MODELING UPDATE

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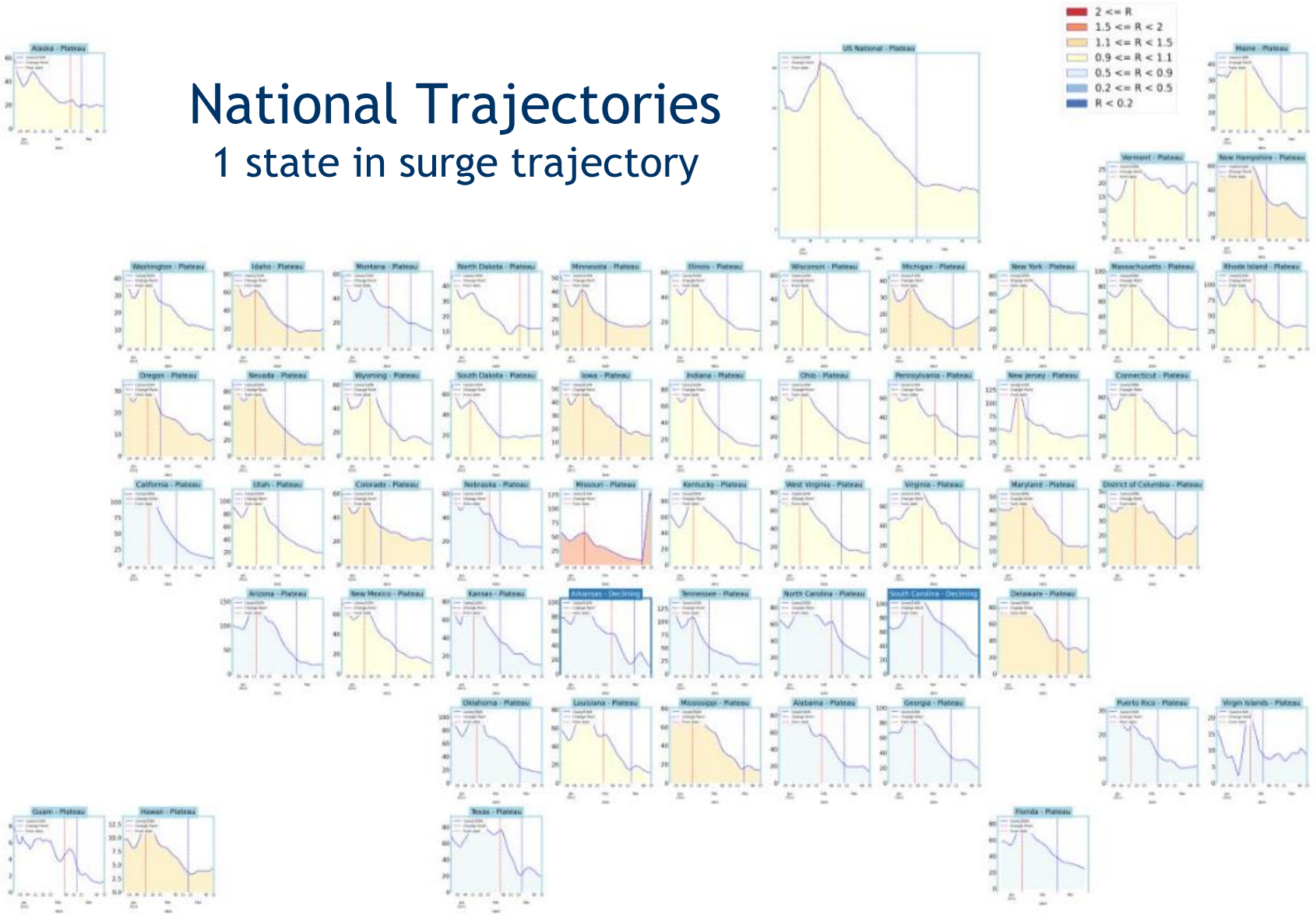
UVA COVID-19 Model-Background

- Model is developed by the UVA Biocomplexity Institute
- Model has evolved
  - Current methodology: “Adaptive Fitting”
  - Based on observed cases in each health district
  - Responsive to current trends → week-to-week volatility
- Models thrive on more & better data, and the model improves every week.
- Behavioral and policy responses drive changes in current trends
- RAND provides additional analysis

National Trajectories

1 state in surge trajectory



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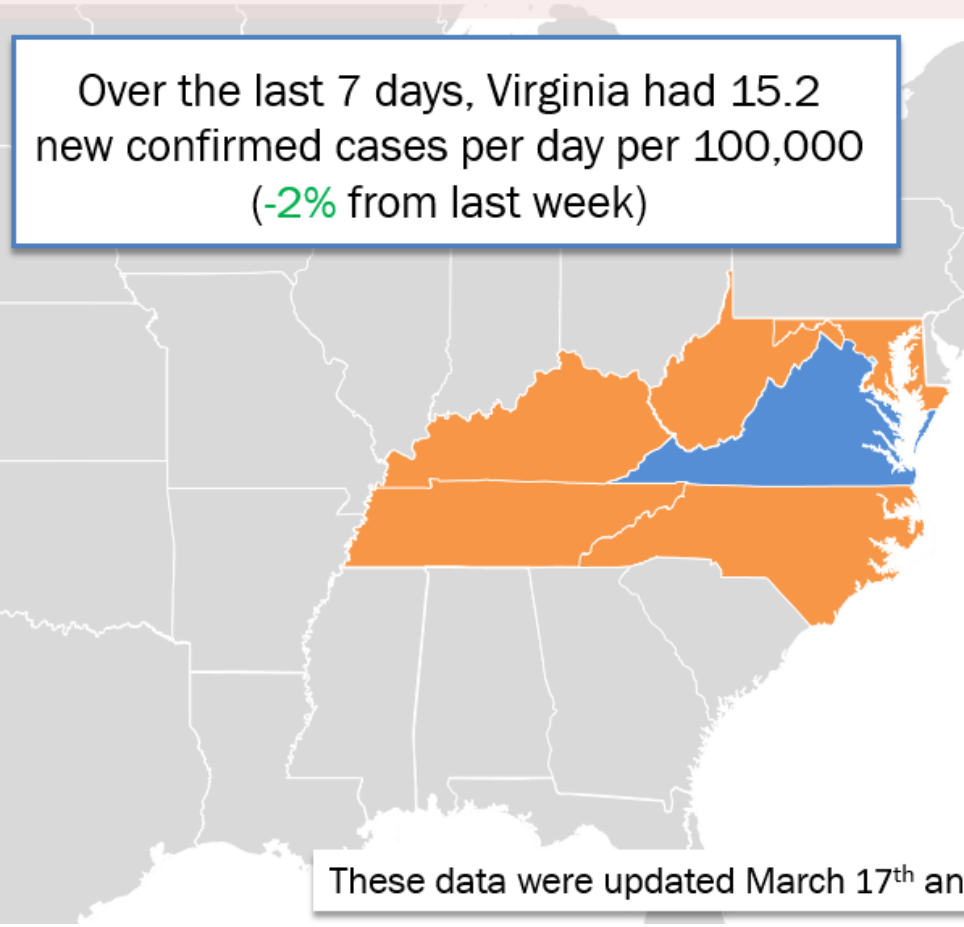
Case levels are converging across neighboring states

