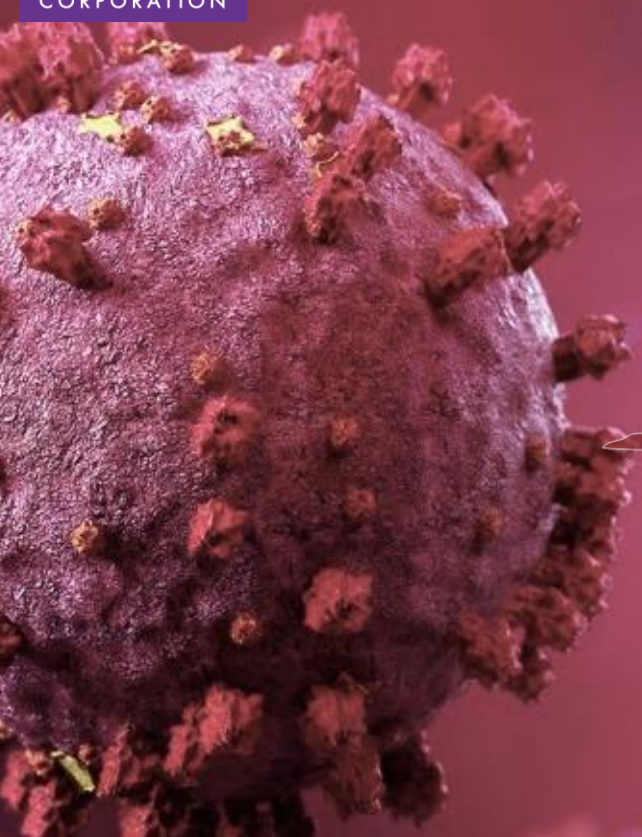
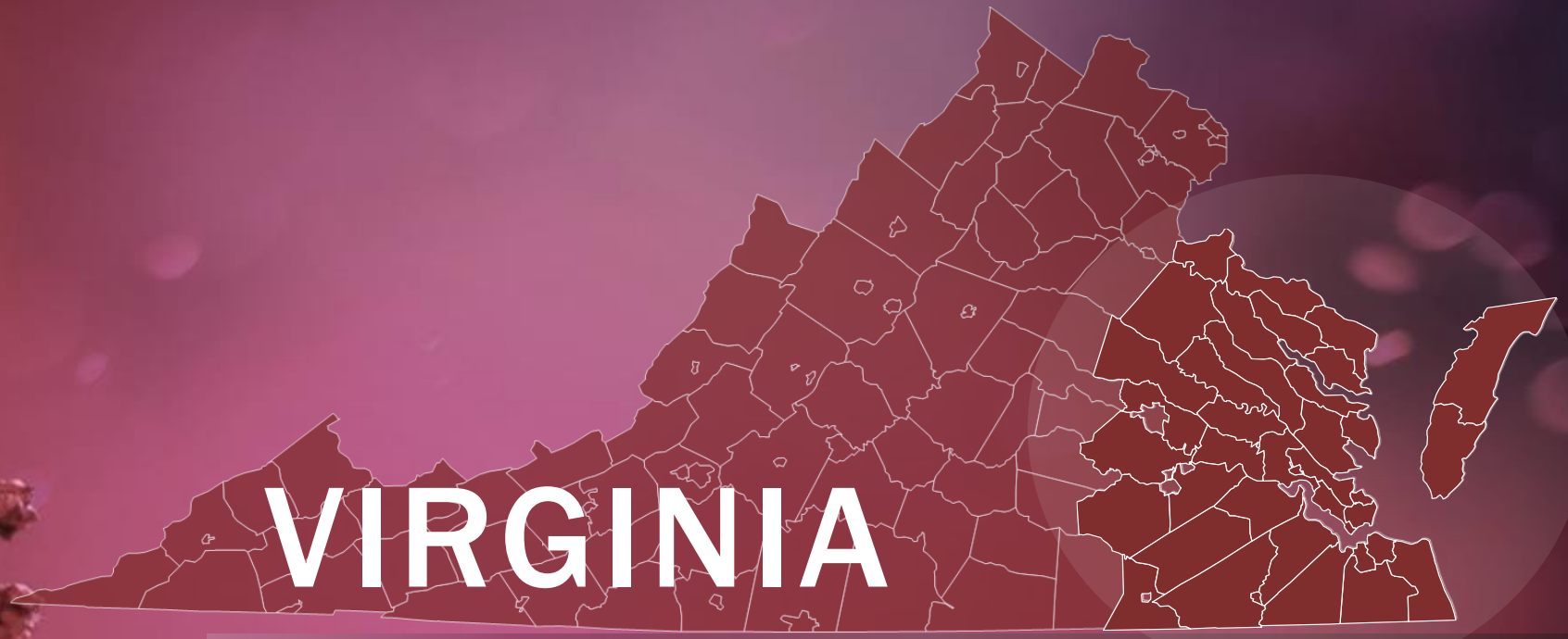




