Harmful Algae Bloom (HAB) Events vs. Water Levels

Title	Value definitions	Correlation	Over Time	Quarters	Water level - weekly rollin..	Drilldown: Water level &..	Takeaways

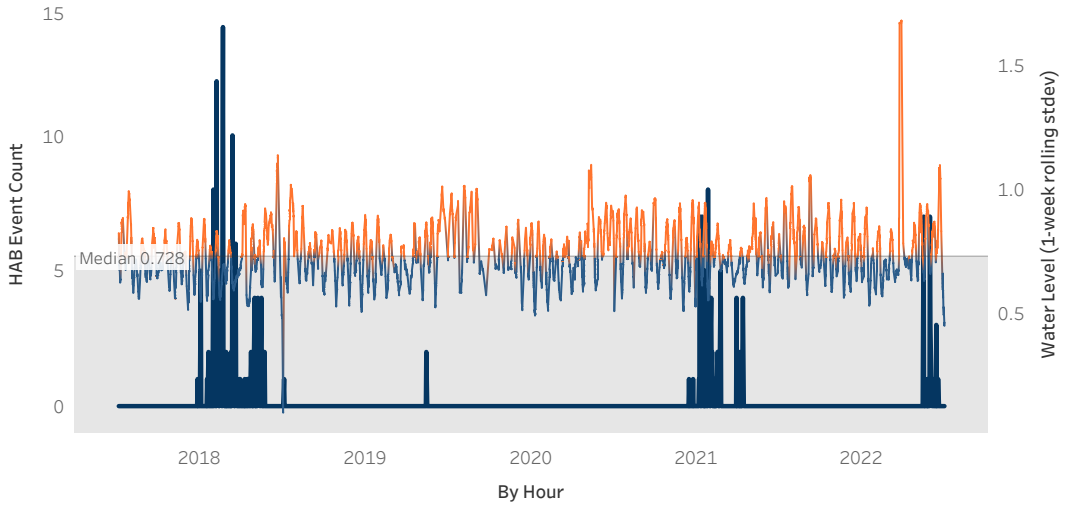
Harmful Algae Blooms (HABs) vs. Water Levels in St. Petersburg, FL (2018 - 2022)

Presented by Ashley Wilson-Rew

There were major harmful algae blooms (HABs) in 2018, 2021, and 2022 in the St. Pete coastal area. Do unusually high or low water levels correlate to these HABs in a way that lets us predict future HAB events through water level measurements?

1. Very low correlation between algae growth and water level changes (0.0007449 R-squared)
2. HAB events spiked in 2018, 2021, and 2022
3. HAB events and water level stdevs display similar seasonality

HAB Events vs. Water Level 1-week Rolling Stdev (by Day)



Latitude (St. Pete Area)
27 to 28.5

Longitude (St. Pete Area)
-84 to -82

Harmful Algae Bloom (HAB) Events vs. Water Levels

Focus of Analysis:

1. Only areas around St. Petersburg, FL
2. Years 2018 - 2022

Assessing data based on the following conditions:

1. HAB events (True or False)
2. Risk levels
3. Time periods
4. Changes in water levels by weekly rolling stdev

Definition of "Risk Level" by Cell Count/mL

high risk: **100k+**
med risk: **20k - 100k**
low risk: **3k - 20k**
no risk: **0 - 3k**

	Avg. Cell count/mL	Min. Cell count/mL	Max. Cell count/mL
high risk	287,333	186,267	388,400
med risk	34,626	20,413	90,000
low risk	7,091	3,009	19,440
no risk	49	0	2,980

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Definition of "HAB Event" by Cell Count/mL