Over the last 7 days, Virginia had 15.2 new confirmed cases per day per 100,000 (-2% from last week)



Very high case loads (>20): None

High case loads (10-20):

- Tennessee (18.6 new cases per 100k, -0% from last week)
- Kentucky (17.6, -4%)
- West Virginia (17.2, +29%)
- District of Columbia (16.6, -28%)
- North Carolina (15.5, -9%)
- Maryland (14.3, +8%)

Lower case loads (<10): None

These data were updated March 17th and represent a seven-day average of the previous week

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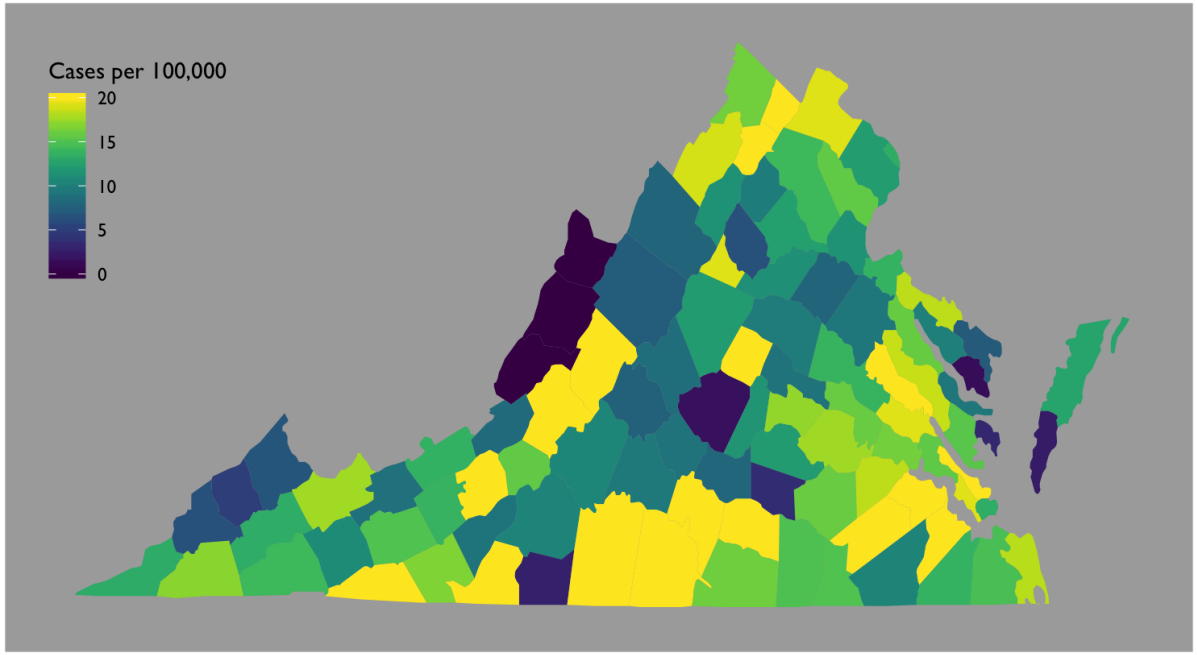
Case levels have declined slightly, but a quarter of counties have very high case levels

