General Comments on the First Discussion Paper (2007)

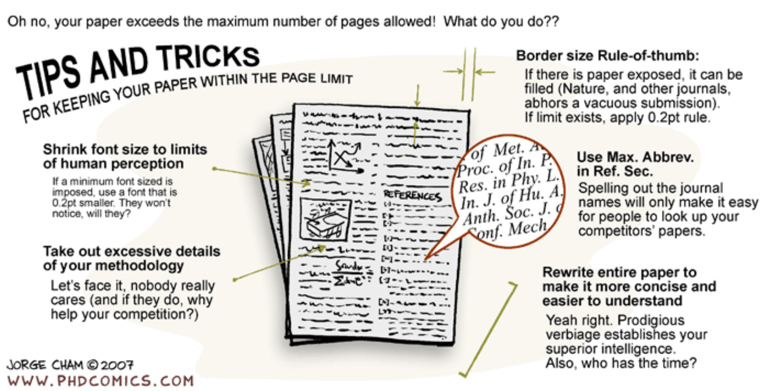
The papers were evaluated at the standard expected of professional ecologists. One goal of CFR501 is for your writing to be at the high end of this standard by the end of the class. Every assertion must be backed by data, citations or a specific train of logic. We have commented the papers extensively. You should not be overly concerned with the numerical evaluation on this paper provided that your subsequent papers achieve a professional level.

Our strongest recommendation for future work is to maximize *effective* space. The assigned page limit allows for inclusion of enough specific detail if irrelevancies are removed – and only if irrelevancies are removed.

More than half of the papers did not address all parts of the question. Consider that the easier parts of the question serve as preparation to develop answers to the hard parts.

Practical hints

- Follow directions: The instructors have an uncanny ability to judge margins and line spacing. Upon receipt, all papers will be reformatted to 12 point font, double spaced, 1" margins all around, and uninteresting verbiage beyond the two-page limit will be disregarded. Setting spacing or margin parameters to "points" and then decreasing those below the specifications makes the instructors grumpy (because of the implication that the instructors are too dense to notice). We recommend a fail-safe way of shrinking papers to the required space – editing.



- If you are having a really hard time squeezing a large number of quantitative details, citations and specific examples into your paper after many hours of work – you are on the right track. If you have filled the page limit without much editing – you are probably missing something.

- Put your name and the assignment in the document header so we can clearly see that each and every page is yours when we print out the document.

- Eliminate transitional words – in science writing, your logic has to flow, your verbiage doesn't (within reason).

- Read the "writing tips" on the assignments page. Almost every person ignored at least one of these tips. When you think you are finished with your papers, re-read the tips to make sure you are taking advantage of them. "You must learn from the mistakes of others. You can't possibly live long enough to make them all yourself." ~ Samuel Levenson

- Eliminate imprecise modifiers or those with no semantic content.

- Scientific writing must be precise – much more precise than when we are speaking about the topic and can elaborate if necessary. In these discussion papers, your inference must stand alone, without relying on what we know you know from our classroom interactions.

- Be specific – use numbers when they are available (e.g. Site A (580 – 670 m), Site B (1190 – 1250 m), Site C (1500 – 1580 m), 10 – 15% ABGR cover). When numbers are not available, be specific about direction (e.g. $\delta^{13}C$ will increase).

- Use SI units. Example: "1 °C" and not "1 degree"

- All citations are not equal. Specific citations of the more complex findings show understanding of the main points and the subtleties. A general reference does not (e.g. "Even moderate drought will affect species at BS in several ways (Lassoie)."). Use any appropriate citation method. Your goal should be to make it clear to us that you are making a correct inference. Do not use "Science" or "Nature" style citations. Also, do not cite papers that you haven't read, because the chance of citing them incorrectly is rather higher than if you have read them.

- Your evaluated papers include words outlined in red. Please do not use these words. They are imprecise, unnecessary, inappropriate in the context of scientific writing, or convey no relevant information. Chose words that convey specific change (e.g. "cover will decrease" instead of "impacted"). Your verbs should indicate the nature of the relationship (e.g. increase, decrease, inhibit) and they should preferably be followed by a numeric modifier (e.g. 10%, 500 GDD).