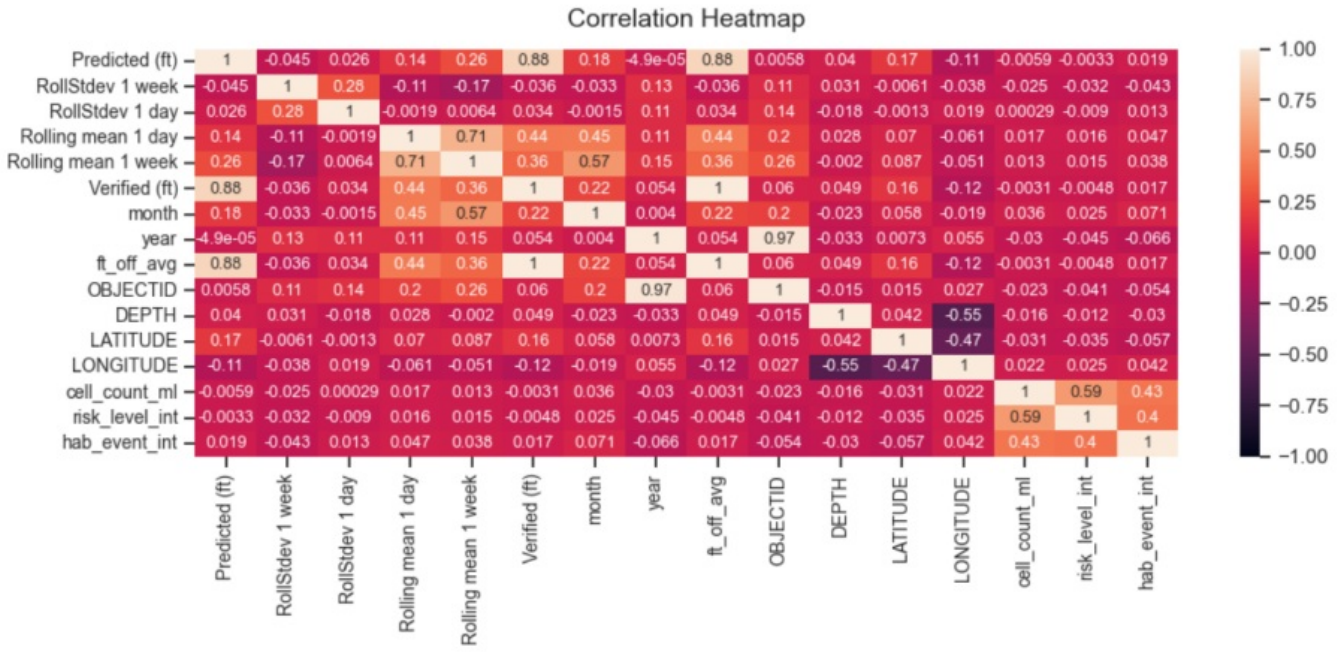
HAB event: **3k+**
Not HAB event: **0 - 3k**

	Avg. Cell count/mL	Min. Cell count/mL	Max. Cell count/mL
HAB event	13,373	3,009	388,400
Not HAB event	49	0	2,980

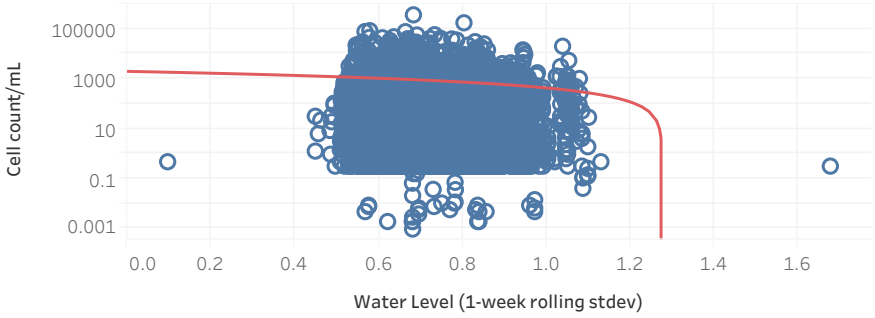
Harmful Algae Bloom (HAB) Events vs. Water Levels

Water level data does NOT seem to correlate with HAB events (R-squared of **0.0007449**)