VIRGINIA

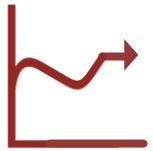
COVID-19 Update December 10th, 2020

Carter C. Price, Ph.D.

A team of RAND researchers was asked by the Commonwealth of Virginia to review available information on COVID-19 models of the Commonwealth to determine the strengths and weaknesses of each model and their relevance to decisionmaking. The information in this presentation is intended to keep policymakers abreast of the latest findings of the research team.

This research was sponsored by the Commonwealth of Virginia and conducted by the RAND Corporation. RAND is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. For more information, visit www.rand.org.

Bottom-Line Up Front



Virginia's total case levels remain very high

- The case growth rate has continued to be very high
- Hospitalizations continue to rise rapidly
- Testing was disrupted, but seems to have kept up

Key triggers will continue to drive a rapid rise for the coming months

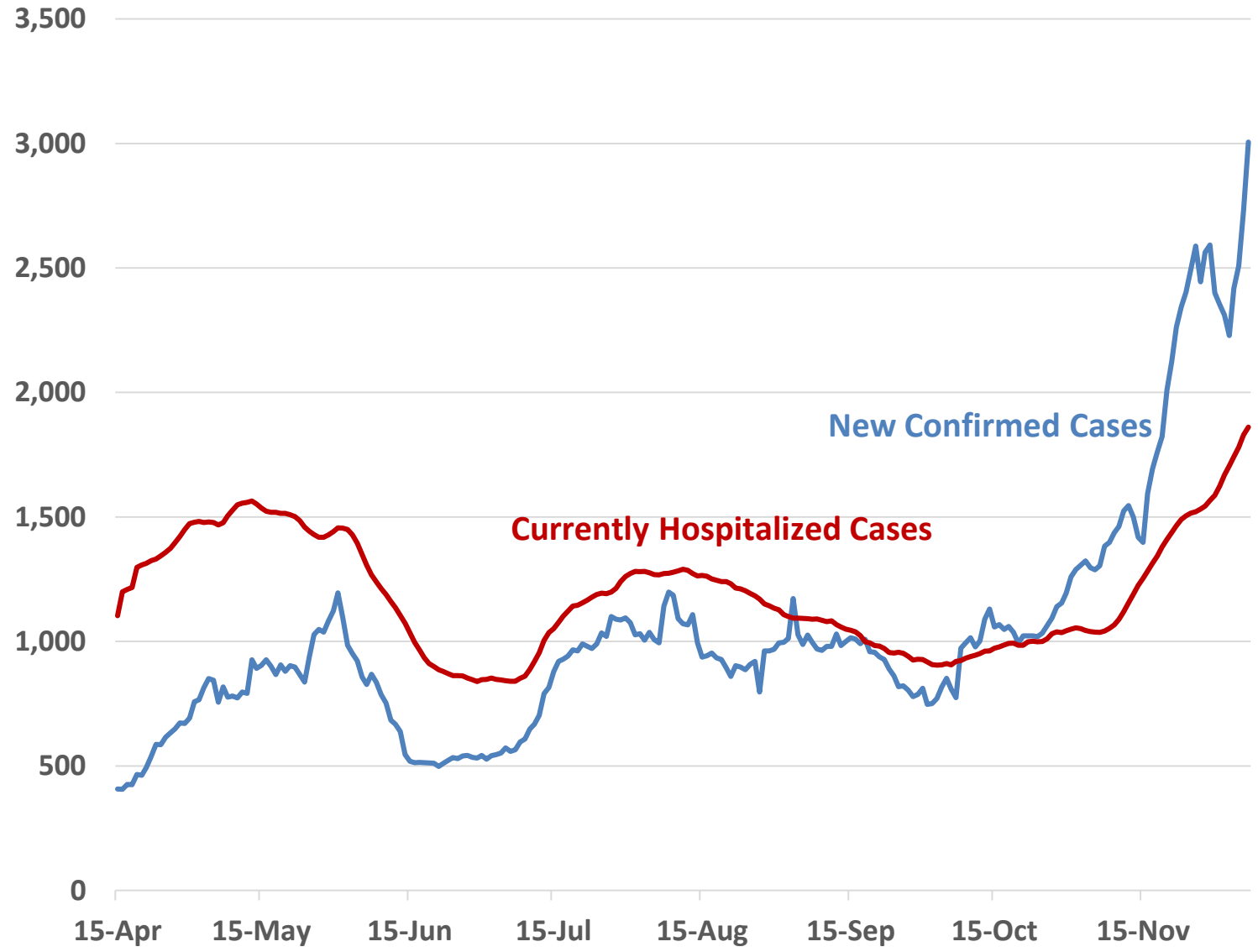
- Seasonal changes
- Holiday interactions
- COVID-fatigue

Cheaper, faster testing or a vaccine could reduce the spread if widely deployed

Model forecasts may be less accurate because behavior is driving growth

- Models will continue to be useful for comparing policies and exploring scenarios

