



DATA 401 – Assignment 4

Data Set Analysis and Visualization

GROUP 5

Kristyll Avila, Andrew Da Costa and Binal Patel

Questions for Dataset 1 (Water Quality)



- Water samples taken every 2 weeks to ensure that water quality is adequate for aquatic life
- Lengthy periods of undesirable water quality levels need controls put in place to meet state regulations

Figure 1. Map of Back Bay NWR, courtesy of U.S. Fish and Wildlife Service.

Questions for Dataset 1 (Water Quality)

1. How water temperature and salinity affects the dissolved oxygen solubility?
2. Does the water quality in the Bay meet Virginia State DEQ (department of environmental quality) regulations?
3. Do any adaptive controls need to be put into place to meet these regulations?

Questions for Dataset 1 (Water Quality)

1. How water temperature and salinity affects the dissolved oxygen solubility?

As salinity and water temperature increases the water solubility of dissolving oxygen is decreases.

Questions for Dataset 1 (Water Quality)

2. Does the water quality in the Bay meet Virginia State DEQ (department of environmental quality) regulations, and do any adaptive controls need to be put into place to meet these regulations?

- Moderate pH (7 – 8)
- Moderate DO (5 - 8 mg/L)
- Low Turbidity (High Secchi depth)
- Low Salinity (0 – 2 ppt)


Questions for Dataset 1 (Water Quality)

3. Does the water quality in the Bay meet Virginia State DEQ (department of environmental quality) regulations, and do any adaptive controls need to be put into place to meet these regulations?

The Bay meets DEQ regulations because all water quality parameters are regularly within the specified ranges. Fluctuations occur based on factors such as the weather, however the water naturally regulates itself back within a suitable range. The water quality does not trend out of control for a prolonged period of time, so no adaptive controls need to be put in place.

Questions for Dataset 2 (Toxics Release Inventory)

TOXIC CLOUD LEAKS AT CARBIDE PLANT IN WEST VIRGINIA

 Give this article



By Ben A. Franklin

Aug. 12, 1985



See the article in its original context from
August 12, 1985, Section A, Page 1 | [Buy Reprints](#)

New York Times subscribers* enjoy full access to
TimesMachine—view over 150 years of New
York Times journalism, as it originally appeared.

<https://www.nytimes.com/1985/08/12/us/toxic-cloud-leaks-at-carbide-plant-in-west-virginia.html>

Questions for Dataset 2 (Toxics Release Inventory)

What is the Toxics Release Inventory?

- In 1986, TRI was a part of a new approach to environmental protection.
- Toxics Release Inventory (TRI) tracks the management of certain toxic chemicals that may pose a threat to human health and the environment.

Questions for Dataset 2 (Toxics Release Inventory)

1. How did the distribution of chemical releases vary among different counties?
2. How did the distribution of chemical releases vary among different industry sectors? What does this imply about businesses in regards of their sustainability efforts?
3. Did the release of chemicals between 2009 to 2019 result in any negative impact on the environment?

Questions for Dataset 2 (Toxics Release Inventory)

1. How did the distribution of chemical releases vary among different counties?

The top three counties mostly contributing on chemical releases are the City of Hopewell, City of Convington and Montgomery.

2. How did the distribution of chemical releases vary among different industry sectors? What does this imply about businesses in regards of their sustainability efforts?

- The top contributing industry is other which refers to US Army and Navy operations, while the food industry being the least
- It implies that businesses are implementing and taking sustainability efforts into effect.

3. Did the release of chemicals between 2009 to 2019 result in any negative impact on the environment?

- The overall chemical quantity being released decreased overtime, therefore mitigating negative impact on the environment.

