Effects of pH and salinity on oyster shell height

Presented By Team 7: The Pythons

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What are Oysters?

Oysters are filter feeders meaning they eat by filtering water through their body cleaning it and getting nutrients. Which is helpful for cleaning out dirty water and allowing other types of creatures to thrive.

They are also creatures that don't move once matured. They find a spot to live generally attached to old oyster shells which allows them to create large structures called oyster reefs that can break large waves to protect areas from large storms

Billion Oyster Project (BOP)

Billion Oyster Project (BOP) is a non profit organization with the goal of restoring one billion live oysters to New York Harbor by 2035. Their goal is to restore oysters to help clean and protect the harbor since oysters are very beneficial to their surroundings. They have already restored 47 million live oysters and engaged over eight thousand NYC students.

BOP Data Insights

The BOP data presented shows correlations between different aspects and factors of oyster growth. Things like pH, Salinity, depth etc. The data is presented through Graphs, Histograms and spreadsheets to visualize the information given. The data is then analyzed to see if there are any correlations between different factors and then later used to determine how to grow oysters more efficiently.

Purpose:

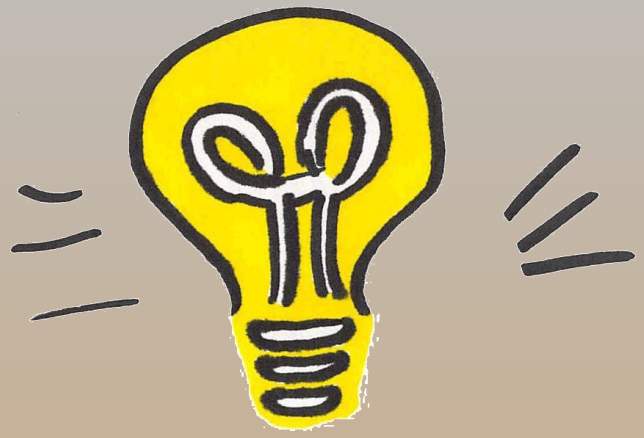
What is the pH and salinity role in oyster height?

Why do oyster shell height change based on environmental conditions?

How can we find correlation and causation for these factors?

Research Question:

How do salinity and pH affect shell height?



Hypothesis:

High salinity will inhibit growth because of the overabundance of salt in water that decreases the amount of other dissolved solids, such as food. A low pH would also inhibit growth since acidic water decreases shell growth.

Results, Salinity:

```
[1] import matplotlib.pyplot as plt
    import pandas as pd
    import numpy as np
    import scipy as sp
    from scipy import stats
```

```
[2] url = 'http://webpage.pace.edu/fparisi/STEM-2021/PythonData/'
```