CASE COUNT

Source: VDH



Yellow indicates at least 25 cases per 100,000

- This is a decline from 30 per 100,000 from last week

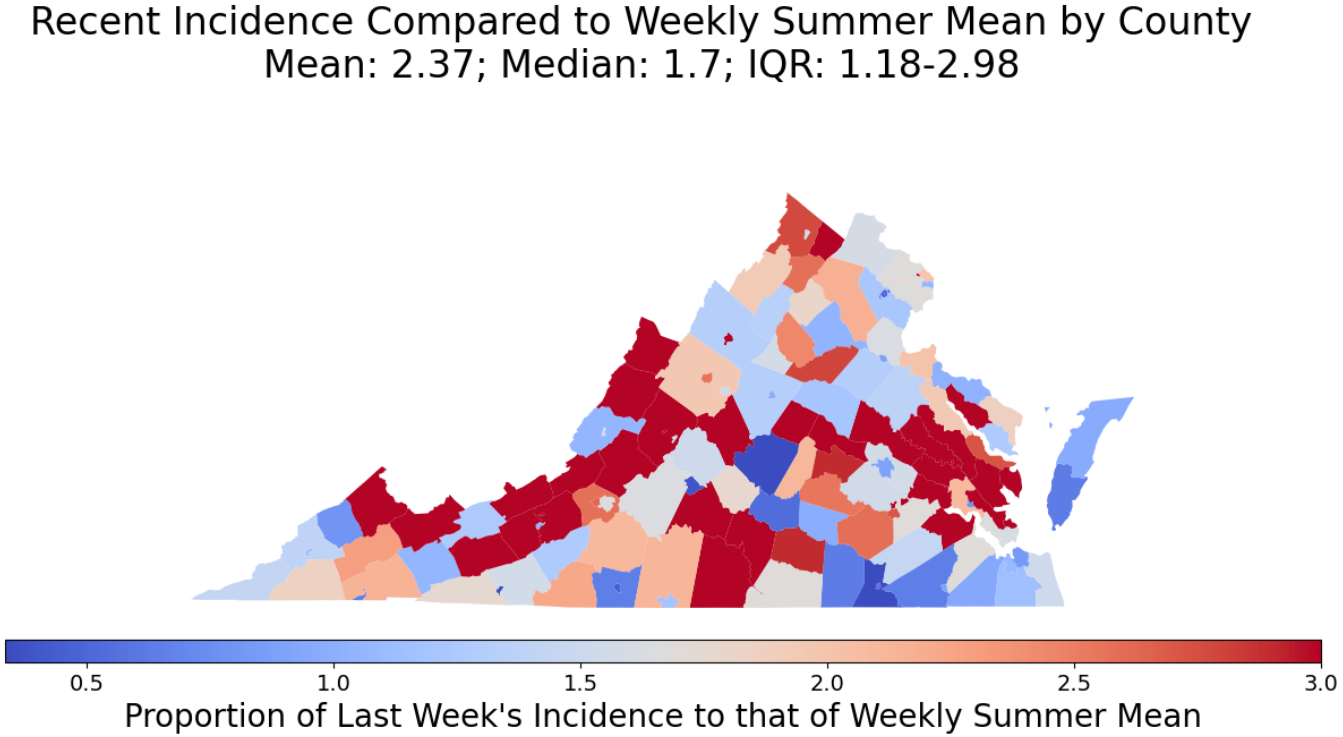
Case levels have declined across the Commonwealth

- 78 percent of counties have fewer than 20 cases per 100,000
- 24 percent of counties have fewer than 10 cases per 100,000

These data were updated March 17th and represent a seven-day average of the previous week

Current Week vs. Summer Mean (June-Aug 2020)

Still some way to go to return to rates experienced during the summer of 2020 (June through August)



- **88% of VA counties** are above the average rate for the summer compared to 88% last week

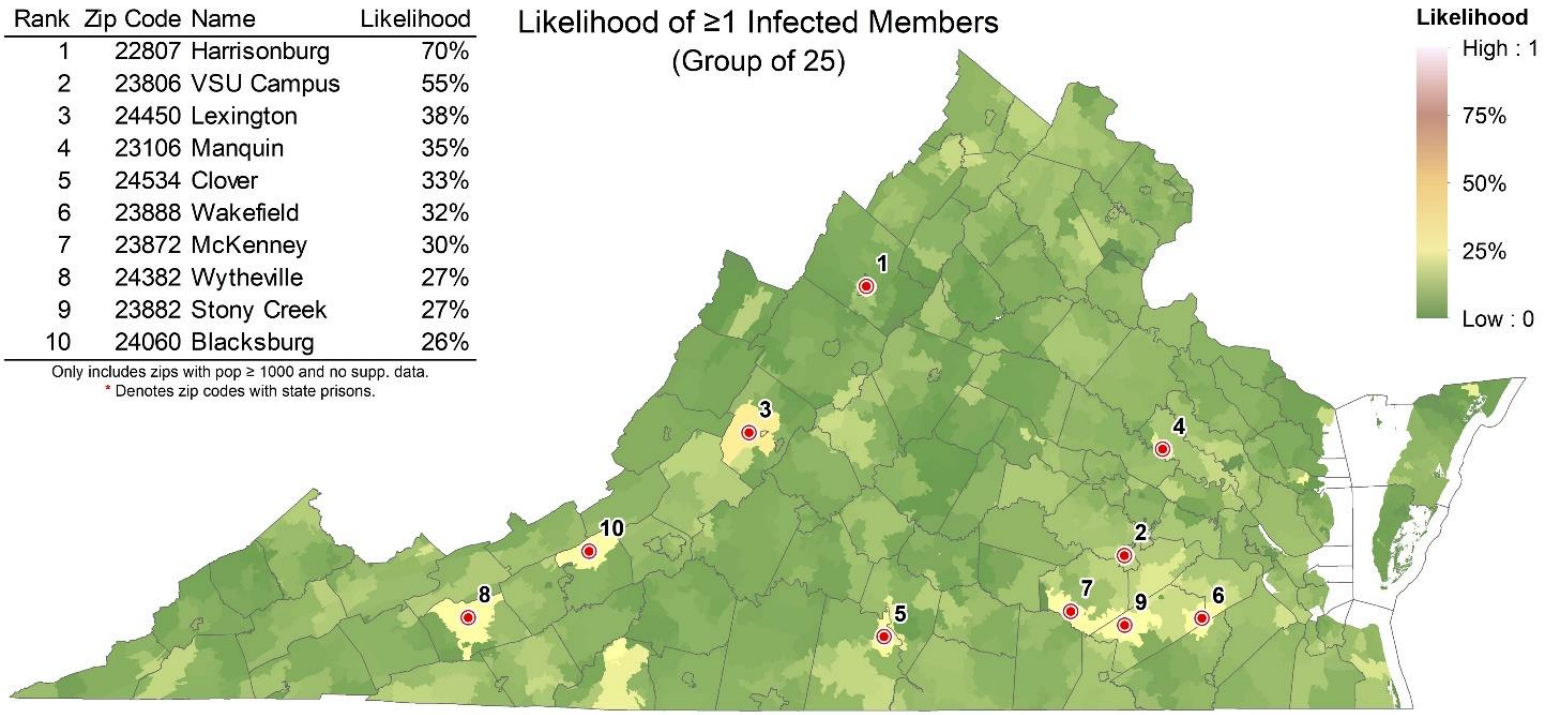
Risk of Exposure by Group Size

Case Prevalence in the last week by zip code used to calculate risk of encountering someone infected in a gathering of randomly selected people (group size 25)

- Assumes 3 undetected infections per confirmed case (ascertainment rate from recent seroprevalence survey)