Case and hospitalization levels are high and growing rapidly



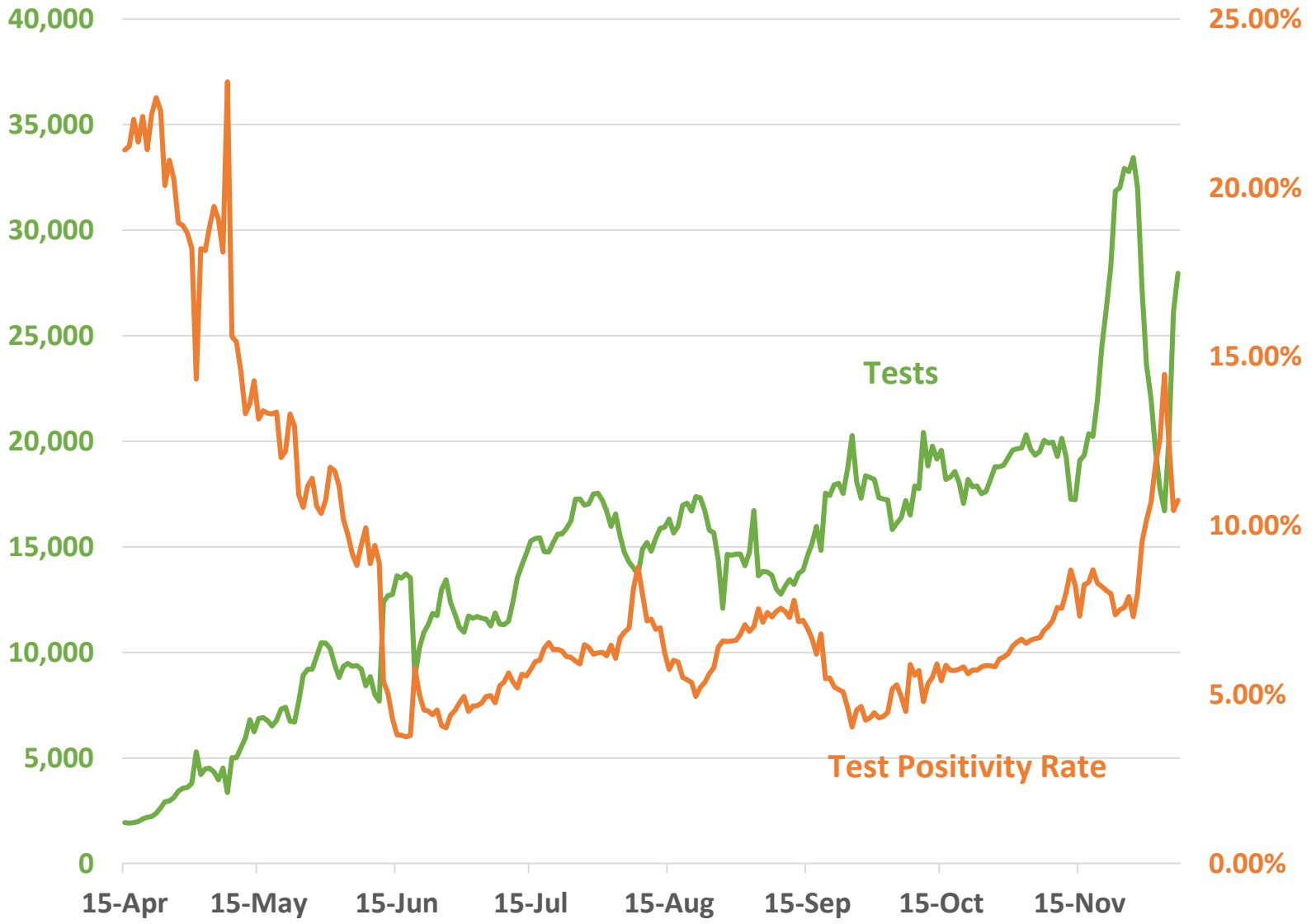
New confirmed cases are spiking and have surpassed 3,000/day on average

- Thanksgiving appears to have been a super-spreader event
- We will have a better picture of the scale by the end of this week

Currently hospitalized cases have risen above 2,000

- Hospitalizations are likely to continue to increase by a similar magnitude to the case rate (more than 20%) in the next week or two

Testing was interrupted by the Thanksgiving holiday but remains high



Tests per day have moved over 25,000

- There was a dip in testing following Thanksgiving, but levels have remained high

