

Activity B: Analyze and Interpret

Kelp Forest Complexity

Analyzing data and interpreting graphs: Role of depth in algal communities

The understory of a kelp forest is made up of a diverse community of smaller algae. In areas with different amounts of light or water flow, these communities are different as a reflection of the different abiotic factors! Follow the instructions below to analyze your data and draw conclusions about the role of depth in algal communities.

Before starting, **write and explain** your prediction to the following question below:

How do you predict that algal species richness will change from 0ft to 60ft?

Answers will vary

Instructions:

1. For this activity, use the [Analyze and interpret: Species richness and depth](#) worksheet. You will need to make a copy of the file and save it to your own Google Drive account before continuing. Open up your new copy of the spreadsheet and make sure your data look like this to start:

	A	B	C	D	E	F
1	Site	Flow	Depth (ft)	Richness	Diversity	Evenness
2	BC Point	High	1.3	5	1.25	0.78
3	BC Point	High	3.9	5	1.38	0.86
4	BC Point	High	5.9	3	0.60	0.54
5	BC Point	High	9.8	7	1.63	0.84
6	BC Point	High	13.5	8	1.61	0.77
7	BC Point	High	17.4	9	1.38	0.63
8	BC Point	High	21	13	1.95	0.76

2. Select all 6 columns by clicking on the **A** at the top of the “Site” column and dragging over to the **F** at the top of the “Evenness” column. Then, click on the **Filter** button in the toolbar. Your spreadsheet should now look like this:

	A	B	C	D	E	F	G	H	I
1	Site	Flow	Depth (ft)	Richness	Diversity	Evenness			
2	BC Point	High	1.3	5	1.25	0.78			
3	BC Point	High	3.9	5	1.38	0.86			
4	BC Point	High	5.9	3	0.60	0.54			
5	BC Point	High	9.8	7	1.63	0.84			

3. Click on the three green arrows at the top of the “Depth” column to open a drop-down menu. From there, select “Sort A -> Z”

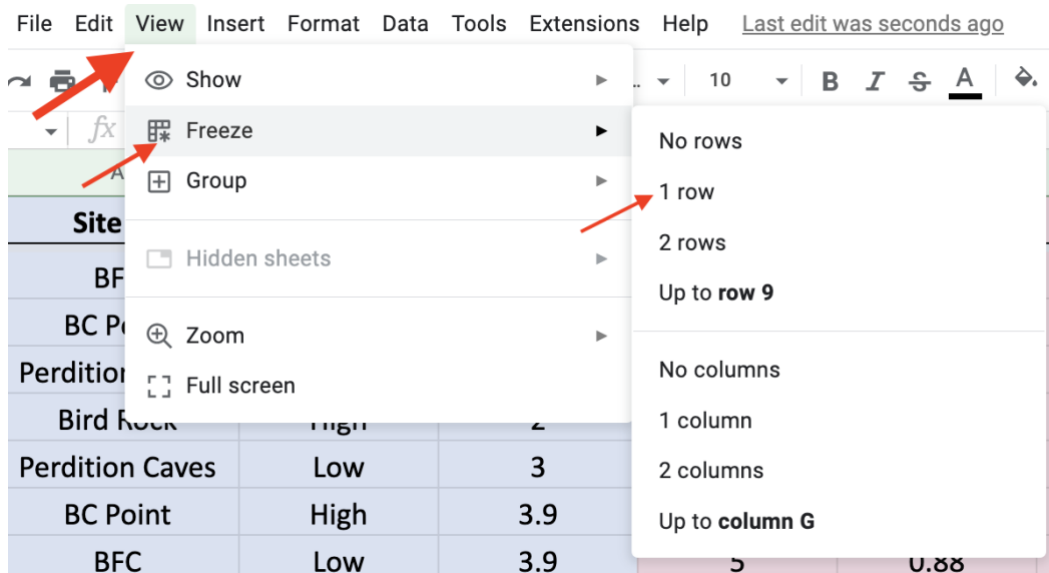
	A	B	C	D	E	F
1	Site	Flow	Depth (ft)	Richness	Diversity	Evenness
2	BC Point	High	1.3	5	1.25	0.78
3	BC Point	High	3.9	5	1.38	0.86
4	BC Point	High	5.9	3	0.60	0.54
5	BC Point	High	9.8	7	1.63	0.84
6	BC Point	High	1.3	8	1.61	0.77
7	BC Point	High	3.9	9	1.38	0.63
8	BC Point	High	5.9	13	1.95	0.76
9	BC Point	High	9.8	7	0.70	0.36
10	BC Point	High	1.3	16	2.19	0.79
11	BC Point	High	3.9	9	1.81	0.83
12	BC Point	High	5.9	10	1.76	0.77
13	BC Point	High	9.8	5	1.11	0.69
14	BC Point	High	1.3	8	1.49	0.72
15	BC Point	High	3.9	7	1.27	0.65
16	BC Point	High	5.9	10	1.95	0.85
17	BC Point	High	9.8	6	1.26	0.70
18	BC Point	High	1.3	10	1.35	0.59
19	Bird Rock	High	58.7	3	0.85	0.78

