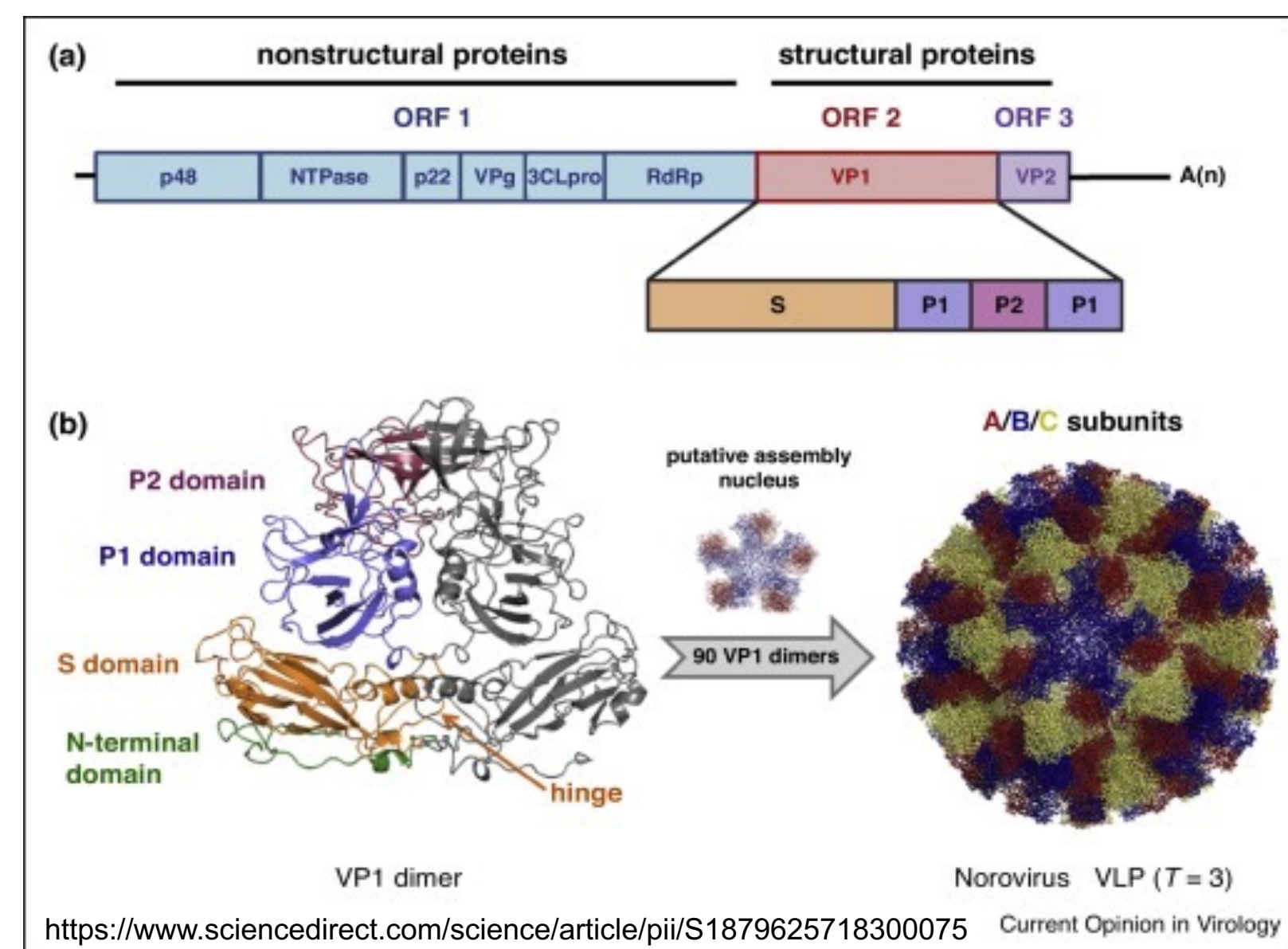


# Norovirus trends and seasonality in Baltimore wastewater: Year-long insight