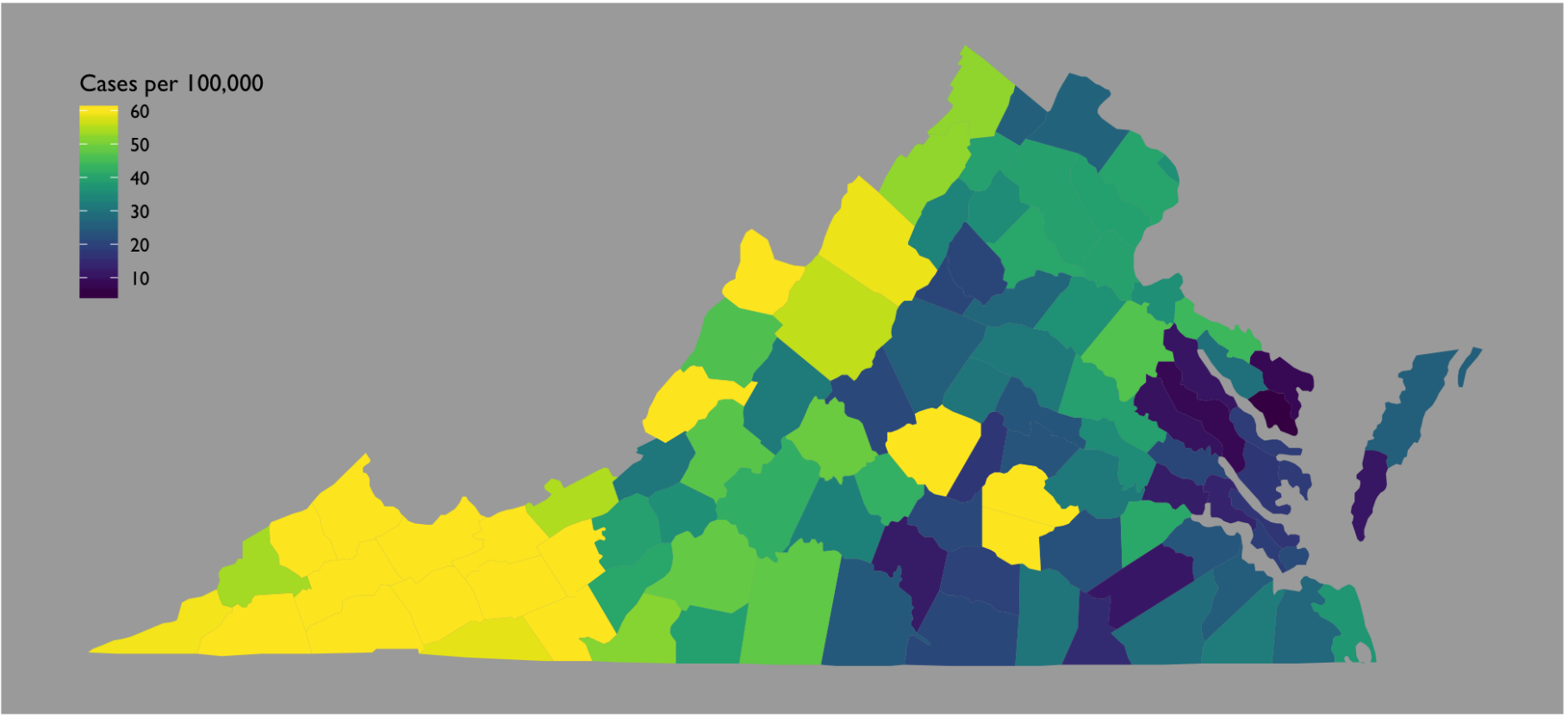
The test positivity rate has dipped to just over ten percent

- Five percent is a suggested target
- If this rate remains over ten percent, the case count levels are likely to be less reliable