Rank	Zip Code	Name	Likelihood
1	22807	Harrisonburg	70%
2	23806	VSU Campus	55%
3	24450	Lexington	38%
4	23106	Manquin	35%
5	24534	Clover	33%
6	23888	Wakefield	32%
7	23872	McKenney	30%
8	24382	Wytheville	27%
9	23882	Stony Creek	27%
10	24060	Blacksburg	26%

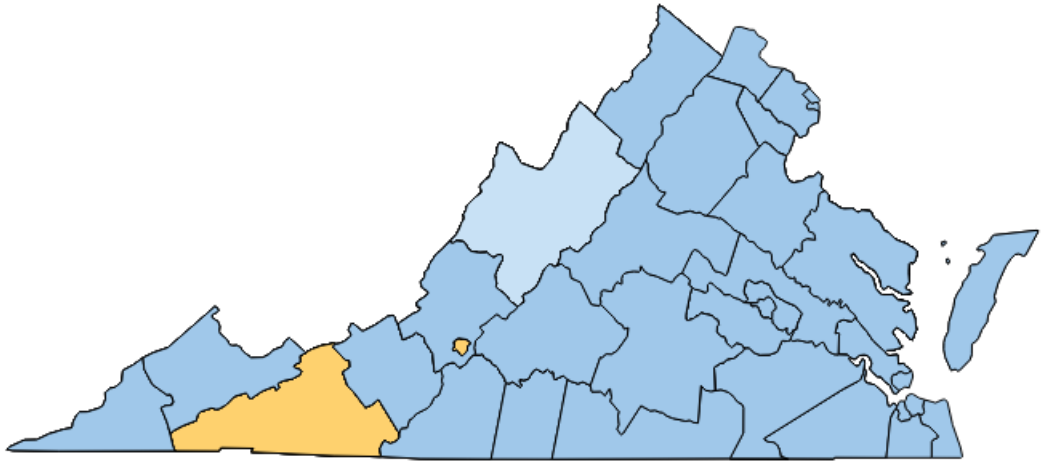
Only includes zips with pop ≥ 1000 and no supp. data.
* Denotes zip codes with state prisons.

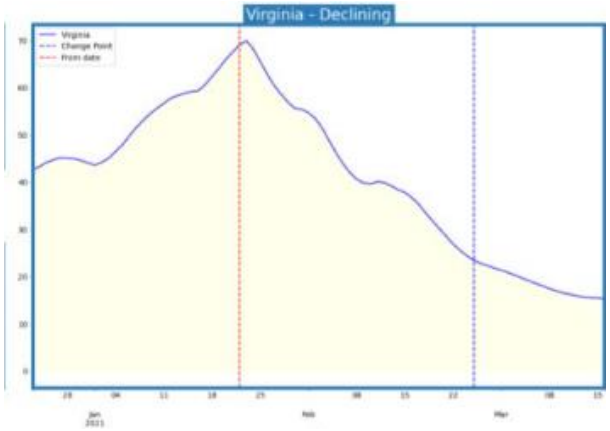


Based on Spatial Empirical Bayes smoothed point prevalence for week ending 2021-03-13

