

### Stream Reach Project

So far in the course we have discussed the interactions and linkages between geomorphology, hydrology, and stream communities; touched on nutrient cycling and this week we will add ecosystem metabolism to the mix. As we have learned streams operate quite differently than terrestrial or even lentic environments. The high rates of disturbance combined with downstream transport create a unique dynamic equilibrium. This project provides you the opportunity to apply the skills that you have learned in class, lab, and the field to characterize a reach within Mesa Creek. In addition to the *general site characterization* (described below) your group must try to *answer an ecological question* (pose a question, state your hypothesis, collect and analyze samples, data analysis, synthesize, present).

The ecological question you ask does not need to be groundbreaking BUT it does need to be something that links multiple components of the stream ecosystem together. For example, “how do macroinvertebrates vary by microhabitat?” links geomorphology and flow regime with the biotic stream community. While, “what are the macroinvertebrates present in the stream reach?” is simply a description of the biotic community, with collection not necessarily focused on teasing apart biotic and abiotic controls. Skills you have learned and/or information you will gather this week include (all \* items must be completed):

- Stream reach characterization, including habitat (riffles, pools, runs) & riparian zone\*
- Discharge measurement\*
- Pebble counts
- Macroinvertebrate identification (we also placed Hester Dendy's out to look at colonization rates)
- Alkalinity, pH, temperature, conductivity
- BOD (and/or dissolved oxygen measurements)
- Nutrient uptake metrics (calculated this week)
- Stream metabolism (i.e. NEP = GPP – R, also calculated this week)
- Organic Matter Assessment (leaf back, CPOM, periphyton)

**Be creative!** Brainstorm ideas with Darren, Kyra, and me (I suggest trying to settle on a question and approach by the end of the day Tuesday, at the latest Wednesday).

You are also allowed to venture beyond your reach (e.g. compare your reach to one that you think is very different) – this will be easier if that group is also interested in sharing data (e.g. you both collect macroinvertebrates and so you can share your data). You have Tuesday, Wednesday, and Thursday afternoon PLUS all day Friday and most of Monday (except when you are taking your final). I recommend the following schedule (bolded items are not optional):

- Tuesday: Reach characterization, measure discharge, take samples for BOD (measure T0)
- Wednesday: Pebble Count, OM Assessment, Macroinvertebrate collection
- Thursday: Macroinvertebrate ID, BOD titrations

- Friday: finish up data collection, relate to literature
- Monday: work on Abstracts, final presentations (take **Oral Final**)
- Tuesday: **Abstract peer review, final presentations @ Becca's**
- Wednesday: **all items due on Canvas by 10 AM**

[40%] You will present your findings in a **short presentation** (5 minutes per group member – i.e. most groups will have 15 minutes to present). The presentation must include: statement of your research question and hypothesis, site characterization, brief methods (more detail if you choose to do something beyond the methods discussed and practiced as a class), results & discussion. Your discussion should include the contextualization of your results within the literature. The presentation will receive one grade. *Everyone in the group must present.*

[60%] Individually, you must turn in an **abstract** of your project (the who, what, when and why of your research, 20%). Abstracts should be no more than 250 words (approximately one page, double spaced). In addition to the abstract, please provide a **minimum of 3 well captioned figures** (e.g. 3-4 sentences explaining the relationship and its significance, 20%). Finally, please provide an **annotated bibliography** of a **minimum of 8 references** (20%). An annotated bibliography provides a brief summary of the article AND a short synopsis of how you used this information in your project. These pieces will be uploaded to Canvas.

### **Presentation**

Your group will be assessed on a 1-10 scale for each of the following categories. These scores will then be weighted (as detailed below) to calculate your group presentation score.

10%	Introduction: You need to explain your question, why you asked it, why it is important, contextualizing it within the literature
5%	Hypothesis: your hypothesis is clearly stated
10%	Site Description: Make sure to explain your site well enough (& include photographs) so that your audience can relate your results to your site
10%	Methods: Describe your methods in a clear, interesting and brief way.
20%	Results: Figures should be well labeled (axes, titles, units included) and clearly explained
25%	Discussion: So what do your results mean? Are they what you expected? What is your confidence in them? How do they compare to results in the literature?
10%	Visuals & Organization: Presentation was easy to follow and well organized. Text was clear, slides were not busy. Presenters made good eye contact with the audience.
10%	Ability to answer questions: Your group was able to answer the audience's questions.

### **Abstract**

A good abstract summarizes the research findings in a way that makes the reader want to learn more. Your abstract should cover the following things: (1) the question and why it is important, (2) how you went about answering it, (3) your findings. In addition it needs to be well written and concise. Each of these categories will be rated on a ten-point scale and then averaged. Given that it is actually quite challenging to summarize all this info in 250 words, **a draft is due Tuesday at 8 AM on Canvas** and we will do peer review (so you will have my comments, plus a classmate's) to help you improve it.

20%	Introduction & Why: What is your question & why is it important?
10%	Methods & Site: How and where you did your study
40%	Results/Findings of your study are well described
30%	Well written (no spelling or grammar mistakes) & 250 words or less

### Well Captioned Figures

You must provide a minimum of **3 data figures** (*not* including a site map – which can be in your presentation but does not need to be included here). Your figures will be assessed on their completeness (all axes are labeled, legends are clear, units are noted, title included) as well as on the clarity of the caption. The caption should (1) describe the relationship (or lack of relationship if that is what is important) illustrated in the figure and (2) why that relationship matters, why it is important. Please note – these must be thoughtful graphs and/or tables. Just because you can plot two variables against each other, doesn't mean you should. If possible and appropriate, statistical tests should be done. You must do *at least two statistical tests* – please think about this when figuring out what you want your project to focus on.

### Annotated Bibliography

Please provide full citation information for **8 peer reviewed scientific articles** or reports. In addition to the citation, briefly describe the findings of the paper (3-4 sentences) and how you used these results in your own research (3-4 sentences). If you use more than 8 sources (yeah you!) you do not need to provide annotation for all of them – just do a subset of 8. You may also use non-peer reviewed material (e.g. Nature Conservancy report) BUT it will not count towards your five. You may share sources with members of your team – but you may not copy each other's annotations.