Case levels remain high statewide

CASE COUNT

Source: VDH



Yellow indicates at least 60 cases per 100,000

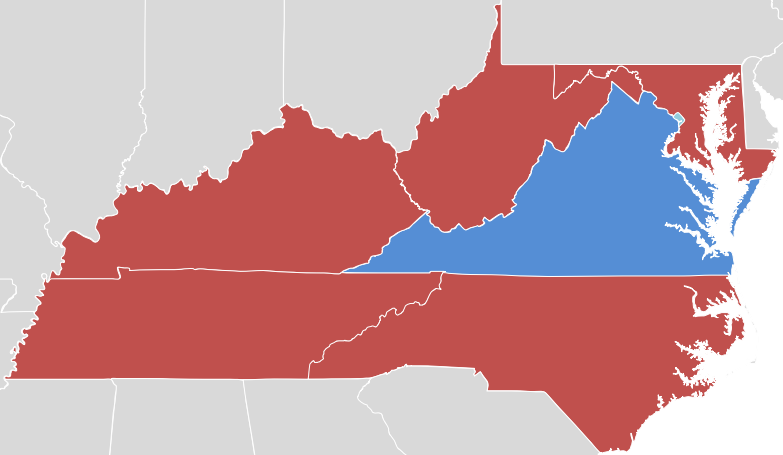
- This scale has changed from last week where the limit was 40