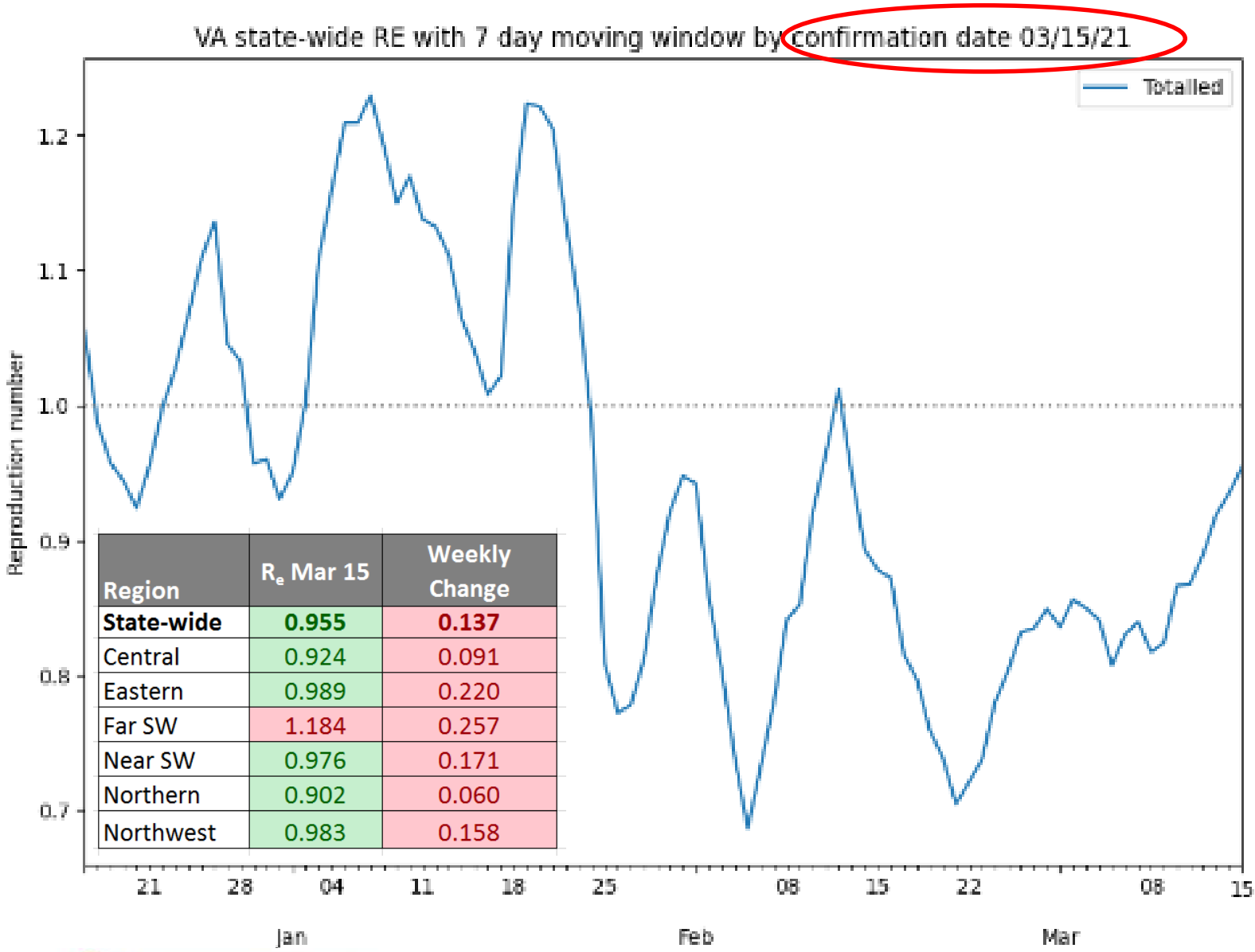
Health Districts in Surge

Status	# Districts (prev week)
Declining	31 (29)
Plateau	2 (4)
Slow Growth	2 (2)
In Surge	0 (0)





Trajectory	Description	Weekly Case Rate (per 100K) bounds
Declining	Sustained decreases following a recent peak	below -0.9
Plateau	Steady level with minimal trend up or down	above -0.9 and below 0.5
Slow Growth	Sustained growth not rapid enough to be considered a Surge	above 0.5 and below 2.5
In Surge	Currently experiencing sustained rapid and significant growth	2.5 or greater



Region	R_e Mar 15	Weekly Change
State-wide	**0.955**	**0.137**
Central	0.924	0.091
Eastern	0.989	0.220
Far SW	1.184	0.257
Near SW	0.976	0.171
Northern	0.902	0.060
Northwest	0.983	0.158

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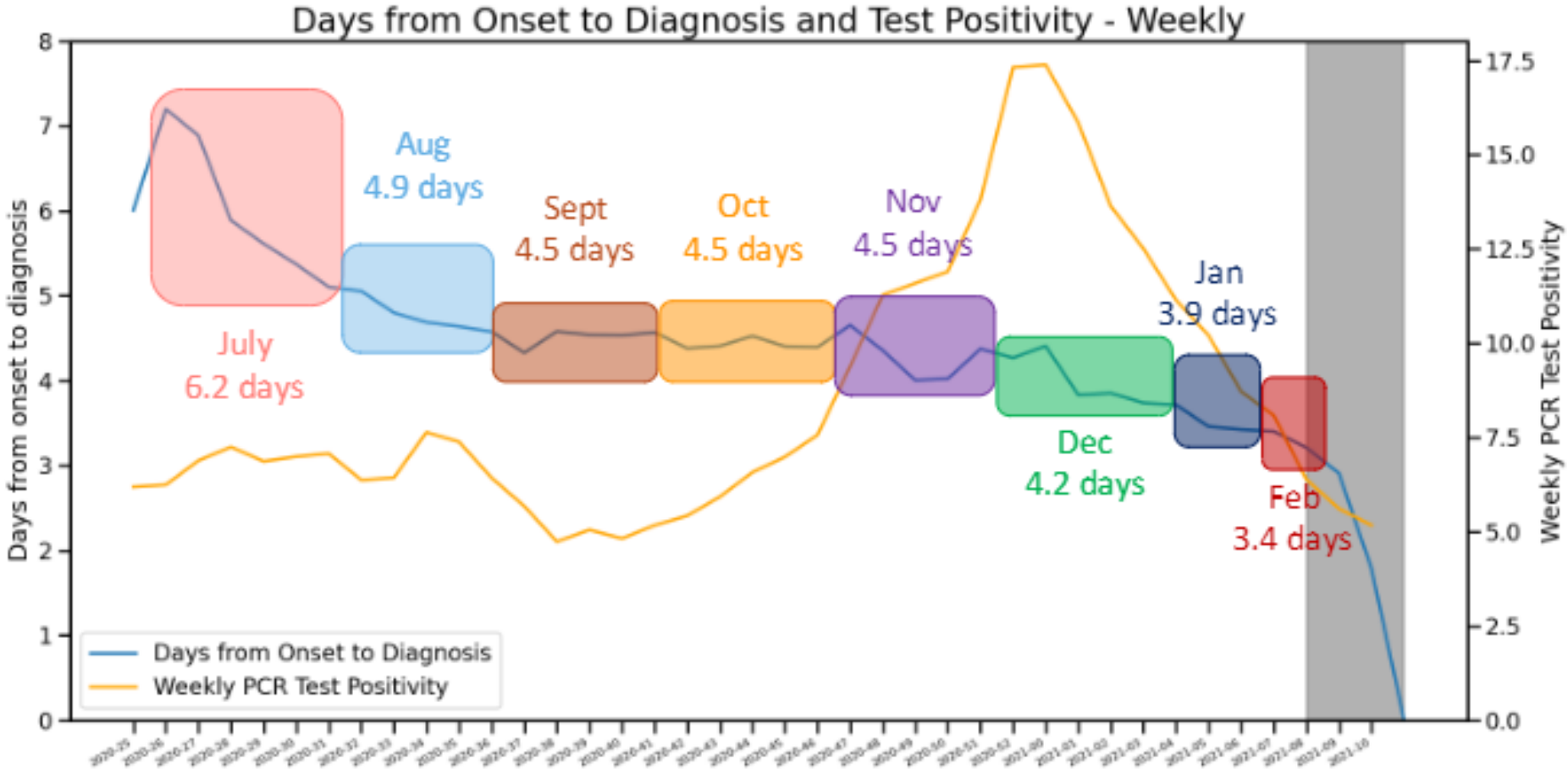
Changes in Case Detection – Symptom Onset to Diagnosis