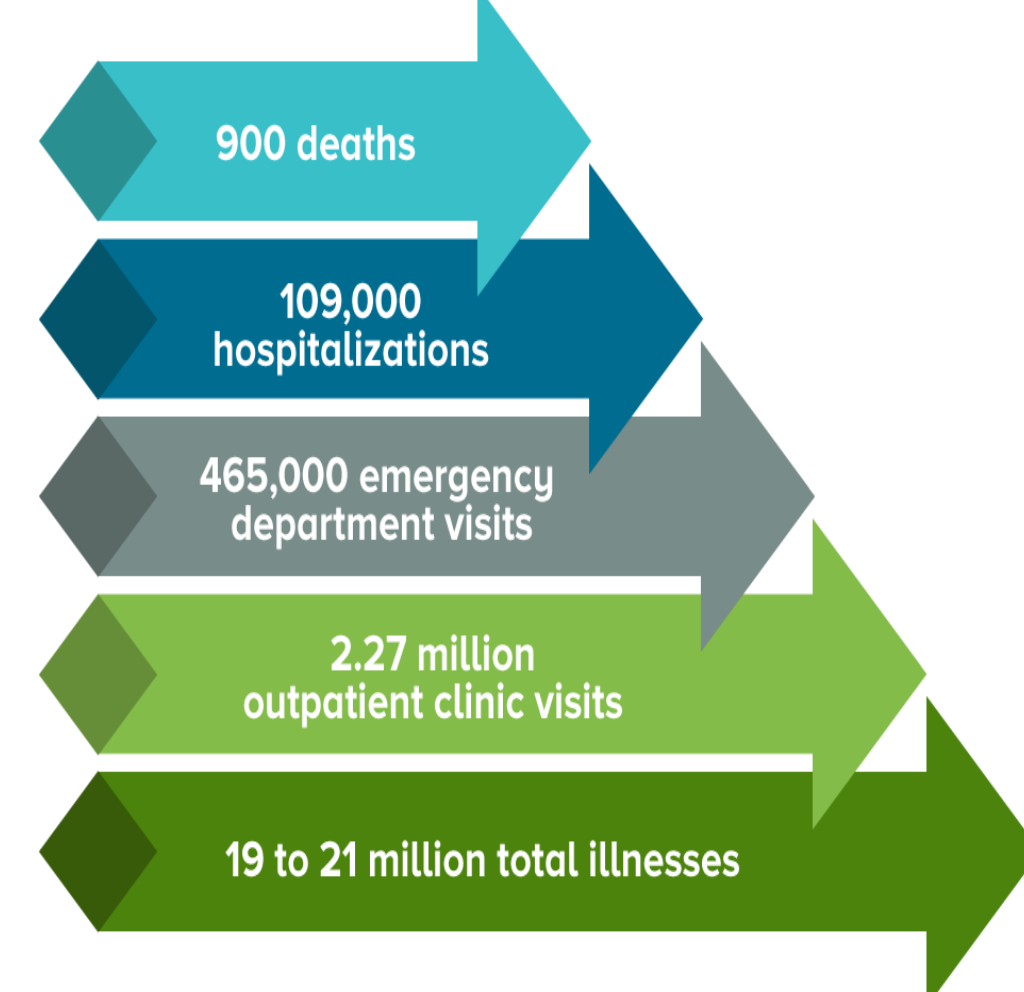
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## Introduction



Burden of Norovirus in the United States.