Conclusion

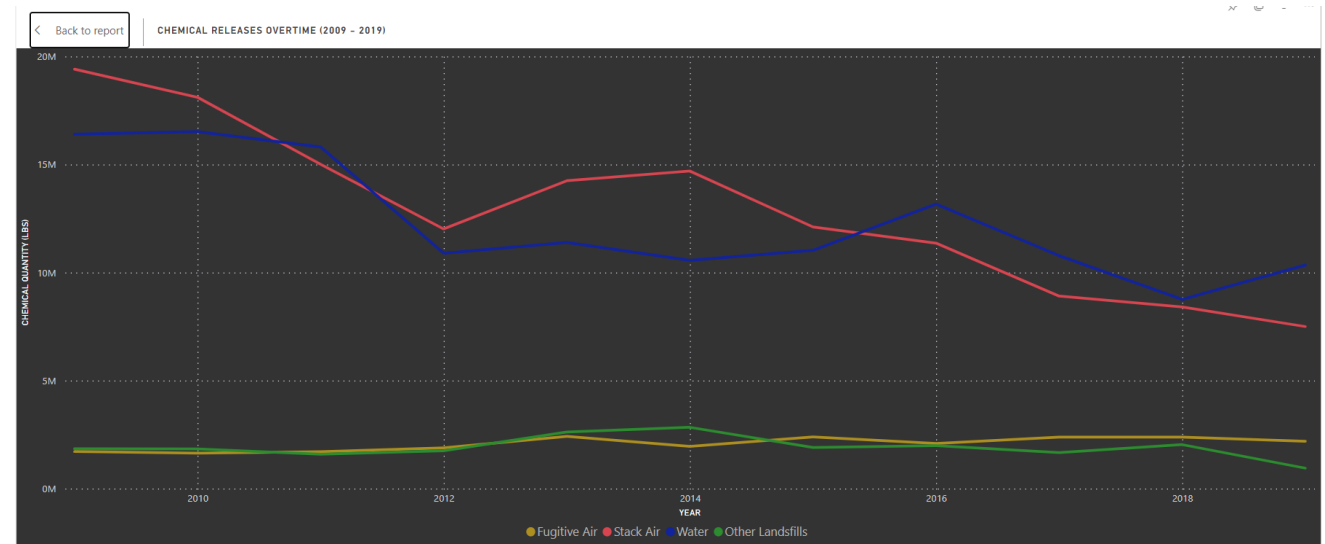
2001

8.39 Average of pH (standard units)	1.65 Average of Salinity (ppt)	0.43 Average of Secchi Depth (m)	5.62 Average of Dissolved Oxygen (mg/L)
--	-----------------------------------	-------------------------------------	--

2019

6.92 Average of pH (standard units)	0.31 Average of Salinity (ppt)	0.60 Average of Secchi Depth (m)	6.16 Average of Dissolved Oxygen (mg/L)
--	-----------------------------------	-------------------------------------	--

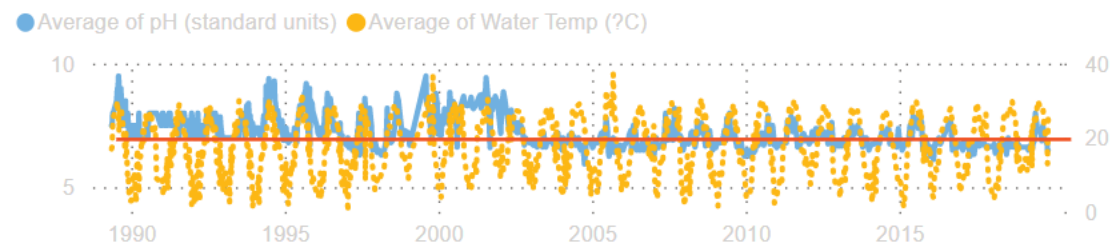
- The toxic chemicals being released decreased in quantity overtime.
 - Indicates environmental health and safety practices are in place.
- The chemicals being released are mostly in a form of surface water and stack air emissions.
- The decrease in total chemical quantity being released is directly correlated to the improving water quality.
- Water Quality in the Bay is up to DEQ standards as there is low salinity and turbidity, moderate pH, and moderate DO.