- Do not include your opinion. You must logically develop your ideas and use previous scientific work (or data) to buttress your arguments. Many people made statements about species which are correct (or probably correct), but which were not cited. Some papers exhibited wild opinions. In scientific writing, people only care about what can be proven to be correct by the study at hand or by previous studies based on real data.

- *Pseudotsuga menziesii*. *Pseudotsuga menziesii*. *Pseudotsuga menziesii*. Using the four letter species codes would prevent the embarrassment of spelling this iconic Pacific Northwest species incorrectly (as well as saving space and avoiding confusion of genera). Please read the guidelines on proper use of species codes. Please also check the spelling of all species names you use. Make sure you have not added an incorrectly spelled species name to your MS Word dictionary.

- Only include data relevant to your inference or which illustrates the limits of your inference. Many papers used a tremendous quantity of ink to list overstory and understory species cover, none of which was used subsequently. Use Occam's Razor – introduce the minimum set of facts (or factoids) to support your inference.

- Weigh the evidence and reach a conclusion. A sentence such as "…could lead to an increase in growth, although….could leave growth rates unchanged or even decrease them" certainly covers all bases, but doesn't allow us to judge whether you can determine the principal and secondary factors influencing community composition. Take the information from the sources, *synthesize* a conclusion, and present that conclusion. All the discussion questions require weighing conflicting trends and deciding which is/are the most important.

- Remember that forest plant communities include the overstory trees, the understory trees and the understory shrubs and herbs. Discussing only trees may not address enough important aspects of community structure and function. And one would certainly not want to label a discussion of two species (out of 50) as "community dynamics."

- Be sure you understand C discrimination and WUE in general, and McDowell specifically. They are important, and you will undoubtedly need to refer to these concepts at some time in the future.

- Some folks made invalid inferences based on affirming the consequent, denying the antecedent or something similar. Be exact with your logic.

  Affirming the Consequent:
  If a tree is a member of Pinaceae, then it is a gymnosperm.
  Thuja plicata is a gymnosperm.
  Therefore, *Thuja plicata* is a member of Pinaceae.

  This statement is, of course, entirely false: *Thuja plicata* is a member of Cupressaceae.

  Denying the Antecedent
  If *Abies amabilis* cover is greater than 10%, then the plot is in the *Abies amabilis* Zone.
  Abies amabilis cover is less than 10%.
  Therefore, the plot is not in the *Abies amabilis* Zone.

  This statement is also entirely false. The overstory (and total cover) plant cover on many early successional sites in the *Abies amabilis* Zone is often completely or nearly completely occupied by *Tsuga heterophylla* or *Abies procera*. One can not conclude that a plant species cannot occur at a site based on the absence of the species. Similarly, a shade tolerant plant is not necessarily a shade obligate plant. Shade tolerant plants often grow vigorously in the sun.

The Answer to The Question

There is no correct answer, and no one gave a wrong answer. Everyone proposed changes to the sites that might actually occur. You were evaluated on how well you backed up your assertion with concrete references and **how you proposed to test the assertion**. In ecology there are many answers that might be right (sometime, somewhere), and a few that would always be wrong. The challenge is to bolster your arguments with actual data and build on the findings of others. The fundamental issue with this assignment was to take data or stipulations that you have (1°C summer increase; 3°C winter increase) and turn those numbers into parameters that are important to plants, judge the magnitude of the effect (on trees, seedlings and understory), and then judge the effect on community composition. The basic logic follows (with variations on this theme).