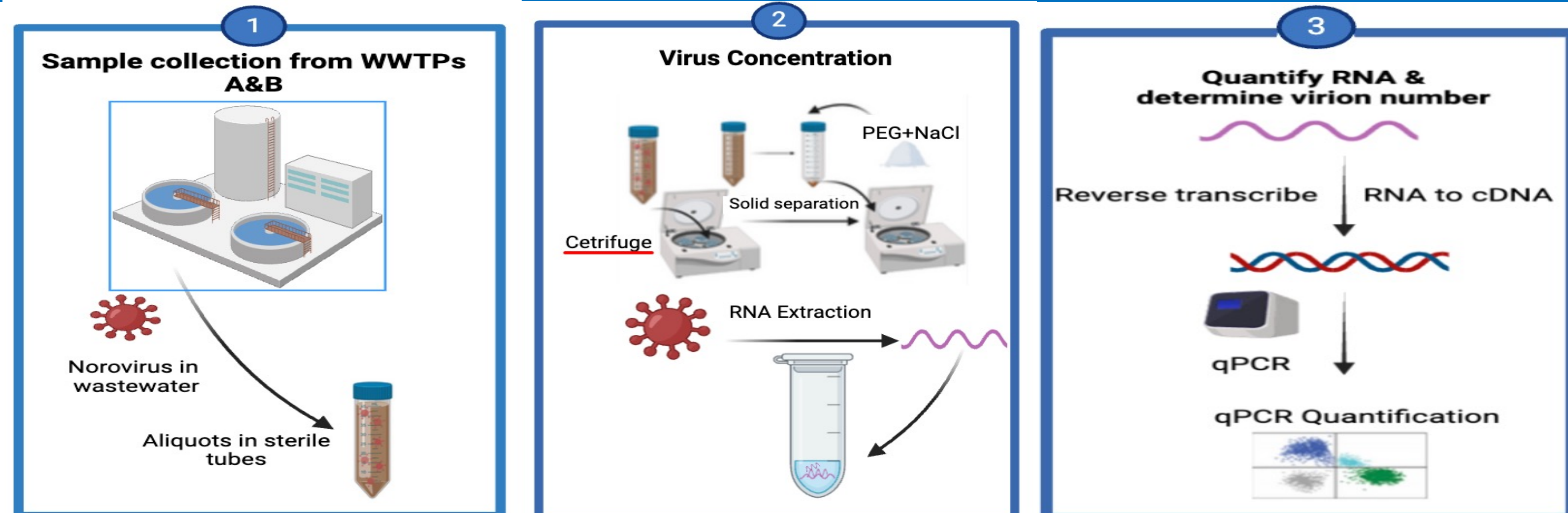
<https://www.cdc.gov/norovirus/burden.html>

- Norovirus, a “stomach flu” or “stomach bug”, is the leading cause of acute gastroenteritis and spreads through direct contact with another person who is infected, contaminated food or water and contaminated surfaces.. 1,3,4
- Genogroups GI and GII are particularly notorious.<sup>2</sup>

## Objective

- To examine the annual presence and seasonal patterns of NoV genogroups GI and GII in Baltimore’s WWTPA and WWTPB.

## Materials/Methods



### Field Sample approach

- Study Duration:** July 2022 to August 2023
- Locale:** Two WWTPs (A&B)
- Populations served:** 450,000 & 1.3 million, resp.
- Sampling Protocol:** Weekly collection
- Sampling:** Grab samples before noon (A)/ 24-hour composite samples via an autosampler (B).

### Quantification approach

- Removal of solids
- PEG/NaCl precipitation
- RNA Extraction (Allprep PowerViral DNA / RNA kit (QIAGEN, cDNA synthesisMD, USA)
- qPCR (GI and GII)