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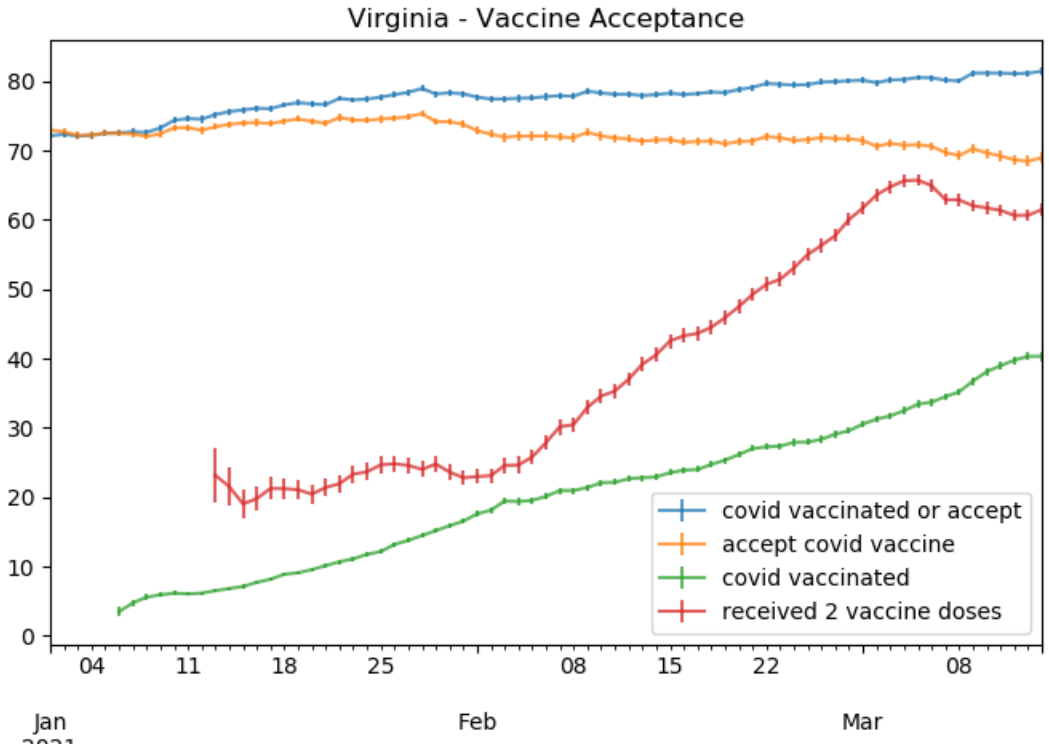
Vaccine Acceptance



Acceptance remains high:

- Proportion of Virginians that would definitely or probably accept vaccination if offered today
- Nearly 80% Virginians have already or will choose to be vaccinated
- Down very slightly from high at end of January, but has been stable for several weeks
- Top reasons for hesitancy: side effects, safety, distrust

COVIDcast Data Explorer
Source: https://covidcast.cmu.edu

Eleven percent of Virginians are fully vaccinated, and an additional eight percent are partially vaccinated

Age	0-9	10--19	20-29	30-39	40-49	50-59	60-69	70-79	80+	Total
Fully Vaccinated	0	5,720	74,659	107,121	121,240	142,352	176,212	192,791	121,626	941,721
% Full	0.0%	0.5%	6.5%	9.1%	11.3%	12.6%	18.0%	31.4%	39.1%	11.0%
Partially Vaccinated	0	6,952	44,093	63,111	74,100	105,839	172,290	173,726	67,895	708,006
% with Partial	0.0%	0.6%	3.8%	5.4%	6.9%	9.4%	17.6%	28.3%	21.8%	8.3%
Confirmed Cases	25,065	59,828	110,118	93,644	84,764	83,567	57,665	31,599	23,150	569,400
% Confirmed Cases	2.5%	5.4%	9.5%	8.0%	7.9%	7.4%	5.9%	5.1%	7.4%	6.7%

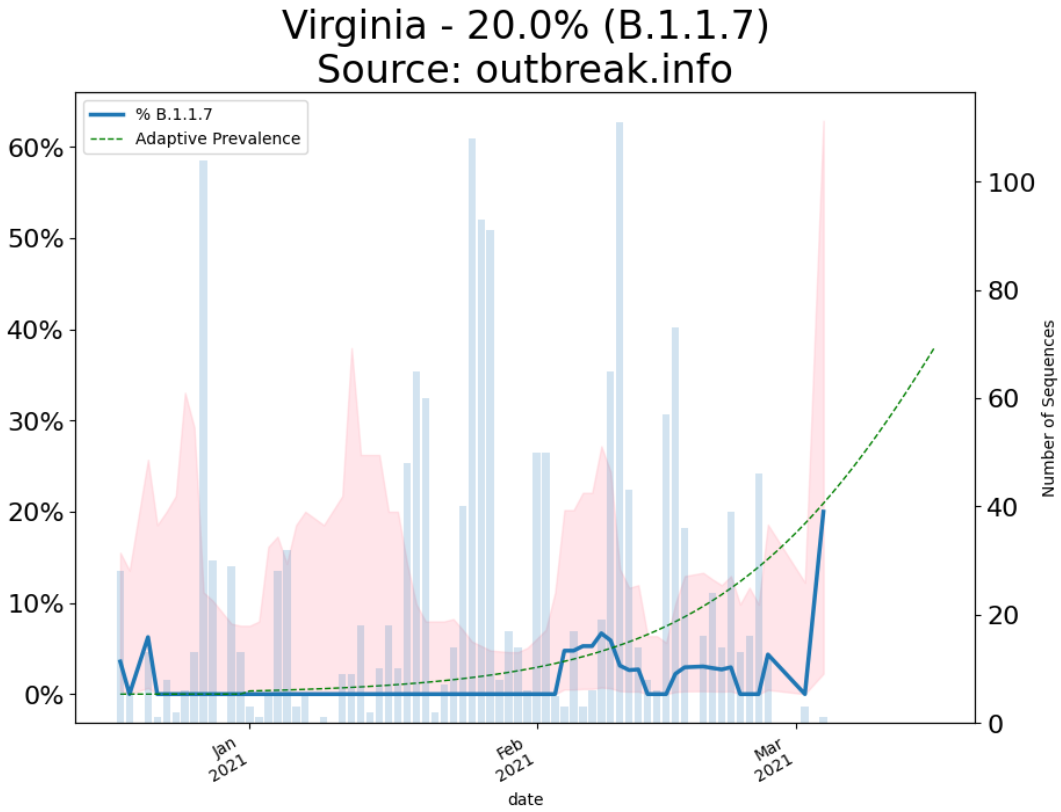
Source: VDH, March 17th

Vaccinations are being rolled out in Virginia

- 3,117,125 doses have been distributed as of March 17th
- Virginia has administered 1,846,094 out of 1,937,600 first doses
- Virginia has administered 964,834 out of 1,179,525 second doses

