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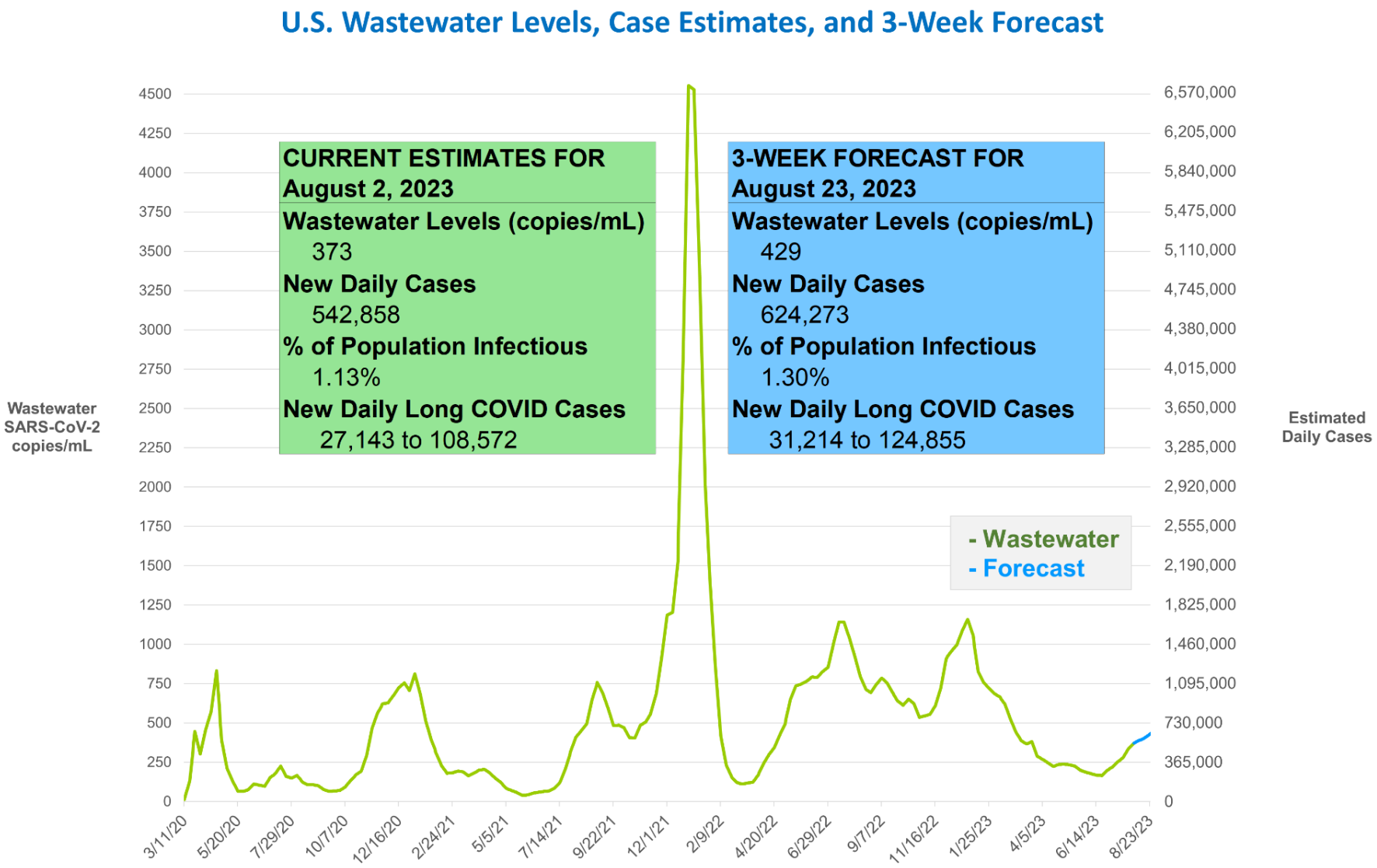
U.S. SARS-CoV-2 Wastewater Levels, COVID-19 Cases, and 3-Week Forecast: Report for August 9, 2023, pmc19.com/data



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Informal Commentary:

U.S. #wastewater levels are higher than during the majority (53.4%) of the pandemic:
- 1.31% (1 in 76 people) are infectious
- 627,000 new daily COVID-19 cases
- Causing 31,000 to 125,000 new #LongCOVID cases per day

How is the Forecast Performing?