4. Your data should now look like this. Double check with your teacher before continuing on to step 5.

	A	B	C	D	E	F
1	Site	Flow	Depth (ft)	Richness	Diversity	Evenness
2	BFC	Low	0.7	2	0.18	0.25
3	BC Point	High	1.3	5	1.25	0.78
4	Perdition Caves	Low	1.3	2	0.48	0.70
5	Bird Rock	High	2	2	0.31	0.45
6	Perdition Caves	Low	3	2	0.63	0.91
7	BC Point	High	3.9	5	1.38	0.86
8	BFC	Low	3.9	5	0.88	0.54
9	Perdition Caves	Low	3.9	7	1.58	0.81
10	Bird Rock	High	4.9	2	0.63	0.91
11	BC Point	High	5.9	3	0.60	0.54
12	Perdition Caves	Low	7.5	3	0.25	0.23
13	BFC	Low	7.9	8	1.39	0.67
14	Bird Rock	High	8.2	1	0.00	1.00
15	BC Point	High	9.8	7	1.63	0.84
16	BFC	Low	11.8	7	1.26	0.65
17	Perdition Caves	Low	12.5	8	1.08	0.52
18	Bird Rock	High	12.8	12	1.88	0.76
19	BC Point	High	13.5	8	1.61	0.77
20	Bird Rock	High	15.4	13	2.41	0.94

Now that we have prepared our data for analysis, let's do some calculations!
 Our first goal is to find the **average species richness from 5 to 20 feet underwater.**

- For easier use, click on *View > Freeze > 1 Row* so you can scroll down and still see the column names.



- It's time to select our data! As a reminder, we want to answer the following question: What is the average species richness from 5 to 20 feet underwater?

To calculate this number, select an empty cell to the right of the data and enter the following formula: **=AVERAGE(**

- Select the data that you want to average. In this case, select all of the values in the "Richness" column that have corresponding depths between 5 and 20ft. Press Enter to calculate the average.

	A	B	C	D	E	F	G	H	I	J
1	Site	Flow	Depth (ft)	Richness	Diversity	Evenness				
2	BFC	Low	0.7	2	0.18	0.25				
3	BC Point	High	1.3	5	1.25	0.78				
4	Perditiion Caves	Low	1.3	2	0.48	0.70				
5	Bird Rock	High	2	2	0.31	0.45				
6	Perditiion Caves	Low	3	2	0.63	0.91				
7	BC Point	High	3.9	5	1.38	0.86				
8	BFC	Low	3.9	5	0.88	0.54				
9	Perditiion Caves	Low	3.9	7	1.58	0.81				
10	Bird Rock	High	4.9	2	0.63	0.91				

=AVERAGE(
 AVERAGE([value], [value2, ...])

Do not delete this cell.

H5	A	B	C	D	E	F	G	H
6	Perditiion Caves	Low	3	2	0.63	0.91		
7	BC Point	High	3.9	5	1.38	0.86		
8	BFC	Low	3.9	5	0.88	0.54		
9	Perditiion Caves	Low	3.9	7	1.58	0.81		
10	Bird Rock	High	4.9	2	0.63	0.91		
11	BC Point	High	5.9	3	0.60	0.54		
12	Perditiion Caves	Low	7.5	3	0.25	0.23		
13	BFC	Low	7.9	8	1.39	0.67		
14	Bird Rock	High	8.2	1	0.00	1.00		
15	BC Point	High	9.8	7	1.63	0.84		
16	BFC	Low	11.8	7	1.26	0.65		
17	Perditiion Caves	Low	12.5	8	1.08	0.52		
18	Bird Rock	High	12.8	12	1.88	0.76		
19	BC Point	High	13.5	8	1.61	0.77		
20	Bird Rock	High	15.4	13	2.41	0.94		
21	Perditiion Caves	Low	15.4	5	1.00	0.62		
22	BFC	Low	15.7	5	1.03	0.64		
23	BC Point	High	17.4	9	1.38	0.63		
24	Bird Rock	High	17.7	6	0.94	0.52		
25	Perditiion Caves	Low	19	4	1.18	0.85		
26	BFC	Low	19.7	6	1.31	0.73		
27	BC Point	High	21	13	1.95	0.76		