At some point in the next month or two, vaccine supply will likely be less of a constraint, and growing the vaccination rates will rely on improving demand

Scenarios Variants of Concern



Lineage B.1.1.7

- B.1.1.7 has been detected in Virginia and all other states as of Mar 14th (10-20 day delay for genotyping), and has continued to rapidly grow. Current estimates place national frequency at ~10% and Virginia at 20%
- Virginia is a little below but still within bounds of estimates based on growth rates indicating it will predominate (eg reach 50% frequency) by late March and is 35%-45% more transmissible

GISAID
outbreak.info
Outbreak Info

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Scenarios – Seasonal Effects

- Variety of factors continue to drive transmission rates
  - Seasonal impact of weather patterns, travel and gatherings, fatigue and premature relaxation of infection control practices
- Plausible levels of transmission can be bounded by past experience
  - Assess transmission levels at the county level since May 1, 2020 through September 30, 2020
  - Use the highest and lowest levels experienced (excluding outliers) as plausible bounds for levels of control achievable
  - Transition from current levels of projection to the new levels over 2 months
- Projection Scenario:
  - **Fatigued Control**: Highest level of transmission (95th percentile) increased by additional 5%

Scenarios – Vaccines

- **Administration schedule uses actual administration and expected for the future**
  - Use history of state-specific doses administered as captured by Bloomberg (up to Jan 19th) and CDC (Jan 20th and on)
  - Vaccination rate specific to each county (as obtained through VDH dashboard) vax data in data package
- **Current administration rate used as baseline courses with future supplies estimated to have a 30% increase**
  - **Rate:** 400 FIRST DOSES per 100K per day
    - Total of ~40K 1st doses / day, ~30% increase over current rate
  - **Total Administrations:** This pace leads to eventually reaching 64K administered a day, implying 32K fully vaccinated a day
  - **Location:** Per capita distribution across all counties

Current rollouts and scenarios inspired by MIDAS Network COVID-19 Scenario Hub: https://github.com/midas-network/covid19-scenario-modeling-hub

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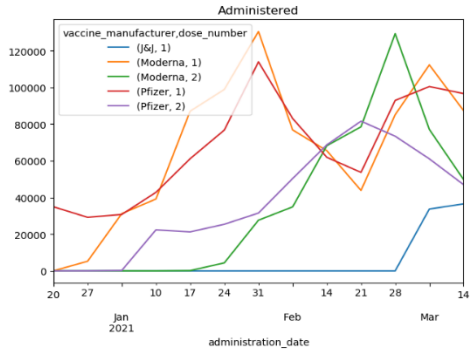
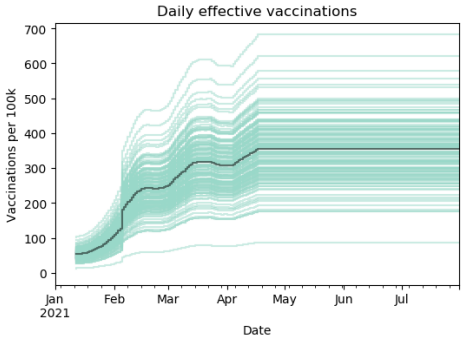
Fluctuations in dosages over time



Modeled Vaccine Induced Immunity



All VA counties, median in black

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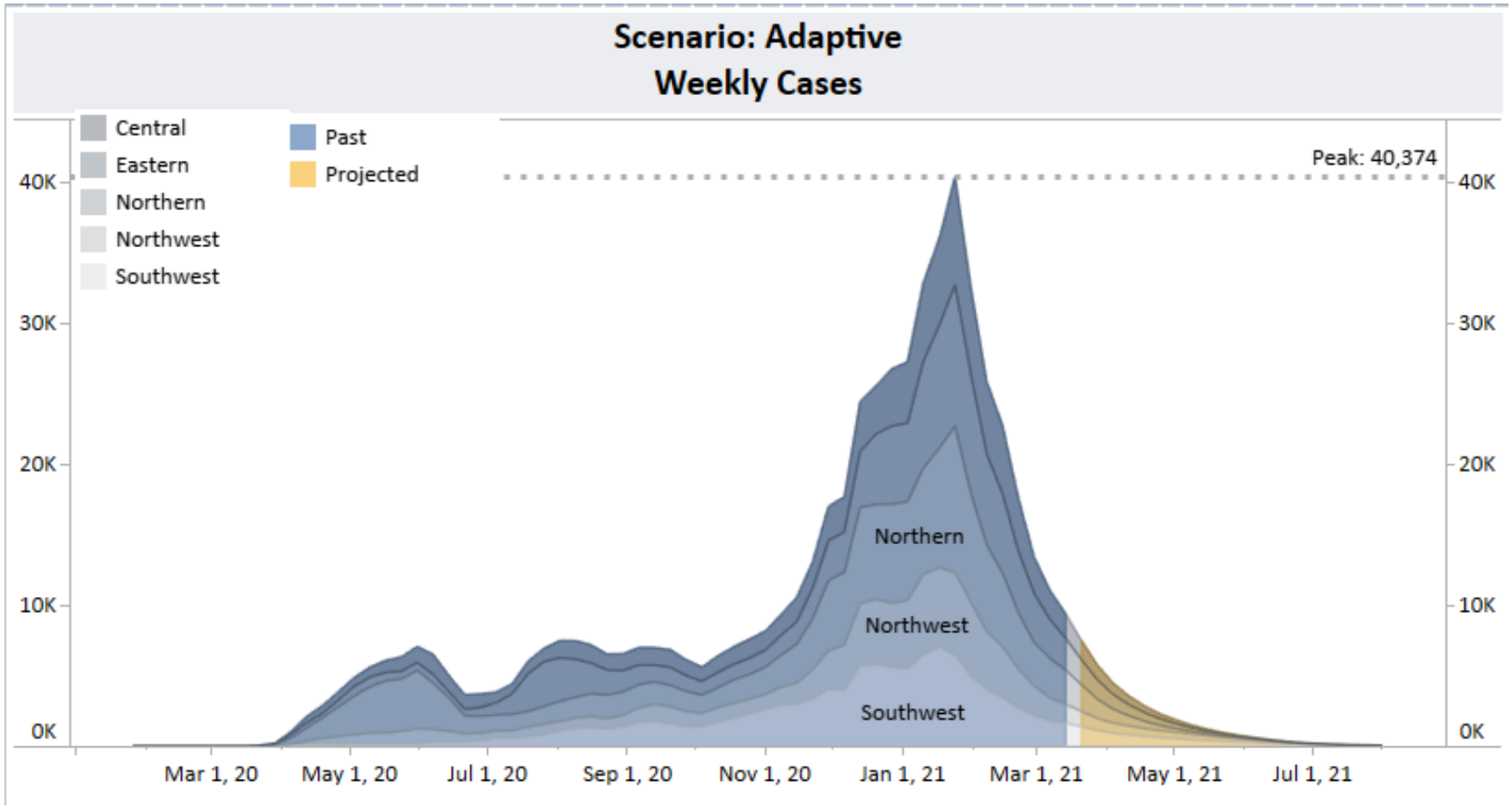
Scenarios

