Canopy Cover and Biofilm Prevalence at Fairfield Osborn Preserve

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Research question

In what ways does light exposure affect the prevalence of biofilm on rocks located in streams at the Fairfield Osborn Preserve?

web.sonoma.edu

Hypothesis

- There will be a greater presence of biofilm on rocks in areas more exposed to sunlight than there will be in those that are more shaded

Background I

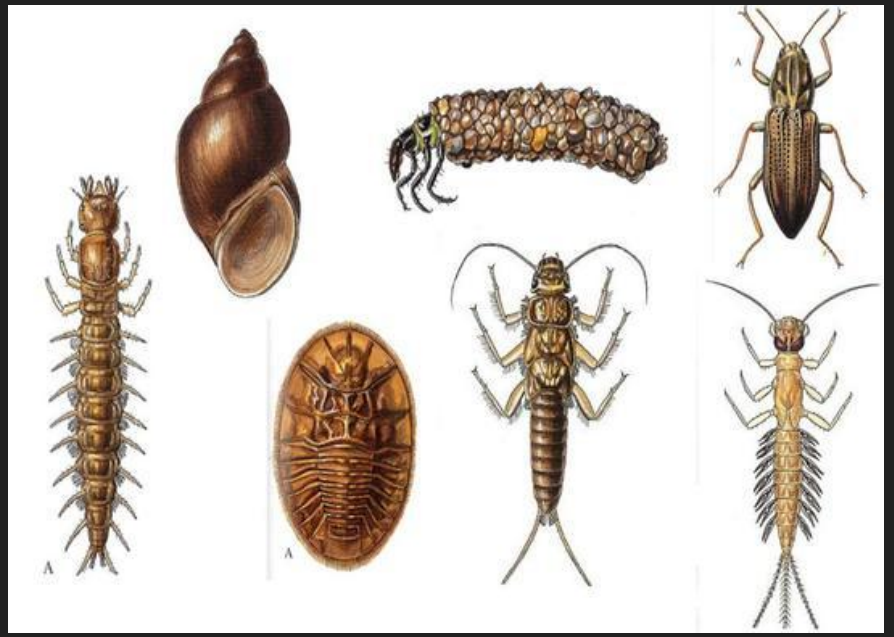
- Biofilm is a slimy substance comprised of combined microorganisms (Donlan, 2002)
- Biofilm can grow on different surfaces (Donlan, 2002)
- Light interacts with microorganisms differently (Josrgenson, 1969)

phys.org

https://effectsofbiofilms.weebly.com/

Background II

- Biofilm is often comprised of primary producers (Persson, 2014)
- Macroinvertebrates and other organisms use biofilm as a source of nutrients (Persson, 2014)
- This means that the amount of biofilm can impact the population of an entire ecosystem



www.thebeatnews.org

Methods I

- Tested in the stream between the parking lot and nature center
- At every two meters of our test area we measured the following:
  - Amount of slime in cm from one end of the stream to the other at each transect
  - Canopy cover

sonoma.edu

Methods II

Equipment:

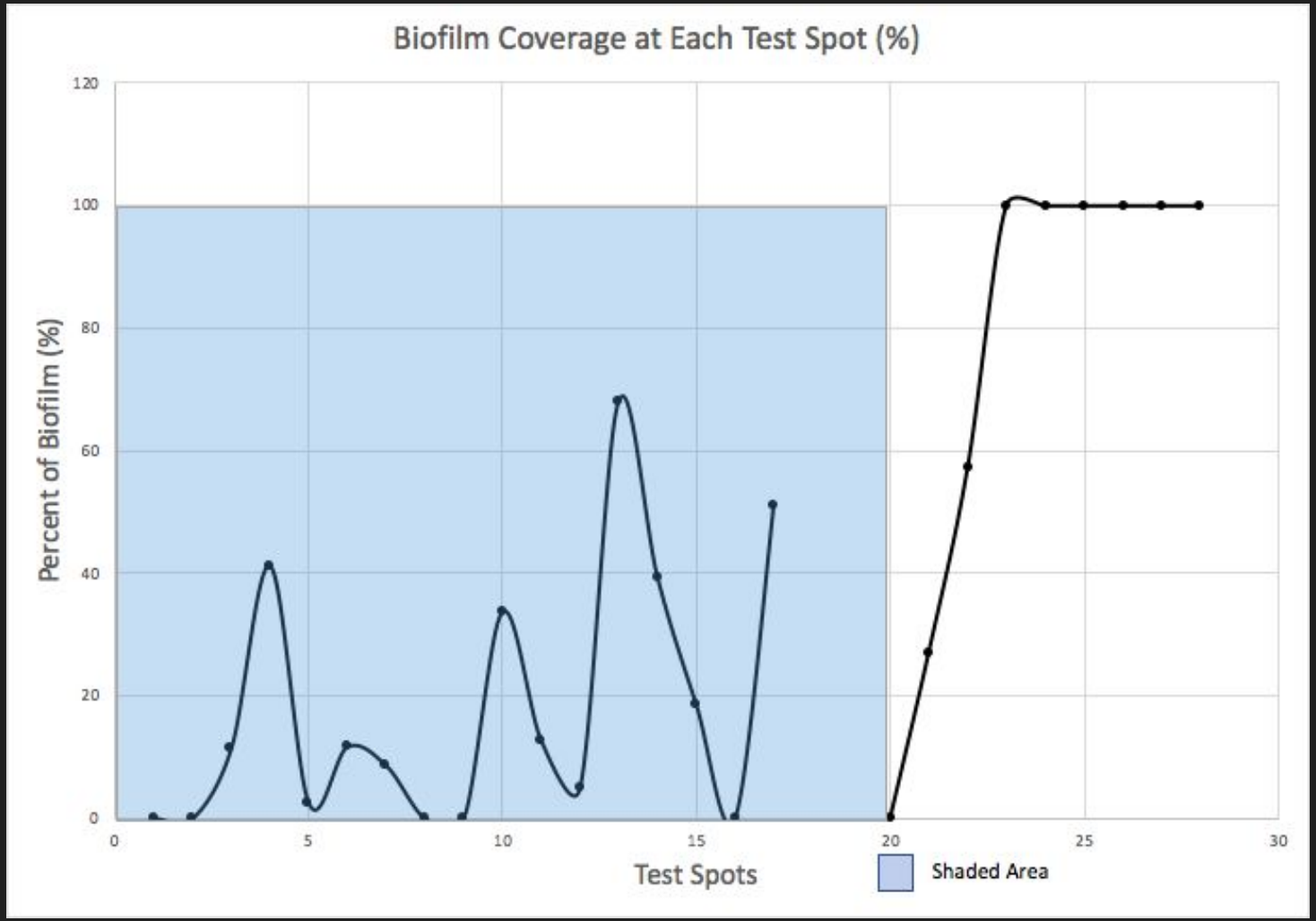
- Densiometer
- Measuring tape
- Flags (markers)