- p-value is **0.0305153** (high significance)



Cell Count/mL vs. Weekly Rolling Stdev (R-Squared: 0.0007449)



# of modeled observations: 6283

R-Squared: 0.0007449

p-value (significance): 0.0305153

Used logarithmic scale for y-axis due to large outliers and many 0-value observations

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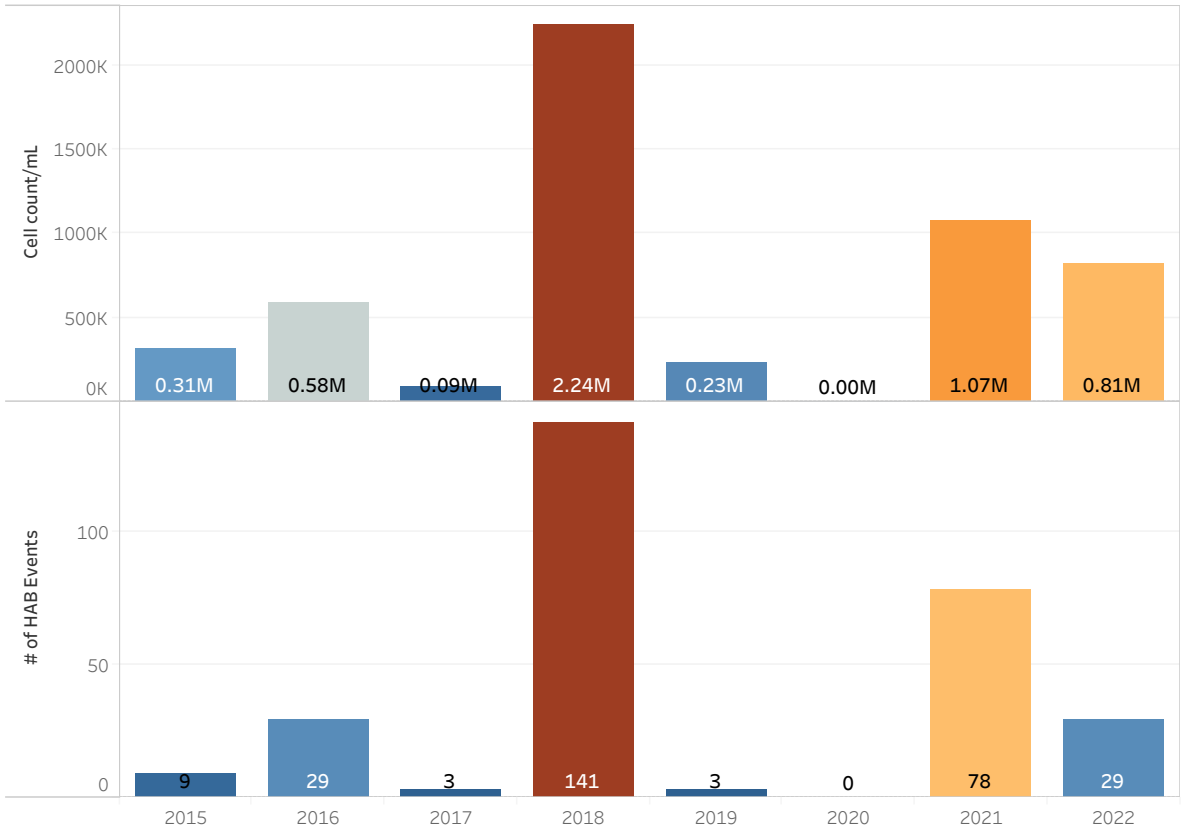
Harmful Algae Bloom (HAB) Events vs. Water Levels

2018 had the highest total algae growth (**2.24M / mL**), followed by 2021 (**1.07M / mL**) and 2022 (**0.81M / mL**)

- HAB events occurred most frequently in 2018 (**141**) and 2021 (**78**)

Number of HAB Events & Cell Count/mL Over Time (by Year)