The current estimates and 3-week forecast suggest slightly greater transmission than anticipated in last week's report because BioBot retroactively revised last week's numbers to show higher wastewater levels. For example, last week, wastewater levels were reported at 373 copies/mL, which was subsequently revised to 396 copies/mL, a 6% increase. Areas with high levels may be delayed reporting accurate numbers. These retroactive updates are common. Usually the numbers for the past 3-5 weeks get updated marginally. Based on the retroactive revisions, we would have estimated that the current week's wastewater levels would be 423 copies/mL, and in actuality they are (based on current reporting) 431 copies/mL. Last week's forecast underestimated this week's values by a marginal 1.9%. That's about as close as you can get, especially given that periods of fluctuation are hardest to forecast accurately.

Where are We Headed, and How Bad Is It?

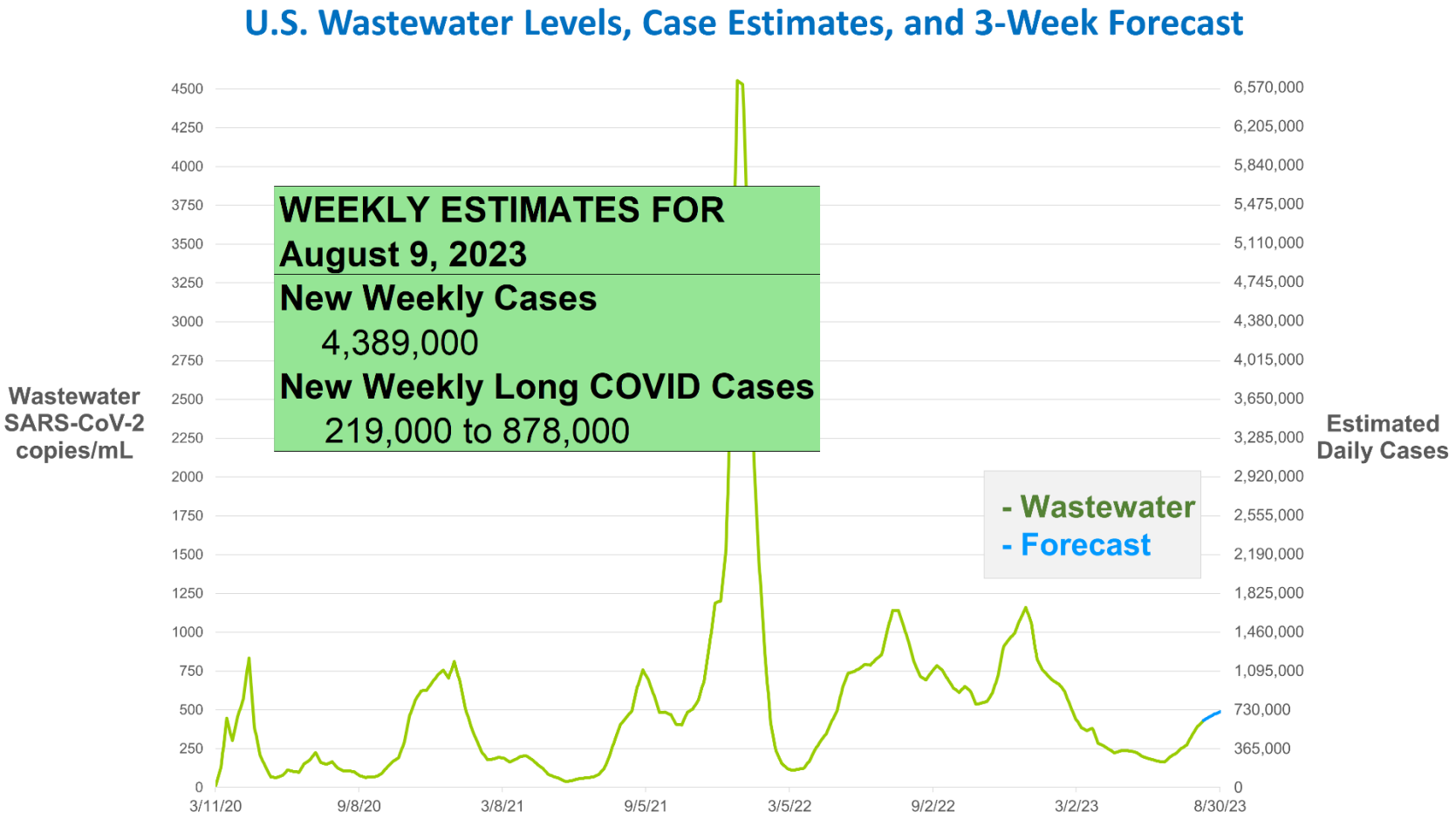
The 3-week forecast shows wastewater levels rising to 488 copies/mL. That will be the approximate peak for the August/September hill, if transmission occurs as expected based on recent weeks and monthly variation estimates derived from prior years. The extreme rise in wastewater in the "Midwest" (gross overgeneralization) this week adds more uncertainty but note that because cases are lower than some time periods, 1-3 counties having 5x surges can affect regional averages substantially. Of 38 BioBot counties with data the past 6 weeks in the Midwest, 3 counties (in Kansas, Missouri, and to a lesser extent Iowa) have a surge. The other 35 counties do not. Nationwide, there are usually a few counties surging and a few with near-zero C0VID. Next week should give a clearer sense of whether we are headed toward a predictable hill versus a steeper climb. Looking at the county-by-county wastewater data, I do not discern a clear regional trend, and note that some key regions of the Midwest (e.g., my home state of Michigan, which had prolonged Whitmerian mitigation and atypical transmission patterns) have not reported wastewater recently. Given the data we have, I see a lot of overinterpreting. "Surge" retweets, so you will see a lot of that.