Counties across the Commonwealth saw increases

These data were updated December 8th and represent a seven-day average of the previous week

Case rate trends in neighboring states are as much as double that in the Commonwealth

Over the last 7 days, Virginia had 35.2 (+25% from last week) new confirmed cases per day per 100,000



Very high case loads (>20):

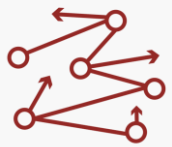
- Kentucky (75.3 new cases per 100k, +25% from last week)
- Tennessee (71.6, +14%)
- West Virginia (66.1, +23%)
- North Carolina (47.5, +38%)
- Maryland (44.8, +47%)
- District of Columbia (35.8, +40%)

High case loads (10-20): None

Lower case loads (<10): None

These data were updated December 8th and represent a seven-day average of the previous week

We've been monitoring recent, relevant literature



Larremore et al. simulated the use of a periodic olfactory test to limit the spread of COVID

- The researchers used clinical data on the timing of the symptoms to understand the role of olfactory tests performed daily or every third day
- They estimate that periodic olfactory tests could be an effective strategy to contain the spread

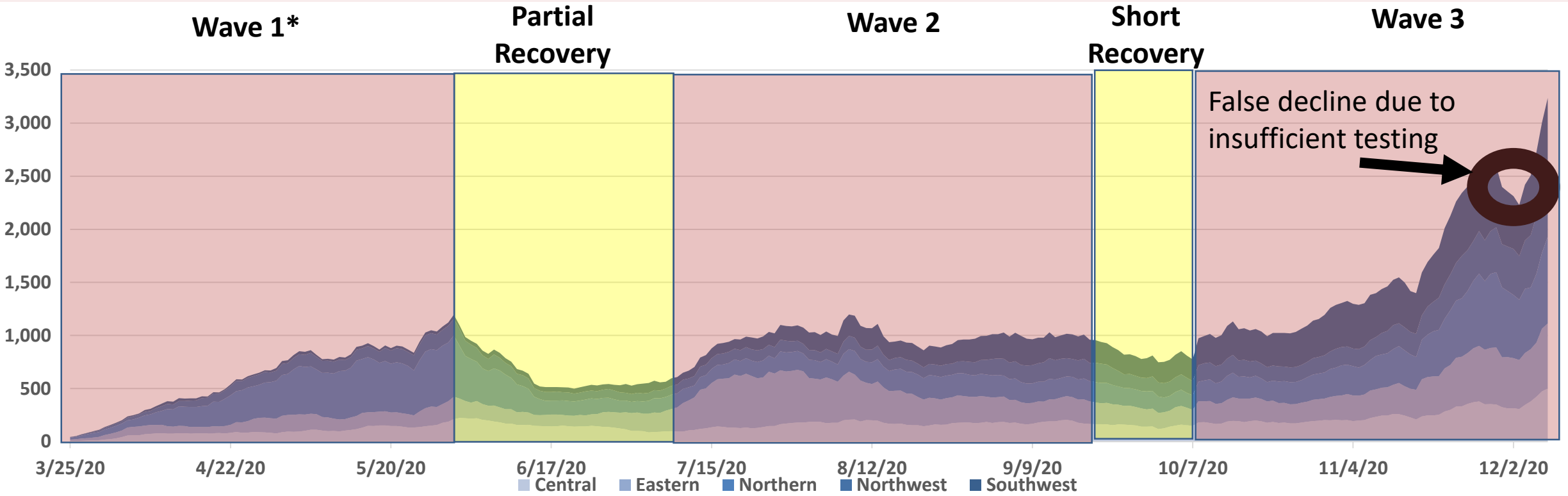
Larremore et al., in a separate study, simulated different testing regimes paired with self-quarantine