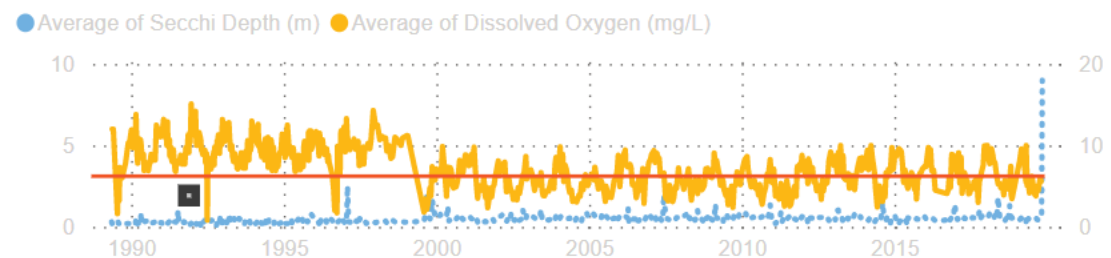
References

- Water Quality. 2023. Does Salt or Salinity of Water Affect Solubility of Oxygen? APEC Water Systems.
https://www.freedrinkingwater.com/water_quality/water-science/j-9-does-salt-concentration-salinity-water-affect-solubility-oxygen.htm#:~:text=Solubility%20of%20dissolved%20oxygen%20also,6%2D14%20mg%2FL
- Back Bay National Wildlife Refuge. 2020. Water Quality Data. Virginia Beach, Virginia <https://ecos.fws.gov/ServCat/Reference/Profile/117348>
- <https://www.epa.gov/toxics-release-inventory-tri-program/what-toxics-release-inventory>
- United States Environmental Protection Agency. 2022. TRI Basic Data Files. <https://www.epa.gov/toxics-release-inventory-tri-program/tri-basic-data-files-calendar-years-1987-present>

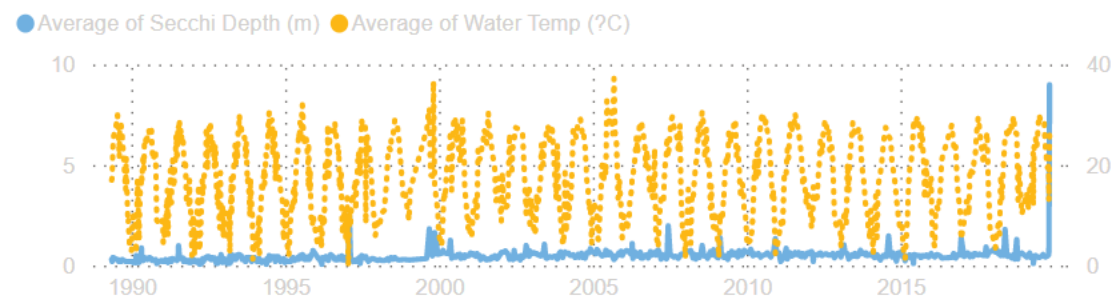
Average of pH (standard units) and Average of Water Temp (?C) by Year, Month and Day



Average of Secchi Depth (m) and Average of Dissolved Oxygen (mg/L) by Year, Month and Day



Average of Secchi Depth (m) and Average of Water Temp (?C) by Year, Month and Day