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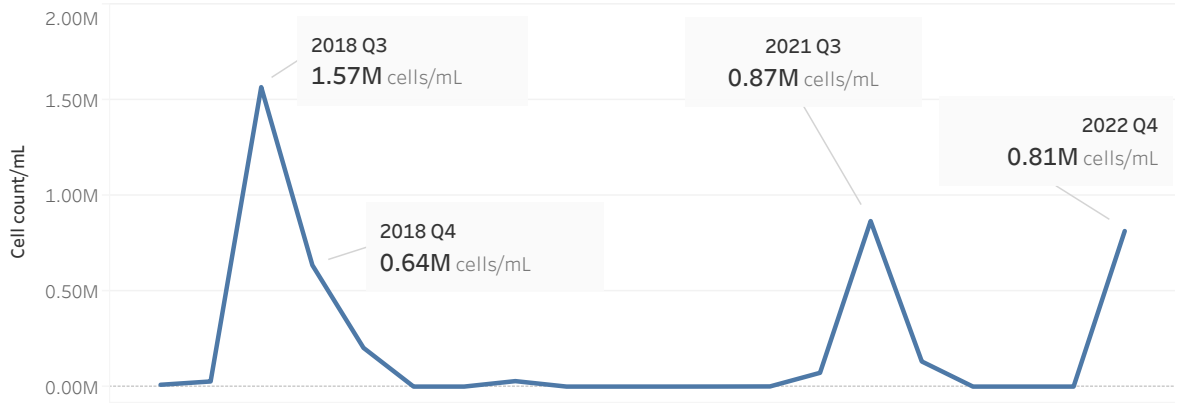
Harmful Algae Bloom (HAB) Events vs. Water Levels

The longest running and largest volume of algae growth occurred from **Q3 - Q4 2018 (2.21M cells/mL)**

- Q3 2021 and Q4 2022 had the next-highest total algae growth (**0.87M cells/mL** and **0.81M cells/mL** respectively)
- These quarters also had the most outliers in cell count/mL

Cell Count/mL 2018 - 2022 (by Quarter)



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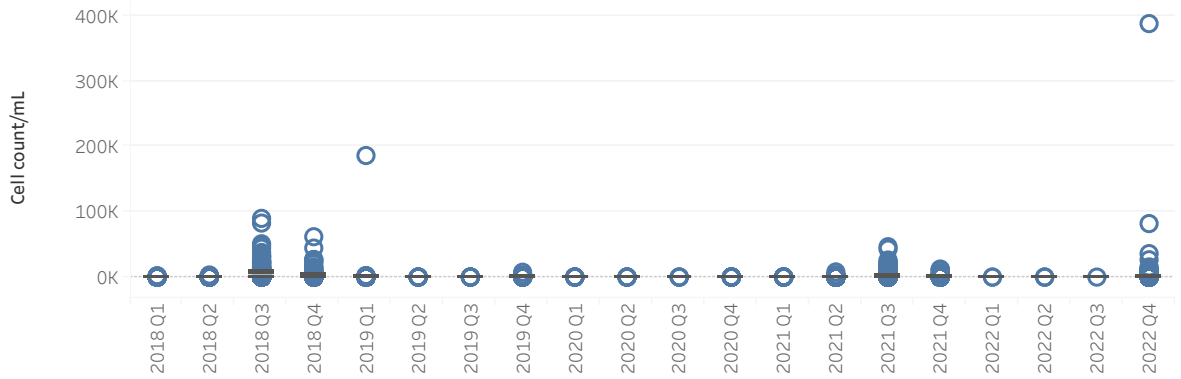
Year
Multiple values

Cell Count/mL 2018 - 2022 (by Quarter)