## Results

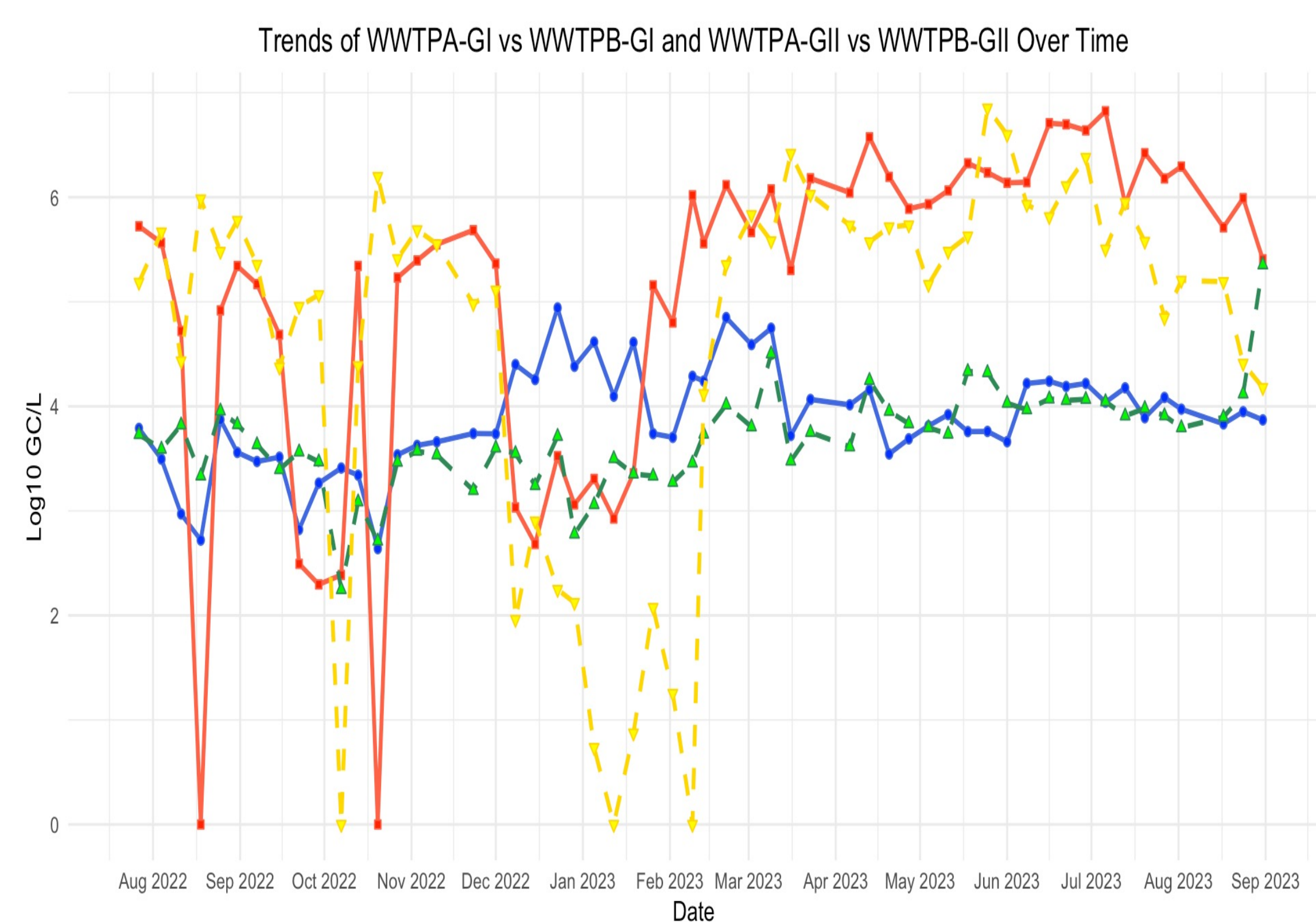


Fig 1: Time Series Analysis of NoV GI and GII Levels at WWTPA and WWTPB

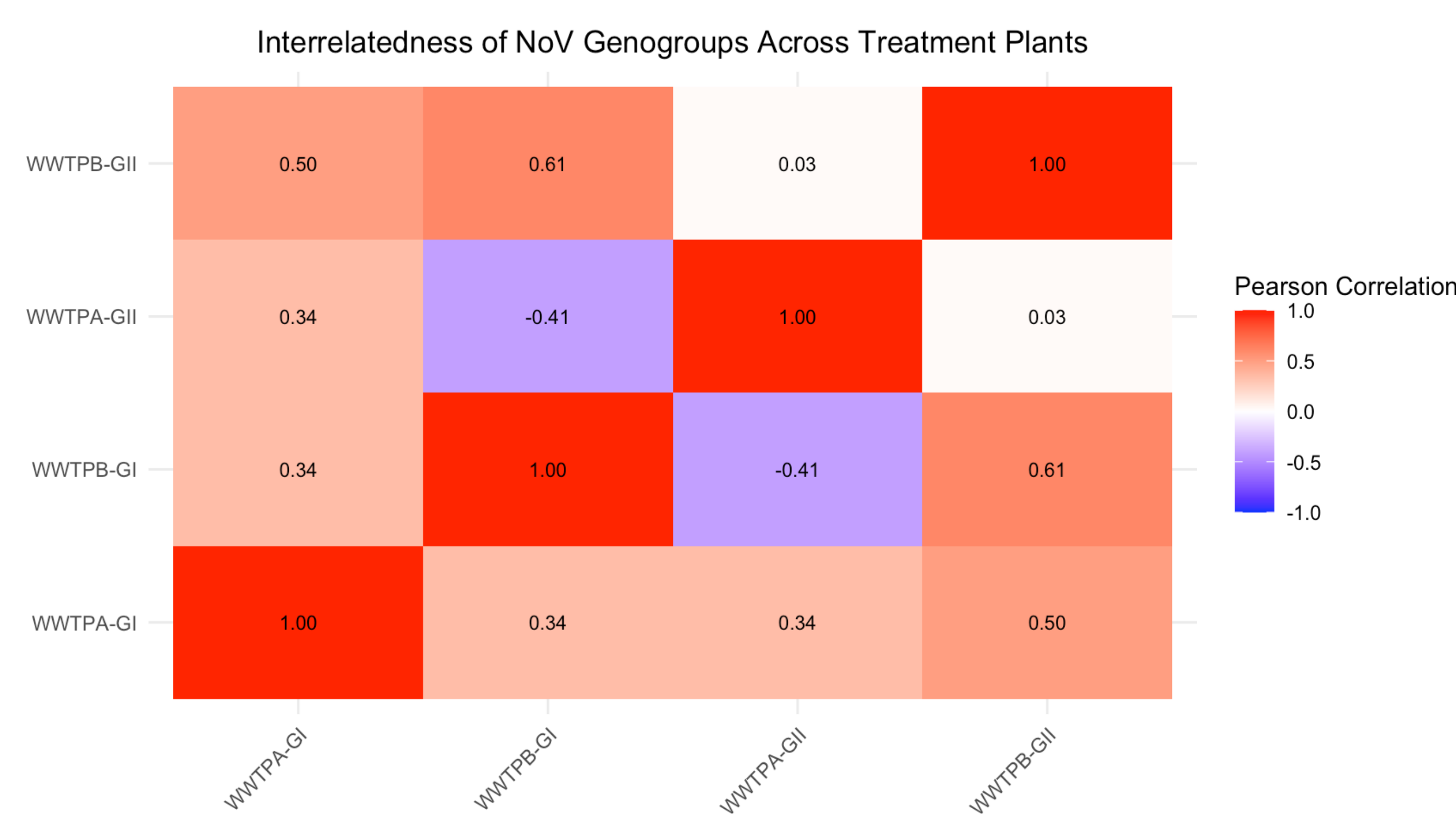


Figure 2: Heatmap of Pearson Correlation Coefficients for NoV GI and GII at WWTPA and WWTPB

## Discussion/Conclusion

- The data illustrates a clear need for targeted public health responses during peak NoV season to mitigate the impact of outbreaks.
- Confirms the efficacy of WBE as a low-cost, high-impact tool for early detection of viral outbreaks and the formulation of proactive public health policies.

## Future Directions

Further interdisciplinary studies combining virology, public health, and environmental science to develop comprehensive strategies against NoV and similar pathogens in urban settings.