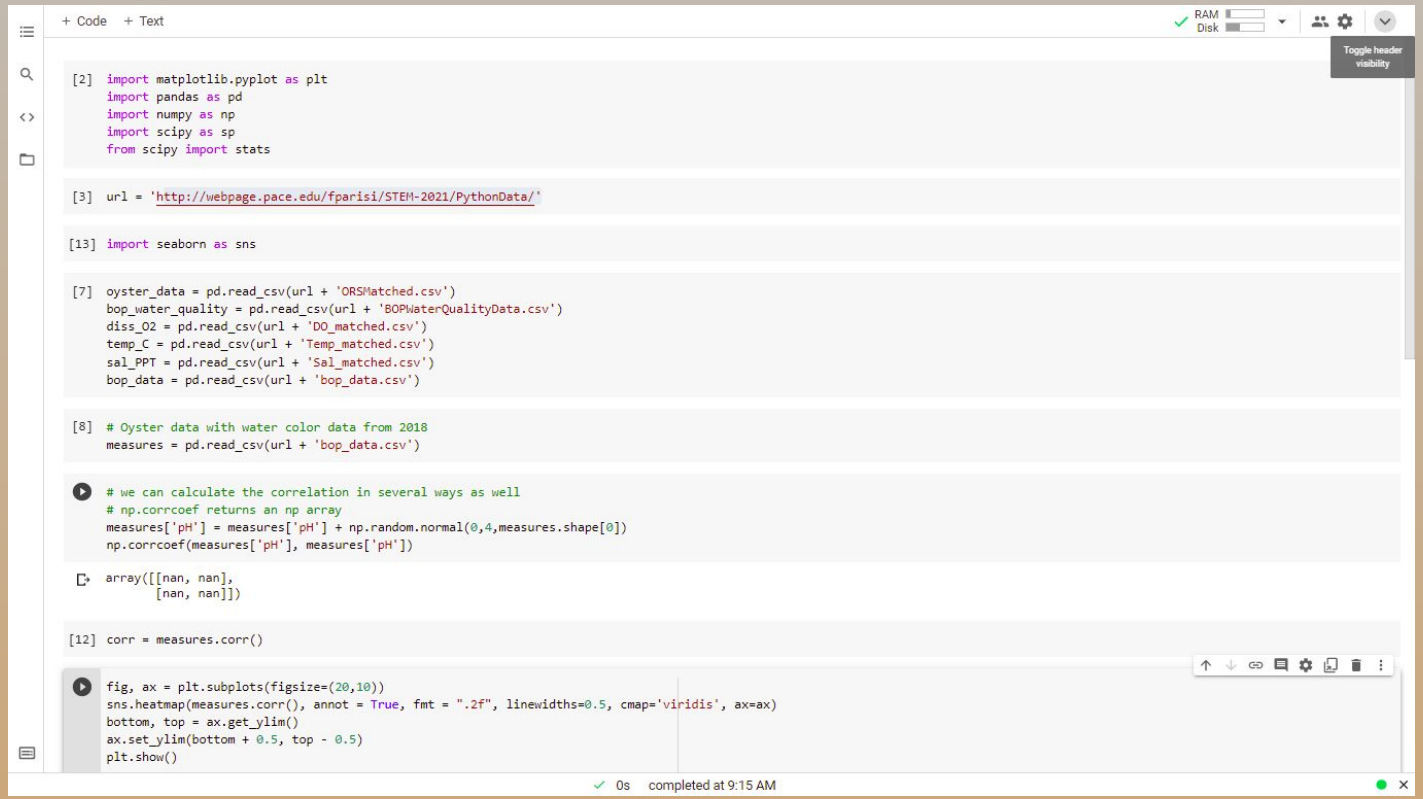
```
[3] oyster_data = pd.read_csv(url + 'ORSMatched.csv')
    bop_water_quality = pd.read_csv(url + 'BOPWaterQualityData.csv')
    diss_O2 = pd.read_csv(url + 'DO_matched.csv')
    temp_C = pd.read_csv(url + 'Temp_matched.csv')
    sal_PPT = pd.read_csv(url + 'Sal_matched.csv')
```

```
[6] # Oyster data with water color data from 2018
    measures = pd.read_csv(url + 'Sal_matched.csv')
```

```
# we can calculate the correlation in several ways as well
# np.corrcoef returns an np array
measures['Max_sal_ppt + Min_sal_ppt'] = measures['Max_sal_ppt'] + np.random.normal(0,4,measures.shape[0])
np.corrcoef(measures['Max_sal_ppt'], measures['Max_sal_ppt + Min_sal_ppt'])
```

```
array([[nan, nan],
       [nan, nan]])
```

Results, pH:



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```
[2] import matplotlib.pyplot as plt
    import pandas as pd
    import numpy as np
    import scipy as sp
    from scipy import stats
```

```
[3] url = 'http://webpage.pace.edu/fparisi/STEM-2021/PythonData/'
```

```
[13] import seaborn as sns
```

```
[7] oyster_data = pd.read_csv(url + 'ORSMatched.csv')
    bop_water_quality = pd.read_csv(url + 'BOPWaterQualityData.csv')
    diss_O2 = pd.read_csv(url + 'DO_matched.csv')
    temp_C = pd.read_csv(url + 'Temp_matched.csv')
    sal_PPT = pd.read_csv(url + 'Sal_matched.csv')
    bop_data = pd.read_csv(url + 'bop_data.csv')
```

```
[8] # Oyster data with water color data from 2018
    measures = pd.read_csv(url + 'bop_data.csv')
```

```
# we can calculate the correlation in several ways as well
# np.corrcoef returns an np array
measures['pH'] = measures['pH'] + np.random.normal(0,4,measures.shape[0])
np.corrcoef(measures['pH'], measures['pH'])
```

```
array([[nan, nan],
       [nan, nan]])
```

```
[12] corr = measures.corr()
```

```
fig, ax = plt.subplots(figsize=(20,10))
sns.heatmap(measures.corr(), annot = True, fmt = ".2f", linewidths=0.5, cmap='viridis', ax=ax)
bottom, top = ax.get_ylim()
ax.set_ylim(bottom + 0.5, top - 0.5)
plt.show()
```

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Results