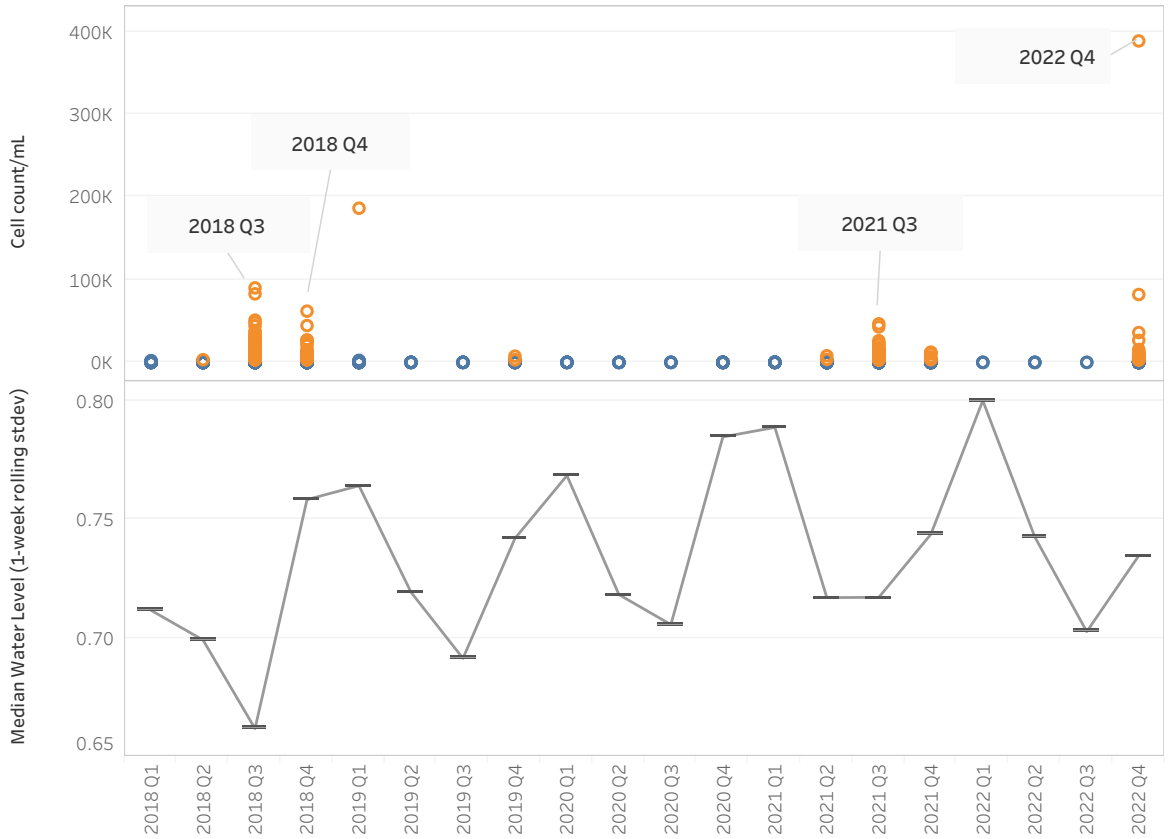


Harmful Algae Bloom (HAB) Events vs. Water Levels

There appears to be some overlap in seasonality for HAB events and water level changes (most likely NOT causal)

- Median water level 1-week rolling stdevs have been trending upward each year

Cell Count/mL vs. Water Level 1-week Rolling Stdev by Quarter (2018-2022)



