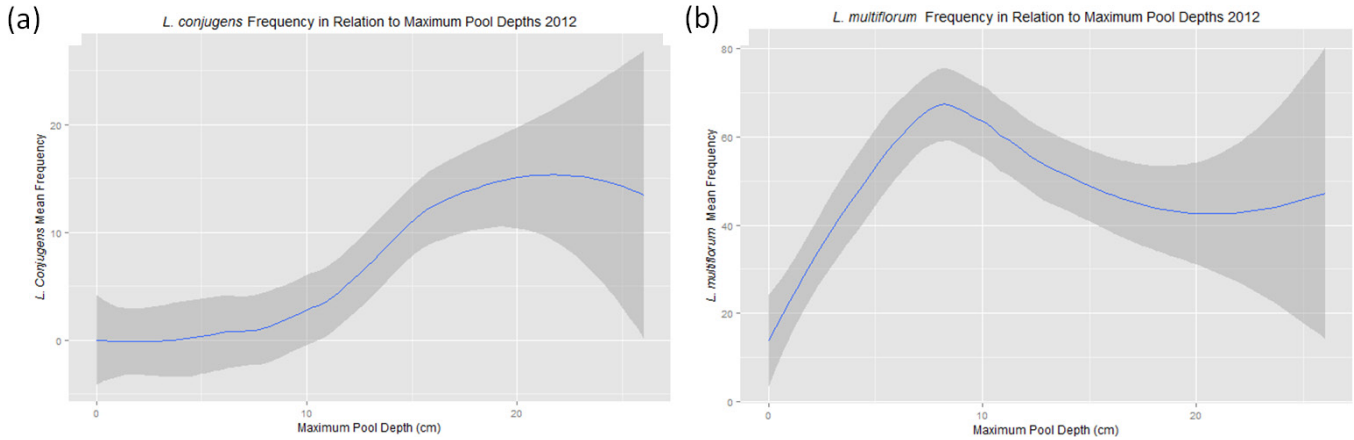
Legend:
- H. marinum
- L. multiflorum

Native species description:

Non-native species description:

Task 4 – Precipitation

After hearing the lecture on precipitation timing and species growth, interpret the following graphs produced by the Collinge Lab as part of continuing research efforts for the research project described in Collinge and Ray (2009). The graphs are made up of smoothed trend lines with standard error bands that highlight one native vernal pool species (a) and one non-native vernal pool species (b). Take 5–10 minutes to predict what would happen to each species if a big early rain event occurred and then if a big late rain event occurred

(a)

L. conjugens Frequency in Relation to Maximum Pool Depths 2012

(b)

L. multiflorum Frequency in Relation to Maximum Pool Depths 2012

How would the native species *L. conjugens* respond to a(n):

    a. Early large rain event:

    b. Late large rain event:

How would the non-native species *L. mulitflorum* respond to a(n):

    a. Early large rain event:

    b. Late large rain event:

To conclude the task we will reconvene as a group and discuss what people learned and how this process went.

And that's it—nice work!

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