H5 6.5625 x
 =AVERAGE(D11:D26)

8. Now that you have calculated the average **species richness** from 5-20ft, follow steps **6-7** again but now find the average **species richness** from **45-60ft**. Do not delete this cell.

Use your data and notes from class to answer the following questions.

What is the average **species richness** from 5-15ft? 6.6

What is the average **species richness from** 45-60ft? 5.8

Go back to the first page and re-read your prediction. Do the results support your prediction? Explain why or why not.

Answers will vary

What do you think is the most important **abiotic factor** that drives this pattern?

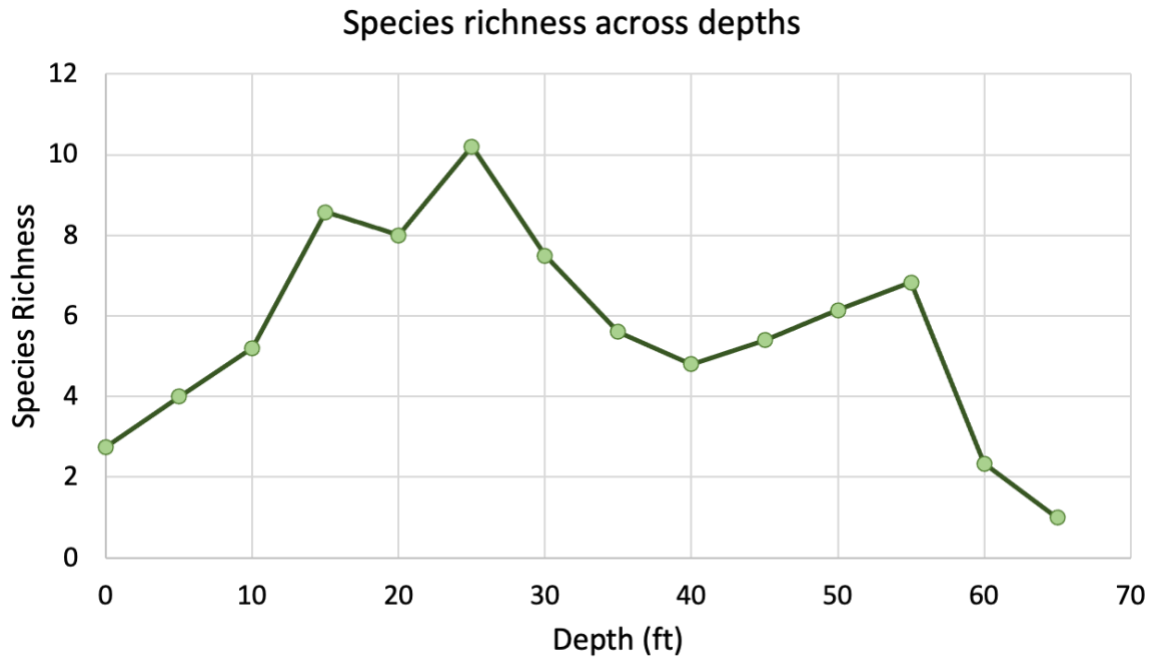
Light

How does the **abiotic factor** you chose affect seaweed communities?

Seaweeds use the sun as an energy source like plants do. Since seaweeds need the sun, there are likely to be more species near the surface of the water where there is more sunlight.

If you could dive to 100ft, would you expect the **species richness** to be higher or lower than at 60ft? Explain your reasoning.

Lower, because less light = less plants.



Use the graph above to answer the following questions.

Which depth has the highest species richness? ____ ~25 feet ____

Which depths have the lowest species richness? a) ____ ~0-5 ft ____ and b) ____ ~60-65 ft ____.

There are two different depth ranges that have a species richness of 4 or less. What do you think is the reason for such low species richness in each of those depths?

At 0 ft there is a higher risk of drying out (especially at lower tides when the surface is out of the water).
 At 60ft, there is very little sunlight so most species won't do well.