**Environmental Components of Species Distribution** Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Instructions**: Working in groups of 4-5, and using the skills you developed to measure environmental data earlier in the course, collect the data requested below and answer the questions that follow. Each of the 5 teams will be in a different location at the creek in Plant Park:

* **Upper creek** team – closest to the fountain
* **UM creek** team – in between
* **Middle creek** team – in the middle of the stream reach between the fountain and the river
* **ML creek** team – in between
* **Lower creek** team – in the open area before the creek joins the river.

At the end of the lab you will all swap data, so that you have the information you need for each stream location to make the comparisons requested at the end of the lab. For each section, you are asked to take replicate data, and that means to “randomize” your sampling in the different locations that you are working in, so that you are not taking your samples in exactly the same spot every time.

**Salinity**: Enter in the salinity, measured using a refractometer or a hydrometer, for 5 replicate spots at your location. Make sure you trade data with the four other groups to fill out the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Site | Replicate 1 | Replicate 2 | Replicate 3 | Replicate 4 | Replicate 5 | Average |
| Upper creek |  |  |  |  |  |  |
| UM creek |  |  |  |  |  |  |
| Middle creek |  |  |  |  |  |  |
| ML creek |  |  |  |  |  |  |
| Lower creek |  |  |  |  |  |  |

Following the lab, draw a graph with labeled axes, comparing average salinity by location on the creek.

Did location along the creek have an effect on salinity? What was the effect?

**Turbidity**: Enter in the turbidity, measured using a turbidometer back in the lab, for 5 replicate spots at your location. Collect 5 water samples using the labeled containers, being sure to avoid stirring up the bottom sediment at you take them. Be sure you trade data with the other groups to fill out the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Site** | Replicate 1 | Replicate 2 | Replicate 3 | Average |
| Upper creek |  |  |  |  |
| UM creek |  |  |  |  |
| Middle creek |  |  |  |  |
| ML creek |  |  |  |  |
| Lower creek |  |  |  |  |

Following the lab, draw a graph with labeled axes, comparing average turbidity by location.

Did location along the creek have an effect on turbidity? What was the effect?

**Water/Air Temperatures**: Enter in the temperature, measured using a thermometer, for 5 replicate spots at your location for both air and water. Make sure you trade data with the other groups.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Site - Air** | Replicate 1 | Replicate 2 | Replicate 3 | Replicate 4 | Replicate 5 | Average |
| Upper creek |  |  |  |  |  |  |
| UM creek |  |  |  |  |  |  |
| Middle creek |  |  |  |  |  |  |
| ML creek |  |  |  |  |  |  |
| Lower creek |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Site - Water** | Replicate 1 | Replicate 2 | Replicate 3 | Replicate 4 | Replicate 5 | Average |
| Upper creek |  |  |  |  |  |  |
| UM creek |  |  |  |  |  |  |
| Middle creek |  |  |  |  |  |  |
| ML creek |  |  |  |  |  |  |
| Lower creek |  |  |  |  |  |  |

Following the lab, draw two graphs with labeled axes (Air and Water), comparing average temperature by location.

Did location along the creek have an effect on temperature? What was the effect? Did air temperatures or water temperatures vary more? Was there an effect of shading? What about proximity to paved surfaces like roads or parking lots?

**Plant diversity**: Using the quadrant dropped carefully into the water over vegetation, count the number of different types of plant you see in each of the 4 sections – each of which will be one replicate below. Make sure you trade data with the other groups to fill out the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Site | Replicate 1 | Replicate 2 | Replicate 3 | Replicate 4 | Average |
| Upper creek |  |  |  |  |  |
| UM creek |  |  |  |  |  |
| Middle creek |  |  |  |  |  |
| ML creek |  |  |  |  |  |
| Lower creek |  |  |  |  |  |

Following the lab, draw a graph with labeled axes, comparing average plant diversity by location.

Did location along the creek have an effect on plant diversity? What was the effect?

**Animal Diversity**: Using the hand nets or dip nets provided, take 4 replicate scoops through the water. Record both the total number of organisms, and the number of different kinds of organisms in each replicate, for the 4 replicate spots at your location. Make sure you trade data with the other groups to fill out the table below. You may need to select an area to watch for a minute and count the number of different organisms that you see in that spot in that time if the dip net approach does not work.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Site | Replicate 1 | Replicate 2 | Replicate 3 | Replicate 4 | Replicate 5 | Average |
| Upper creek |  |  |  |  |  |  |
| UM creek |  |  |  |  |  |  |
| Middle creek |  |  |  |  |  |  |
| ML creek |  |  |  |  |  |  |
| Lower creek |  |  |  |  |  |  |

Following the lab, draw a graph with labeled axes, comparing average animal diversity by location.

Did location along the creek have an effect on fish/invertebrate diversity? What was the effect?

**Planktonic diversity**: Using the specimen cups in your buckets, please take two samples of the water in your site and cap them tightly. Back in the lab, take the water samples out and place a drop of water onto a slide with a coverslip from one of the cups. At a magnification of \_\_\_\_\_, look at the field of view and count the number of different kinds of organisms you see. Complete this exercise 4 more times, using samples from both cups. Make sure you trade data with the other groups to fill out the table below, and work with groups from other locations to try to identify patterns of species that are abundant vs. ones that are rarer.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Site | Replicate 1 | Replicate 2 | Replicate 3 | Replicate 4 | Replicate 5 | Average |
| Upper creek |  |  |  |  |  |  |
| UM creek |  |  |  |  |  |  |
| Middle creek |  |  |  |  |  |  |
| ML creek |  |  |  |  |  |  |
| Lower creek |  |  |  |  |  |  |

Following the lab, draw a graph with labeled axes, comparing average planktonic diversity by location.

Did location along the creek have an effect on planktonic diversity? What was the effect?

**Phosphorous and Nitrogen compounds**: Because the kits can be expensive to measure these compounds, you will have to ask your instructor if you should run multiple tests at your site. You should certainly measure both Phosphate and Nitrate/Nitrite at each location and record your amounts below, using the instructions on the test kits themselves. Make sure you trade data with the four other groups.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Phosphorous** | Replicate 1 | Replicate 2 | Replicate 3 | Replicate 4 | Replicate 5 | Average |
| Upper creek |  |  |  |  |  |  |
| UM creek |  |  |  |  |  |  |
| Middle creek |  |  |  |  |  |  |
| ML creek |  |  |  |  |  |  |
| Lower creek |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Nitrogen** | Replicate 1 | Replicate 2 | Replicate 3 | Replicate 4 | Replicate 5 | Average |
| Upper creek |  |  |  |  |  |  |
| UM creek |  |  |  |  |  |  |
| Middle creek |  |  |  |  |  |  |
| ML creek |  |  |  |  |  |  |
| Lower creek |  |  |  |  |  |  |

Following the lab, draw two graphs with labeled axes (Phosphorous and Nitrate/Nitrite), comparing average concentrations by location.

Did location along the creek have an effect on chemical compounds measured? What was the effect? What is your location relative to paved surfaces like roads or parking lots? Agriculture? Manicured green spaces that may have lots of fertilizers used?

**Follow up questions:**

Look over your graphs, and think about the patterns that you see. Were there patterns in the environmental data that you can describe as a group (comparing temperature, salinity, and turbidity)? What factors do you think caused the patterns that you observed in the environmental data?

Do you think there is a correlation between the environmental data and the biological patterns that you observed? Which site had the highest overall biodiversity? Why do you think that is?