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Year
Multiple values

HAB Status
HAB event
Not HAB event

Harmful Algae Bloom (HAB) Events vs. Water Levels

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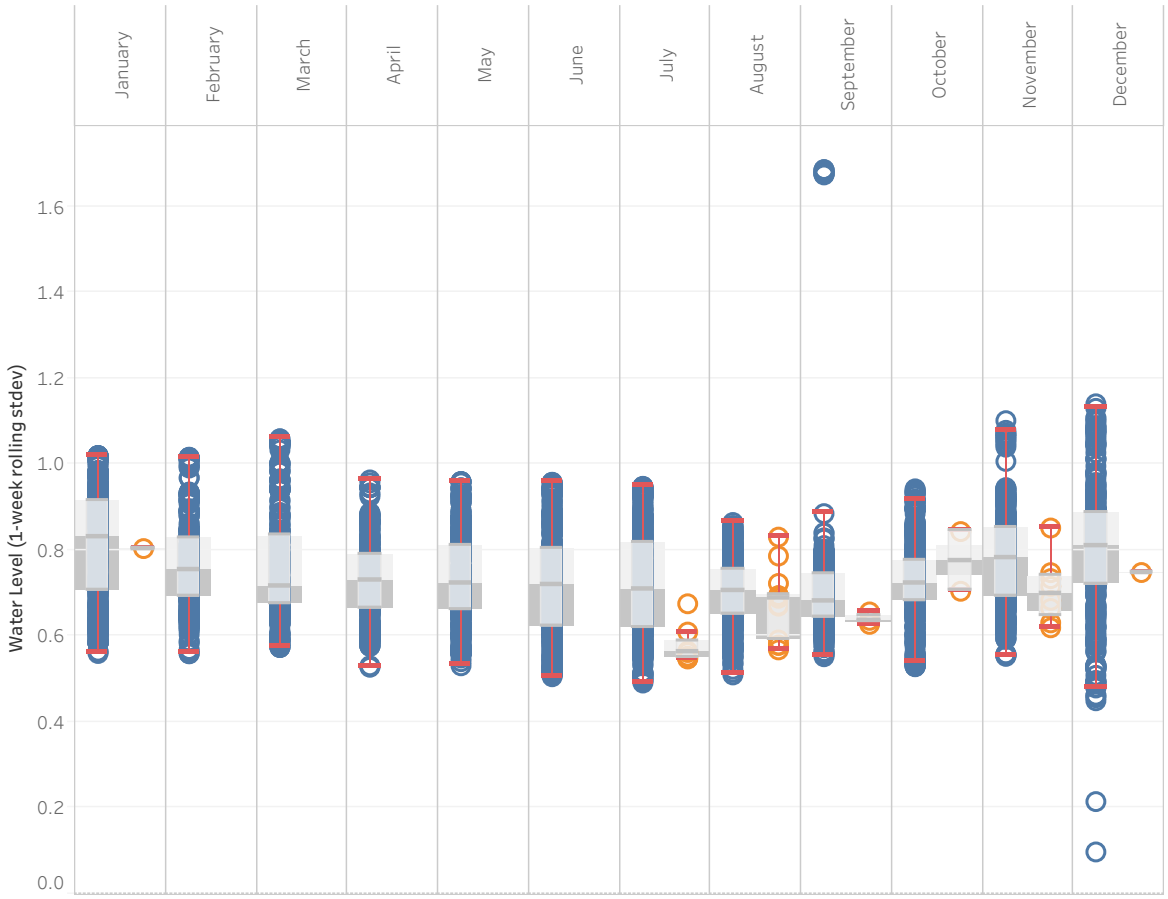
Med/high-risk HAB events tend to have lower median rolling stdevs than no/low-risk HAB events

- Months associated with more HAB events tend to have smaller IQRs

Water Level 1-week Rolling Stdev 2018 - 2022 (by Month & Risk Level)



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Year
Multiple values

HAB Risk Levels
no - low risk
med - high risk

Harmful Algae Bloom (HAB) Events vs. Water Levels

Takeaways

1. Changes in water level stdevs do NOT appear to correlate with HAB events
   - R-squared value is 0.0007449

2. HAB events and water level stdevs fluctuate on a similar seasonal basis
   - HAB events are more likely in Q3 and Q4
   - Rolling water level stdevs tend to bottom out in Q3 and spike back up in Q4

3. Water level stdevs have been increasing on a consistent basis YOY
   - This indicates rising water levels

While water levels do not appear to be correlated to HAB events, other variables may impact changing water levels and HAB growth (such as water temperature). This would require additional analysis.