```
[12] corr = measures.corr()
```

```
fig, ax = plt.subplots(figsize=(20,10))
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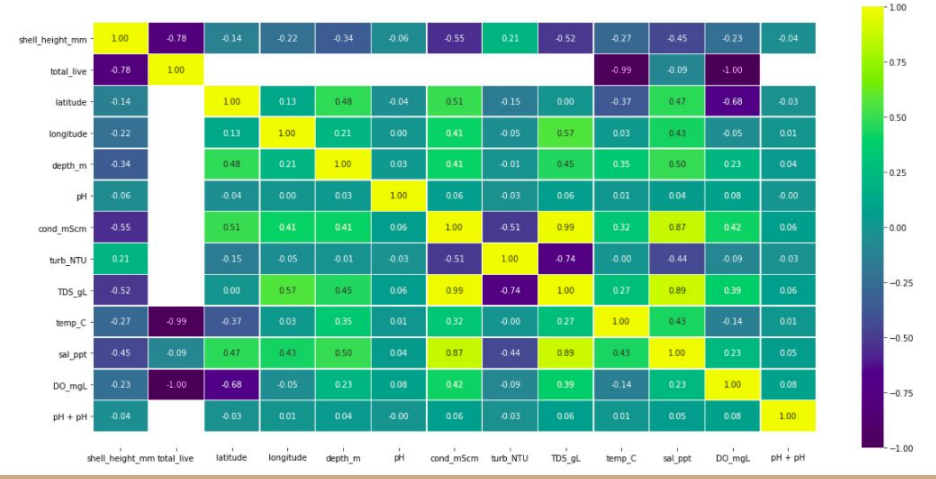

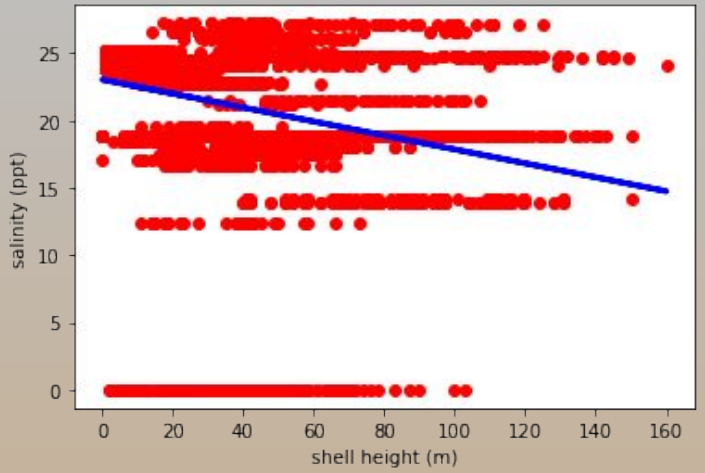

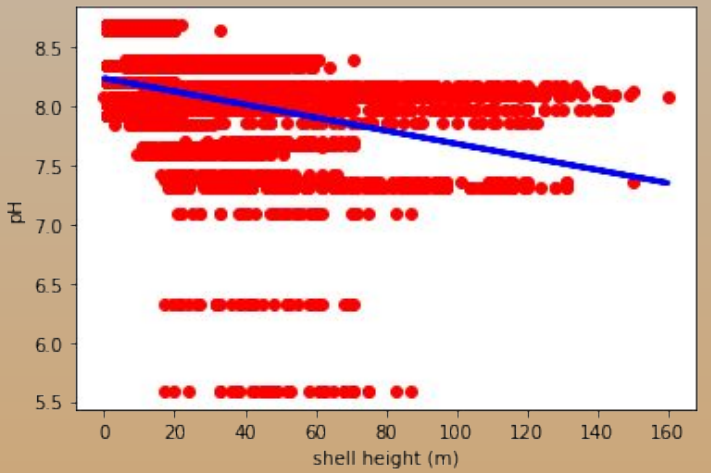

Conclusion

Within this data, there isn’t a correlation between shell height and pH or salinity. though individually Ph or salinity may affect shell height there was no real correlation between the two with the data collected on oysters. We haven't found a correlation with the data presented but in theory pH should affect shell height, with more data it’s completely possible to find connections between pH, salinity and shell height.

Thank you!

Any questions?