## Acknowledgement

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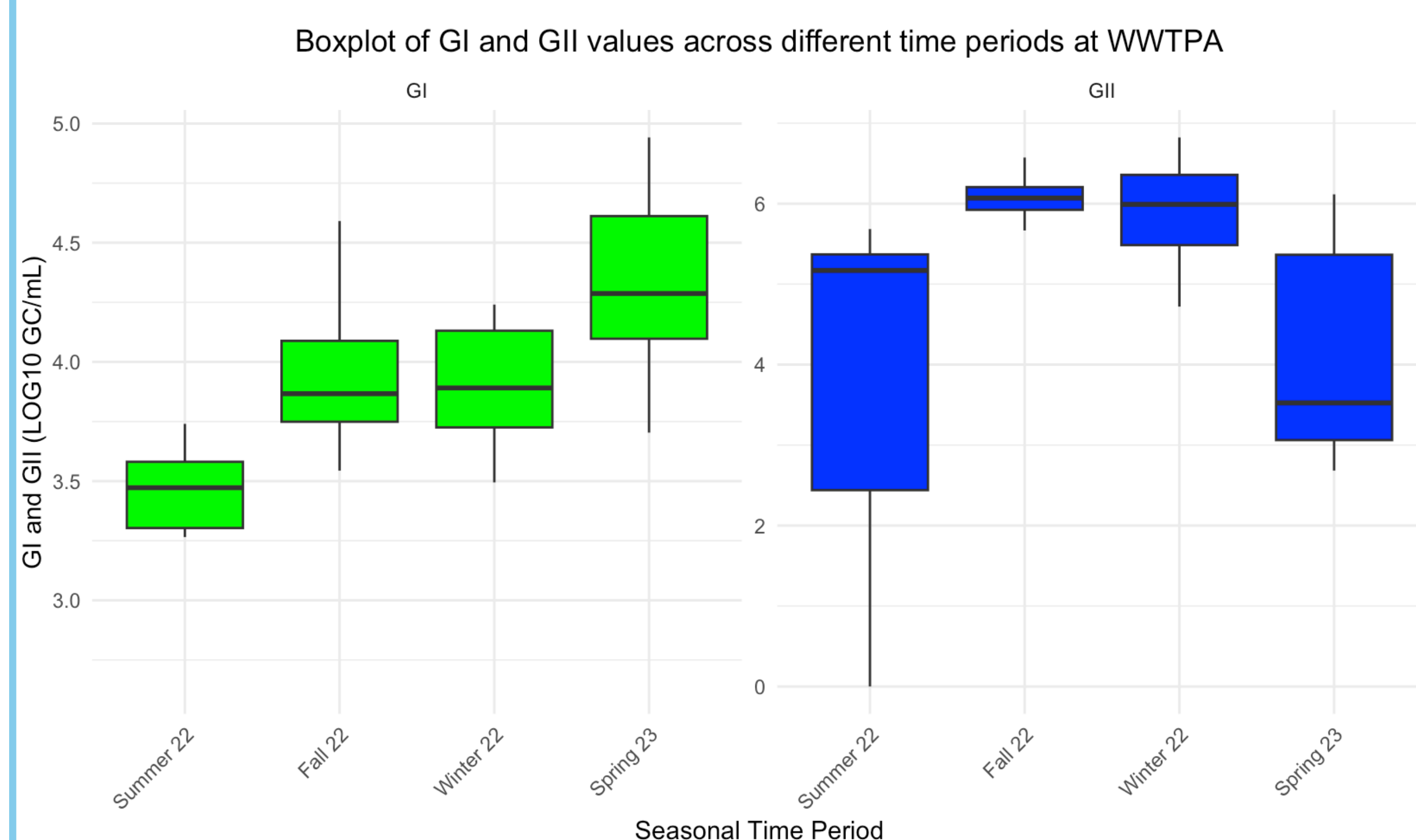