- They varied the share of the population participating in testing, the rate of testing, and the limit of detection (essentially how much viral load is required for a positive test)
- The ability to control the spread is particularly sensitive to the rate of testing, and even tests that require a higher viral load (such as an antigen test) can be effective in containing the spread with a low time between tests
- They estimate that the cases would drop precipitously in a matter of weeks with a mass testing approach

Coronado et al. looked at mitigation strategies used by Head Start and Early Head Start in September and October

- The research team conducted in depth interviews with Head Start staff for programs in eight states
- The report documents the key strategies for everyday prevention actions, response to an ill individual, and ongoing communications and support

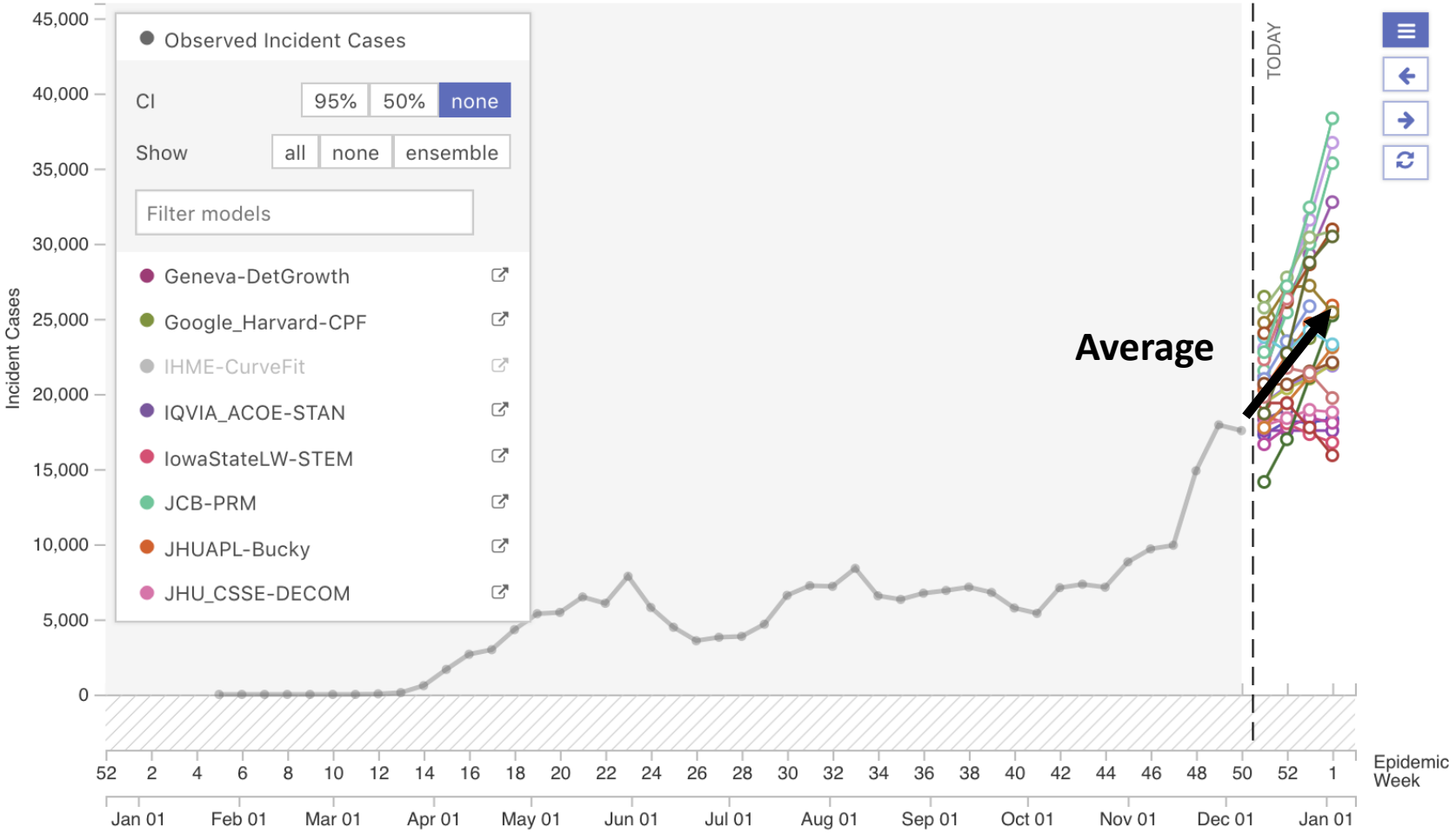
Each wave of cases has been centered in different parts of the Commonwealth