Some would point to high positivity ratios on the Walgreens or various local dashboards as cause for concern over a national "surge." That could be the case, but testing is about 1% of what it once was. Really, positivity ratios have not been particularly useful in most places in over a year, with exceptions being the few settings where testing has remained high or mandatory. So, the positivity ratios could forebode an unanticipated rise. However, with limited testing that's no longer free, positivity ratios are more an indicator of how well affluent people can guess they have C0VID or how little non-C0VID illness is circulating. We may just be seeing more volatility in positivity ratios, given limited testing and limited other illnesses circulating, with the predictable increase in cases increasing the positivity ratio more than usual.

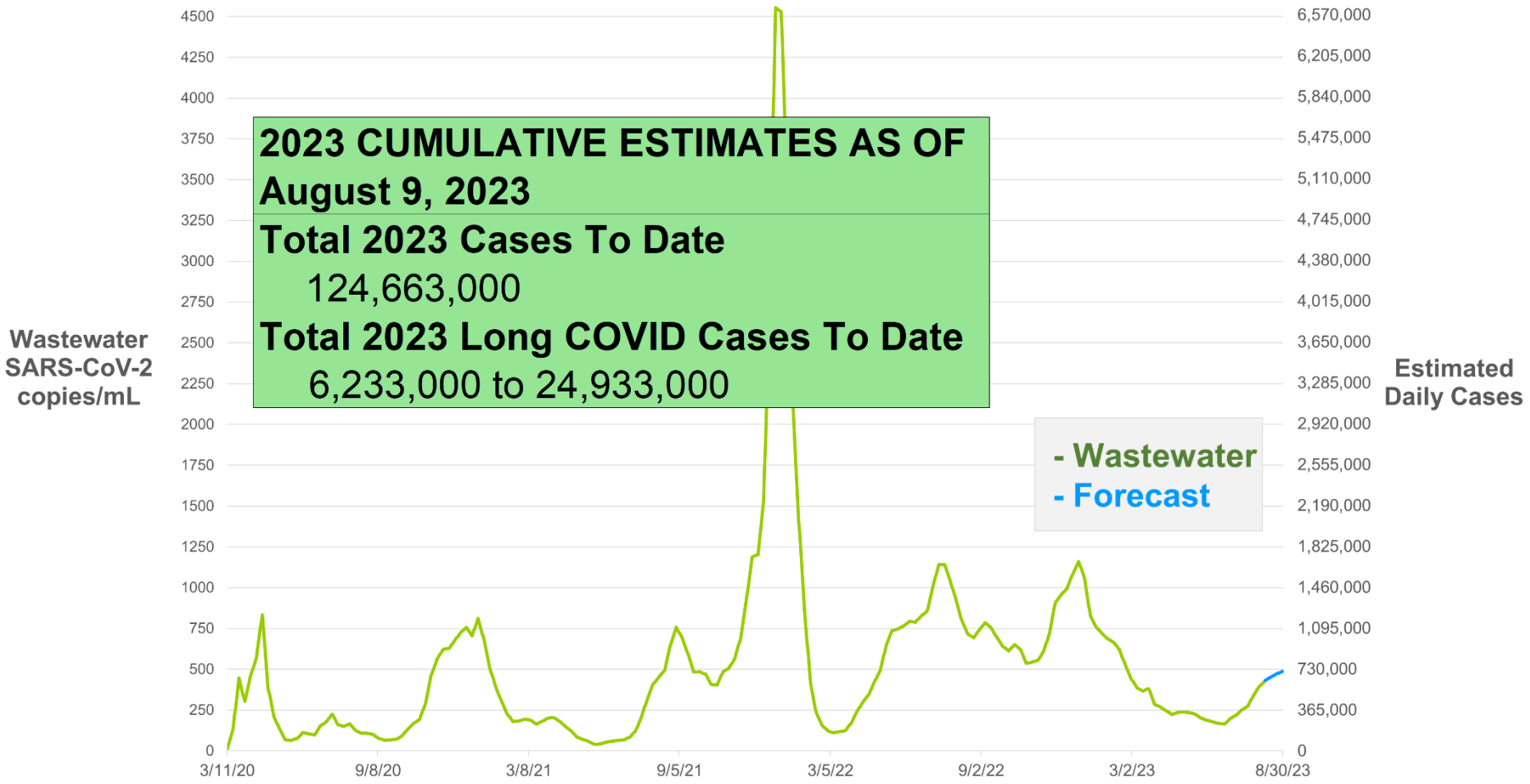
If no immune-evasive variant is on the way, 3 weeks from now, our model is basically saying that we will be at the top of an August/September hill, with cases subsequently subsiding before increasing greatly in November-January. The height of this anticipated Aug/Sep hill is about equal to the ground at the start and end of the Delta wave, and we will be at about two-thirds the 2020-21 winter high point. In sum, the forecast is "predictable enduring bad transmission the next six week," but keep your eye on the Midwest for a higher spike or a spike that generalizes to other regions.

What's the Weekly Picture? How's 2023 Been So Far?

As shown in subsequent posts, the model estimates over 4 million U.S. C0VID cases per week, leading to >200,000 weekly Long C0VID cases. The model estimates over 124 million U.S. C0VID cases so far in 2023, leading to at least 6 million Long C0VID cases so far this year. These estimates are, arguably, quite conservative (lower limit assumes 5% of cases result in Long C0VID) and highly concerning. To put in context, about 2 million Americans get cancer per year. We're basically ignoring a disease with high incidence, prevalence, and impairment in terms of very bad known consequences and unknown 5-10 year consequences.