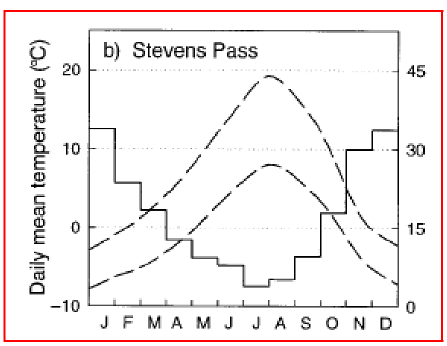
More precipitation falls as rain
Less precipitation falls as snow
The snowpack is thinner
The snowpack melts earlier
The snowpack begins to accumulate later
The growing season, ***as and if limited by low temperatures***, is longer
The period where potential evaporation exceeds actual evaporation begins earlier
If the soil reaches a water potential too negative for (some or all) plants to transpire at some time during the summer, it does so earlier.
The growing season, ***as and if limited by soil moisture***, is shorter
Survival of seedlings limited by minimum low winter temperature increases
Survival of seedlings limited by high summer temperature decreases
Survival of seedlings limited by summer soil drought decreases
The point of the paper was that "limited by temperature" and "limited by moisture" are a recapitulation of the "tastes great" vs. "less filling" debates of yore. The assignment asked you to use ecophysiological mechanisms, previous studies and field data to argue whether BS or CN "tastes great", " is less filling", or both.

Good points taken from papers

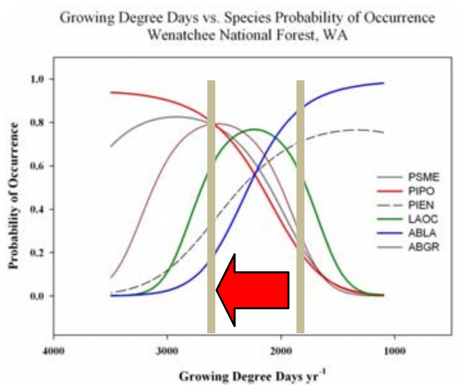
GP #1) Site BS: "Understory composition would also change to more xeric vegetation on the site. Species present in the lower dryer transects, such as *Ceanothus velutinus* and *Spiraea betulifolia* may become more common throughout the site, replacing mesic species such as *Chimaphila umbellate* and *Rosa species* (Table 2)."

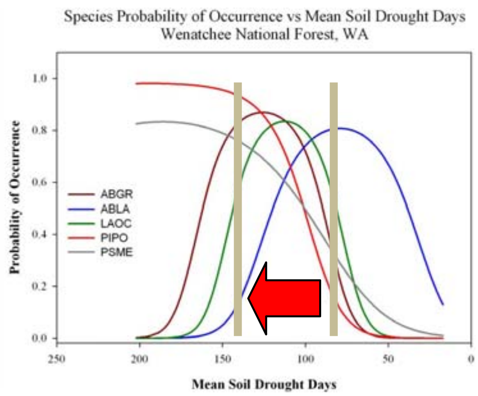
This inference required correctly gauging the effect of the proposed temperature change in terms of elevation. A 1°C change corresponds to 100 – 200 m of elevation change, or the approximate elevation range of our sampling transects. Some people inferred that species from BN would begin to be found at CN and those from AS would begin to be found at BS. However, the elevation difference between sites is 500 m, which would correspond to a temperature increase of 3 – 5°C. A correct inference would have had to rely on species present at both AS and BS and their abundances (e.g. MAAQ currently has abundant cover at AS (X%) and lower cover at BS (Y%)). Increasing summer temperature will increase MAAQ abundance at BS). A similar argument could be made for the decline in abundance of a species (e.g. using AMAL cover for AS and BS).

GP #2) Using the climate charts presented in the readings (**actual data**) to gauge (relatively precisely) the increase in growing season by graphical interpretation.



GP #3) Making a quantitative estimate of the temperature change in terms of the biophysical variables.





Mean Soil Drought Days

GP #4) How many drought days are there at CN? Use the actual field data to approximate the current condition. Under temperature change, this line moves to the left (some unknown or approximate distance). Species occurrence on the data transects allows rough placement of all our plots in McKenzie biophysical space. McKenzie in this way. Annotating a graph with lines and arrows makes your point clear. Inference based on two biophysical parameters