Fig 3: Seasonal Variability in NoV GI and GII Concentrations at WWTPA

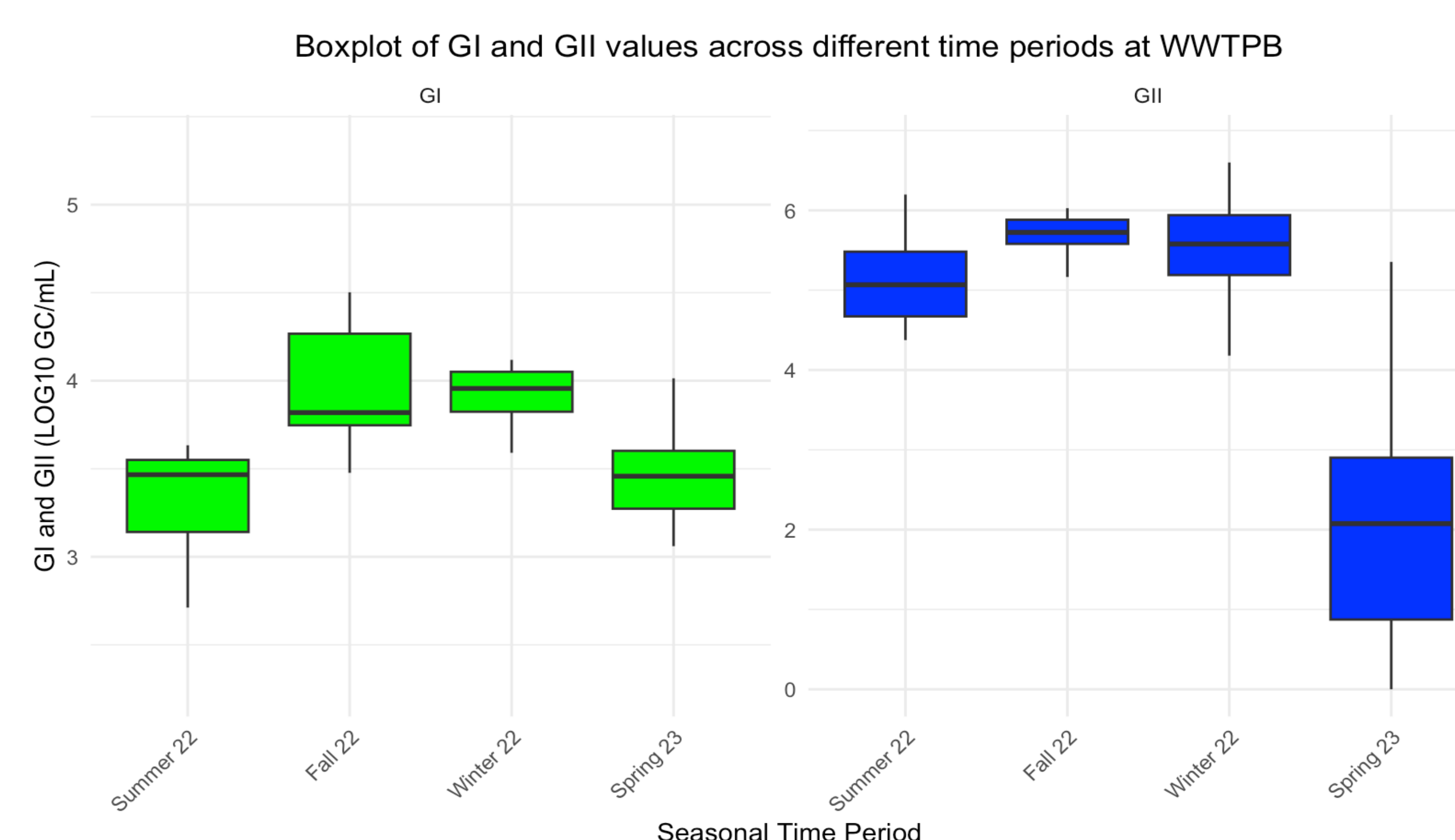


Fig 4: Seasonal Variability in NoV GI and GII Concentrations at WWTPB