U.S. Wastewater Levels, Case Estimates, and 3-Week Forecast



What's the Risk in an Office or in a Classroom?

As shown in subsequent posts, the office and classroom risks are presently quite bad. In a group of 10 people (daycare, team meeting, etc.), there's a 12% chance someone will have infectious COVID. This escalates to about 25% in a group of 20-25 people (e.g., K-12 classroom, department meeting, busy hospital waiting room, etc.). In a university classroom the size of about 50 or greater, it should be assumed someone has infectious COVID. This is quite troubling for instructors or students who mix time with multiple groups of classmates each week.

Not all classrooms and meetings are the same. Virtual meetings reduce risk close to zero. Outdoor meetings are often safer than indoors. Testing reduces risk, as do policies that encourage people to stay home when symptomatic. High-quality, well-fitting masks greatly reduce risk. Air quality monitoring and improved air cleaning reduce risk. Recent boosters reduce risk. It remains troubling that elected leaders and public health officials choose to model poor mitigation when ongoing risk is so high.

Number of People	Chances Anyone is Infectious	Number of People	Chances Anyone is Infectious
1	1.3%	25	28.1%
2	2.6%	30	32.7%
3	3.9%	35	37.0%
4	5.1%	40	41.0%
5	6.4%	50	48.3%
6	7.6%	75	62.8%
7	8.8%	100	73.2%
8	10.0%	150	86.2%
9	11.2%	200	92.8%
10	12.3%	300	98.1%
15	17.9%	400	99.5%
20	23.2%	500	99.9%

Supplemental Information – It's August now, but you may be getting invites for events in mid-December. What's the outlook?

It's August, and you just received an invite to a work holiday party, school assembly, final exam, or other meeting scheduled for mid-December.

How bad will COVID-19 transmission be at the event?

I believe there is too much uncertainty to forecast that far out. However, I've made a descriptive table based on the three prior years of the #pandemic in the U.S. We must often make decisions far in advance. Any reasonable approximation often suggests a need for more caution than people realize.

The table is based on our work with the PMC C0VID-19 Tracker (next Tweet). The left column shows the number of people in the room. The remaining columns show low (optimistic), medium (middle), and high (pessimistic) estimates for how often a group that size would have anyone who is actively infectious with COVID. These are based on the years 2020, 2022, and 2021, in that order. My own forecasting model will zoom in on the "best" estimate at we get closer, though right now it favors a medium-to-high scenario.

What are the Chances Someone in a U.S. Office or Classroom Will Be Infectious with COVID-19 on December 15, 2023?

	Chances Anyone is Infectious		
Number of People	Low Estimate	Med Estimate	High Estimate
1	2.2%	3.1%	4.6%
2	4.3%	6.0%	9.0%
3	6.4%	8.9%	13.2%
4	8.4%	11.7%	17.1%
5	10.4%	14.4%	20.9%
6	12.4%	17.0%	24.6%
7	14.3%	19.6%	28.0%
8	16.2%	22.1%	31.3%
9	18.0%	24.4%	34.5%
10	19.8%	26.8%	37.5%
20	35.7%	46.4%	60.9%
30	48.4%	60.7%	75.6%
40	58.6%	71.2%	84.7%
50	66.8%	78.9%	90.5%
75	80.9%	90.3%	97.1%
100	89.0%	95.6%	99.1%
200	98.8%	99.8%	>99.9%
300	99.9%	>99.9%	>99.9%

The first row of numbers across just shows you the proportion of the U.S. population actively infectious. For example, 2.2-4.6% of the population may be actively infectious on the example day of December 15. For every small group meeting (5 people), you'd expect that 10-20% of the time someone in the group would be infectious. In each classroom of 20-30 people, you'd expect something like a 35-75% chance that someone would be infectious. Not great odds when you factor in multiple classes per week or any mixing of students across classrooms throughout the day or week. In a large cafeteria or lecture hall, you'd expect something like an 80-99% chance someone is infectious.