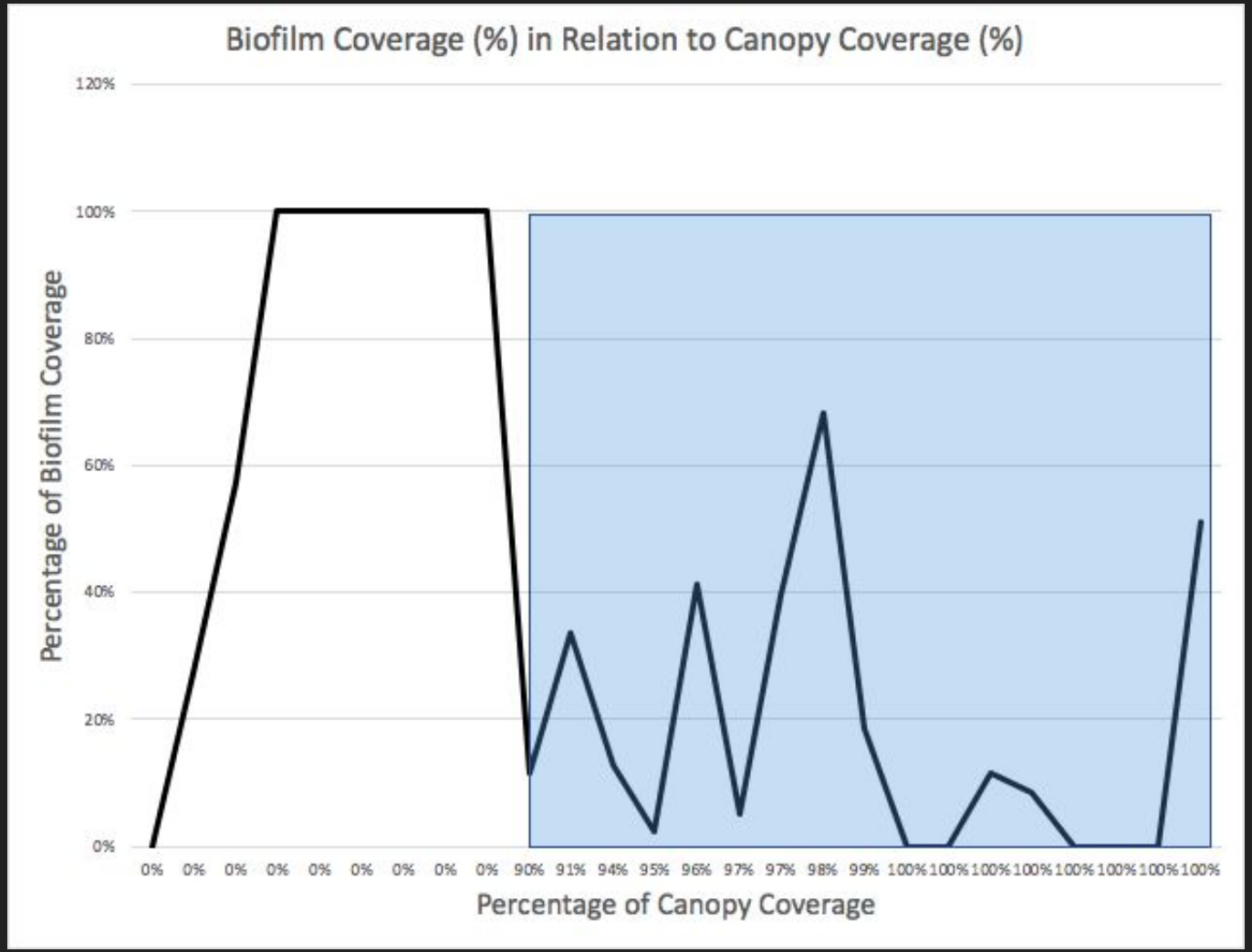
www.overtonpark.org

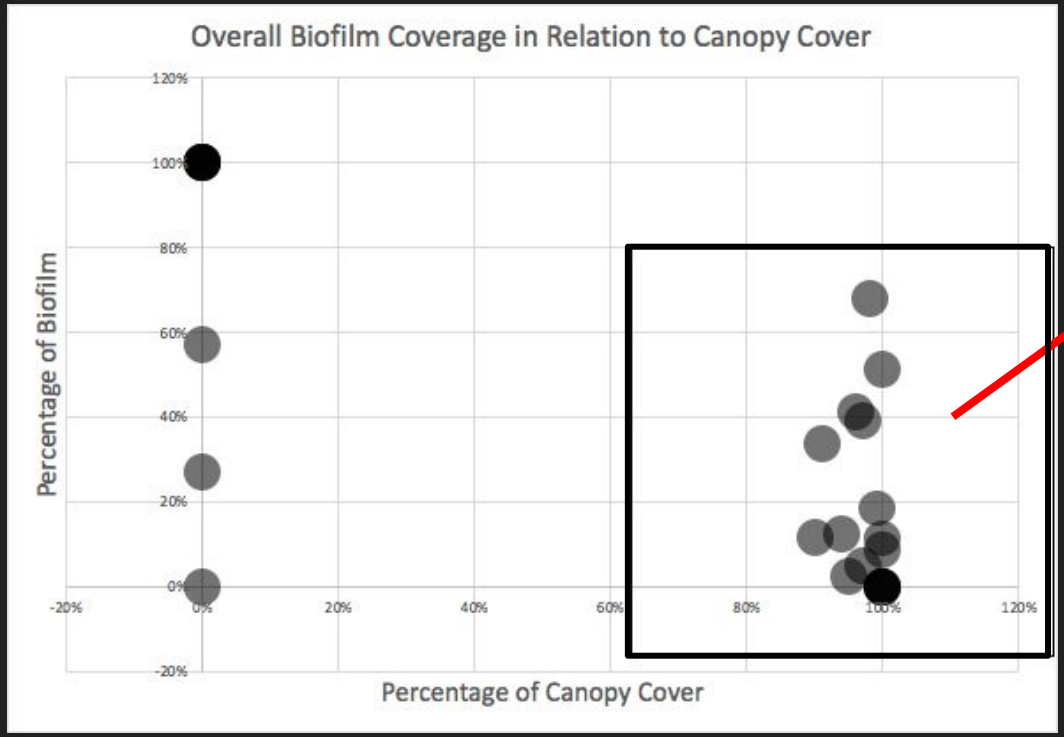
amazon.com

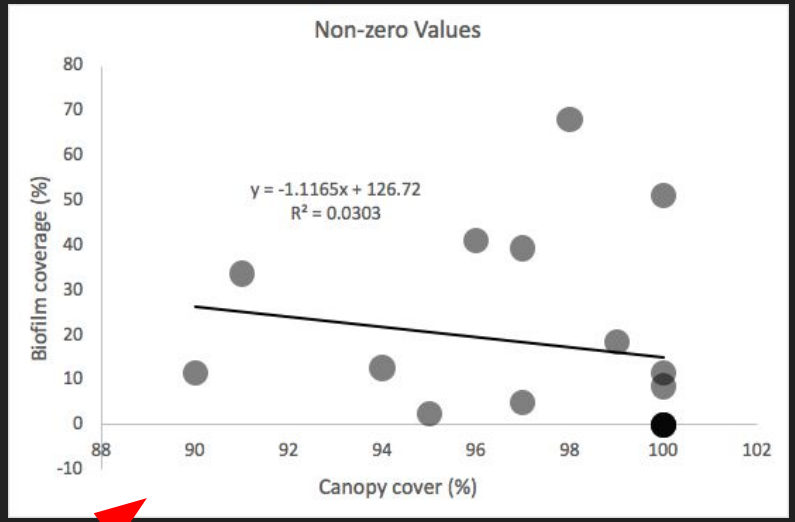
Results

- Our data shows the amount of biofilm present on rocks depending on the amount of canopy cover
- Our data confirmed our hypothesis


Biofilm Coverage at Each Test Spot (%)
Percent of Biofilm (%)
120
100
80
60
40
20
0
0
5
10
15
20
25
30
Test Spots
Shaded Area


Biofilm Coverage (%) in Relation to Canopy Coverage (%)
120%
100%
80%
60%
40%
20%
0%
Percentage of Biofilm Coverage
0% 0% 0% 0% 0% 0% 0% 0% 0% 90% 91% 94% 95% 96% 97% 97% 98% 99% 100% 100% 100% 100% 100% 100% 100% 100%
Percentage of Canopy Coverage


Overall Biofilm Coverage in Relation to Canopy Cover
Percentage of Biofilm
120%
100%
80%
60%
40%
20%
0%
-20%
-20%
0%
20%
40%
60%
80%
100%
120%
Percentage of Canopy Cover


Non-zero Values
Biofilm coverage (%)
80
70
60
50
40
30
20
10
0
-10
y = -1.1165x + 126.72
R² = 0.0303
88
90
92
94
96
98
100
102
Canopy cover (%)

Conclusions

- Can be used to predict where biofilm might be more prevalent
- Biofilm serves as an important source of nutrients for macroinvertebrates and other primary consumers

References

Ledford, S. H., Lautz, L. K., Vidon, P. G., & Stella, J. C. (2017). Impact of seasonal changes in stream metabolism on nitrate concentrations in an urban stream. *Biogeochemistry*, *133*(3), 317-331.

Zedler, J. B. (1980). Algal mat productivity: comparisons in a salt marsh. *Estuaries*, *3*(2), 122-131.

Stevenson, R. J., Rier, S. T., Riseng, C. M., Schultz, R. E., & Wiley, M. J. (2006). Comparing effects of nutrients on algal biomass in streams in two regions with different disturbance regimes and with applications for developing nutrient criteria. In *Advances in Algal Biology: A Commemoration of the Work of Rex Lowe* (pp. 149-165). Springer, Dordrecht.

Warren, D. R., Keeton, W. S., Bechtold, H. A., & Rosi-Marshall, E. J. (2013). Comparing streambed light availability and canopy cover in streams with old-growth versus early-mature riparian forests in western Oregon. *Aquatic sciences*, *75*(4), 547-558.

Donlan RM. Biofilms: microbial life on surfaces. Emerg Infect Dis. 2002;8(9):881-90.

Jøsrgensen, E. G. (1969). The adaptation of plankton algae IV. Light adaptat

Thank you!