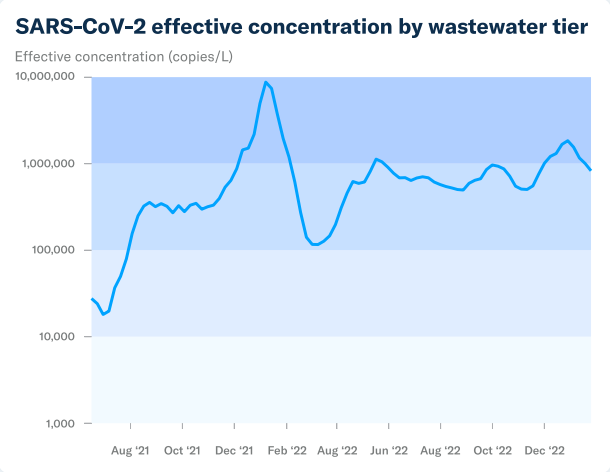
Biobot Analytics

Biobot's COVID-19 community wastewater tiers help guide interpretation of SARS-CoV-2 wastewater data

Wastewater concentrations of SARS-CoV-2 span an extremely wide range, from less than 10,000 virus copies per liter (c/L) of wastewater to over 1,000,000 c/L. Biobot's community wastewater tiers help guide interpretation of wastewater concentration values from wastewater treatment plants, pump stations, and manholes.

Wastewater Tier	Effective Concentration (copies/L)	Level of SARS-CoV-2 Activity in the Community
Tier 1	< 10,000	Low
Tier 2	10,000 - 100,000	Moderate
Tier 3	100,000 - 1,000,000	Substantial
Tier 4	> 1,000,000	High

Wastewater tiers provide at-a-glance insights into what is happening with SARS-CoV-2 in a community. The figure below shows wastewater concentrations over time in one U.S. county, plotted against a log-transformed y-axis.[1] Each color band represents a wastewater tier. As the figure shows, the effective concentration values from that county's wastewater samples were in Tier 2 in July 2021, rose through Tier 3, then peaked in Tier 4 in January 2022. Throughout 2022, effective concentrations stayed primarily in Tier 3, reaching Tier 4 at times. Thus, levels of SARS-CoV-2 in the community were substantial-to-high during most of that year. This visualization, which overlays wastewater data onto community tiers, provides an example of how to communicate what levels of wastewater concentrations mean for a community.



Biobot's community wastewater tiers contextualize wastewater data, relating effective concentration values to SARS-CoV-2 activity in a community. This approach helps answer the difficult question of whether the level of SARS-CoV-2 in wastewater is "high" or "low." For example, wastewater concentrations that are consistently in Tier 4 suggest that there are consistently high levels of SARS-CoV-2 in a community.

→ *For more information, please see Biobot's COVID-19 Community Wastewater Tiers methodology brief.*

[1] Log-transformation of a y-axis makes it easier to see very large and very small values on the same graph. Intervals on a log-transformed y-axis increase exponentially.

COVID-19 community wastewater tiers: Frequently Asked Questions

1 How do Biobot's community wastewater tiers relate to other pandemic metrics?

Biobot compared how frequently data in each tier corresponded with each CDC Community Transmission Level from June 2020 to October 2021. We chose this metric because it was the gold standard for community transmission rates at the time. We chose this timeframe because it was during a time period of relatively high case reporting and prior to the widespread adoption of at-home testing.

Our analysis showed consistent alignment between Biobot's tiers and CDC Transmission Levels. The highest COVID-19 wastewater tier correlated especially closely with the High CDC Community Transmission Level across all catchment area sizes. This means that if wastewater data were in Tier 4, the vast majority of sampling locations were also in a High CDC Transmission Level at that time.

2 How do Biobot's community wastewater tiers relate to cases?

Biobot and others have shown that wastewater concentrations correlate to cases. Even as case ascertainment changes, we expect wastewater data to remain reflective of COVID-19 activity in a community. However, Biobot's community wastewater tiers are not intended to provide estimates of numbers of cases in a population; we suggest using the tiers to estimate relative COVID-19 activity in the community.

3 Will the tiers change as the pandemic changes?

Regardless of how the pandemic changes, Biobot's community tiers provide context for COVID-19 activity in the community. Keeping the tiers the same allows for comparability across time. For example, analyzing changes in the proportion of sampling locations in Tier 4 can provide insight into shifts in community COVID-19 activity.