All

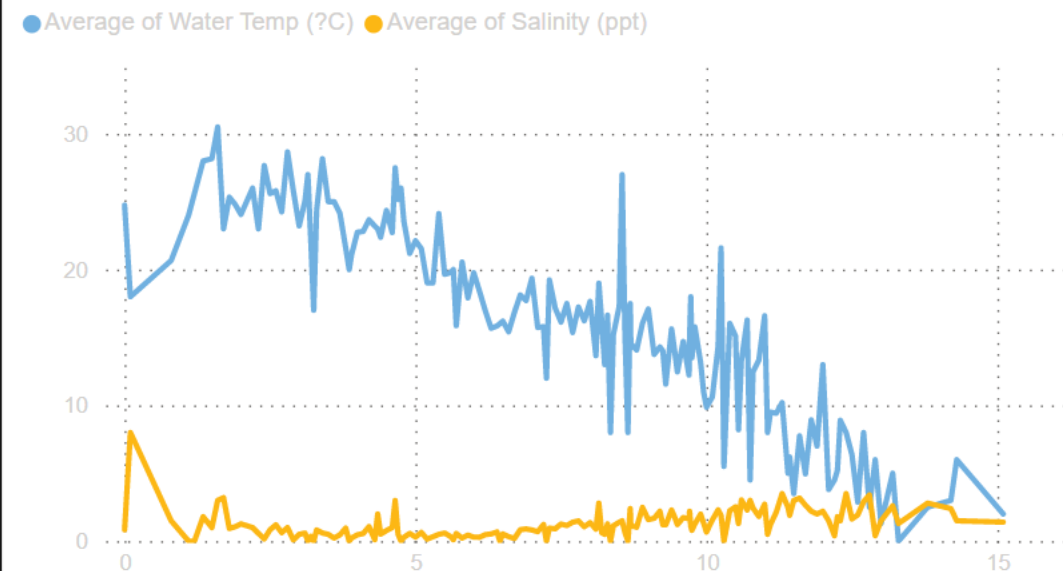
All

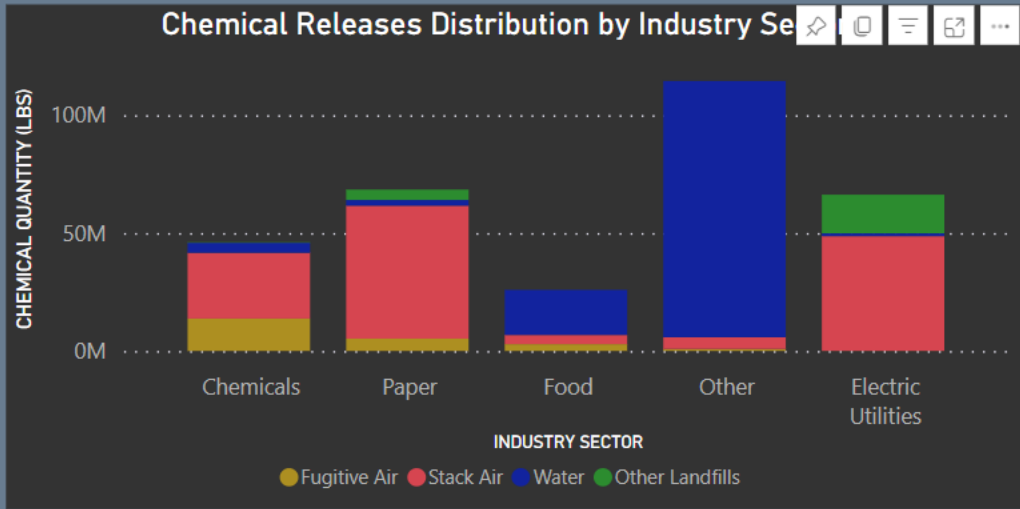
Site_Id	Max of Secchi Depth (m)
D	9.00
Bay	7.40
C	5.80
A	5.50