- The initial wave was concentrated in the Northern region*
- There was a partial recovery when cases in the Northern region dropped
- In mid-July, cases grew first in the Eastern region and then, beginning in August, statewide
- Statewide levels declined slightly, with a dip in the Eastern region in late September
- A new wave began in the Southwest region early in October, and previous highs have been surpassed in each region

*Testing was insufficient for accurate counts during the first wave

Forecasts for cases vary, but average to a rapid rise



Note: SEIR-type models have been cut from this figure due to poor fit
Source: COVID-19 Forecast Hub, https://viz.covid19forecasthub.org/
Accessed December 9th

There is substantial variation in the case forecasts

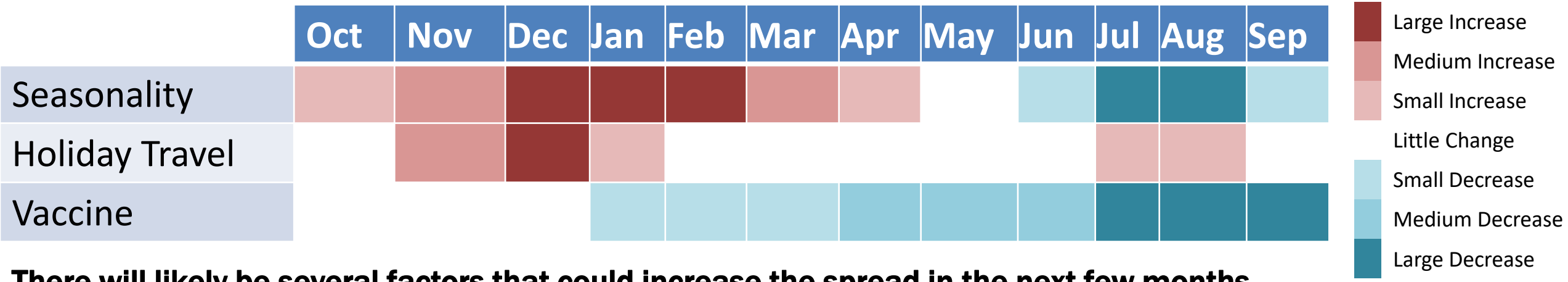
- The model "average" is for a rapid increase for the coming weeks

The mechanisms driving the spread at this stage are very different than in the early stage

- Initially, people did not change their behavior, so COVID spread exponentially
- Increased tele-work, changing weather, the return of in-person instruction, and other factors changed the pattern of spread
- These new patterns require the models to evolve

There may have been a gap in testing over Thanksgiving that could cause problems for models

There are several triggers that could lead to increased spread



There will likely be several factors that could increase the spread in the next few months

- Seasonal effects for COVID-19 could lead to more spread during the colder months
- Holiday travel could lead to increased spread, particularly from the mixing of age cohorts

A vaccine may become available around the turn of the year

- For the first several months of 2021, there will not be sufficient supply to significantly reduce the spread
- People may scale back preventative behaviors (such as distancing and mask wearing) too soon

There are likely to be long-term repercussions that need planning and preparation to mitigate

- Mental health problems may persist, particularly among medical professionals and those directly affected
- Following the 1918 pandemic, there were higher rates of disability, mental illness, and other conditions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