7.17 Average of pH ... 0.72 Average of Salinit...

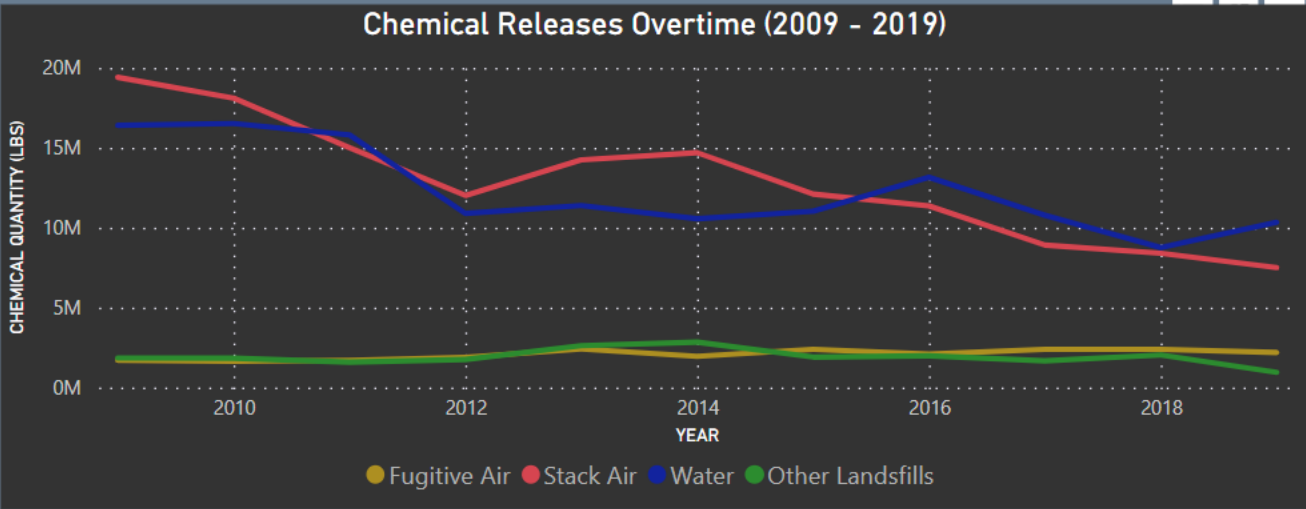
0.52 Average of Sec... 6.65 Average of Dissol...

Average of Water Temp (?C) and Average of Salinity (ppt) by Dissolved Oxygen (mg/L)





How did the distribution of chemical releases vary among different industry sectors? What does this imply about businesses in regards of their sustainability efforts?



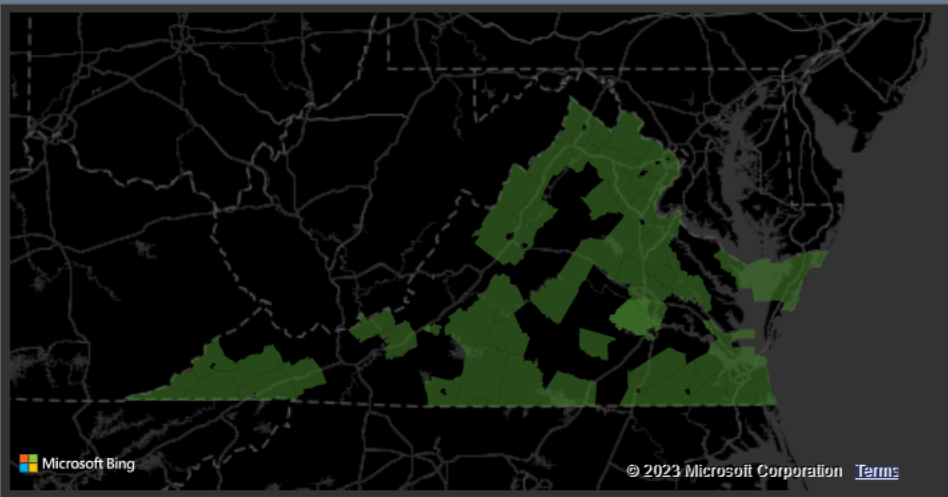
Did the release of chemicals between 2009 to 2019 result in any negative impact on the environment?

135.65M
WATER

141.78M
STACK AIR

22.75M
FUGITIVE AIR

21.00M
OTHER LANDFILLS



How did the distribution of chemical releases vary among different counties?