Three scenarios combine these seasonal effects and use the accelerated vaccine schedule

- **Adaptive:** No seasonal effects from base projection
  - If things continue as they are
- **Adaptive-Fatigue Control:** Fatigued control seasonal effects
  - If we revert to slightly worst transmission experienced Summer 2020
- **Adaptive-Variant B117:** Boosting of transmissibility from the emergence of B.1.1.7
  - If new variants begin to predominate and boost transmission, this assumes current seasonal affects remain the same (eg like Adaptive)
- **Adaptive-Fatigue Control-Variant B117:** Fatigued control (Summer Scenario) and transmission boost from B.1.1.7

Counterfactuals with no vaccine ("NoVax") are provided for comparison purposes

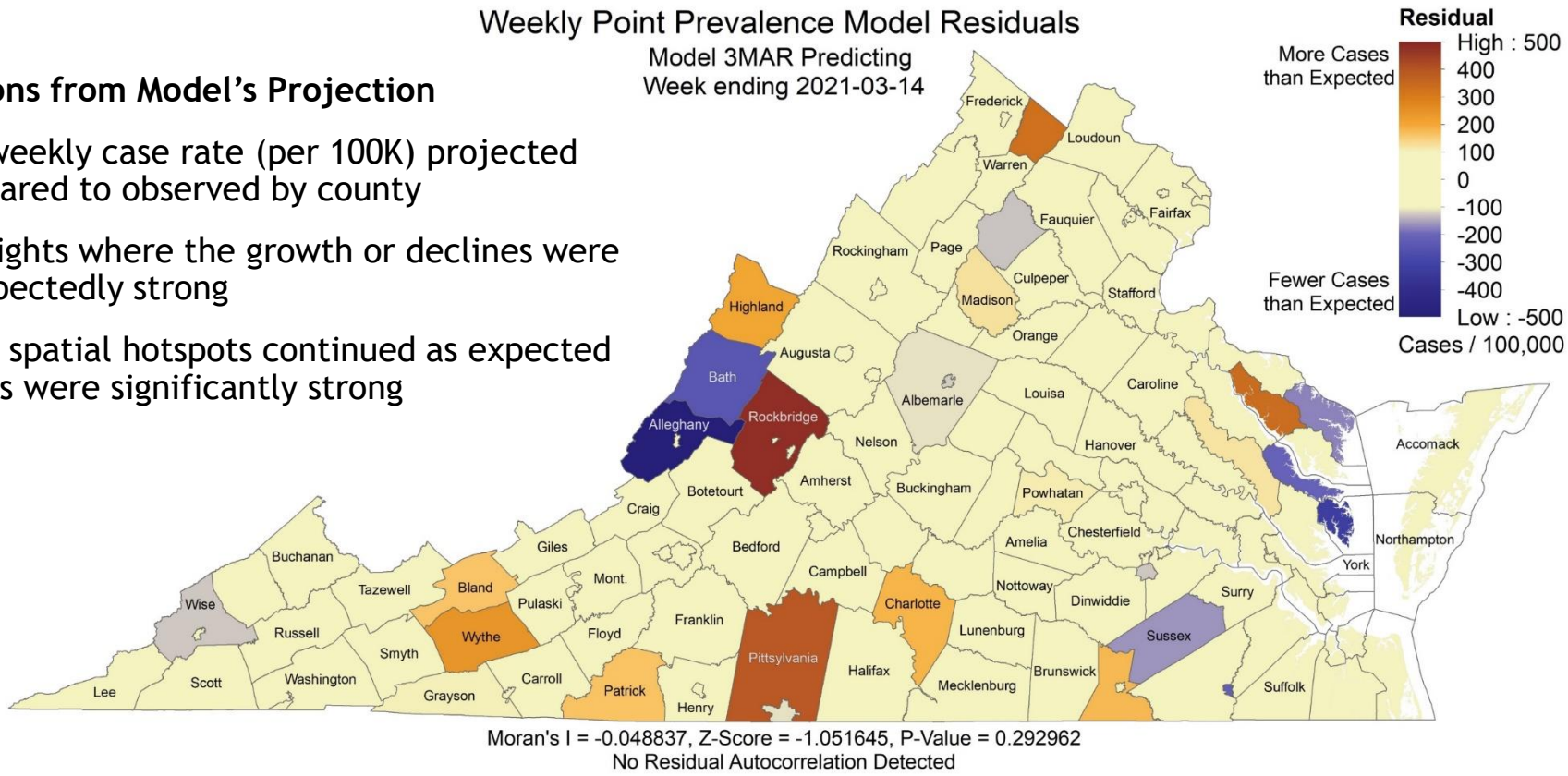
Scale of Projections: Adaptive



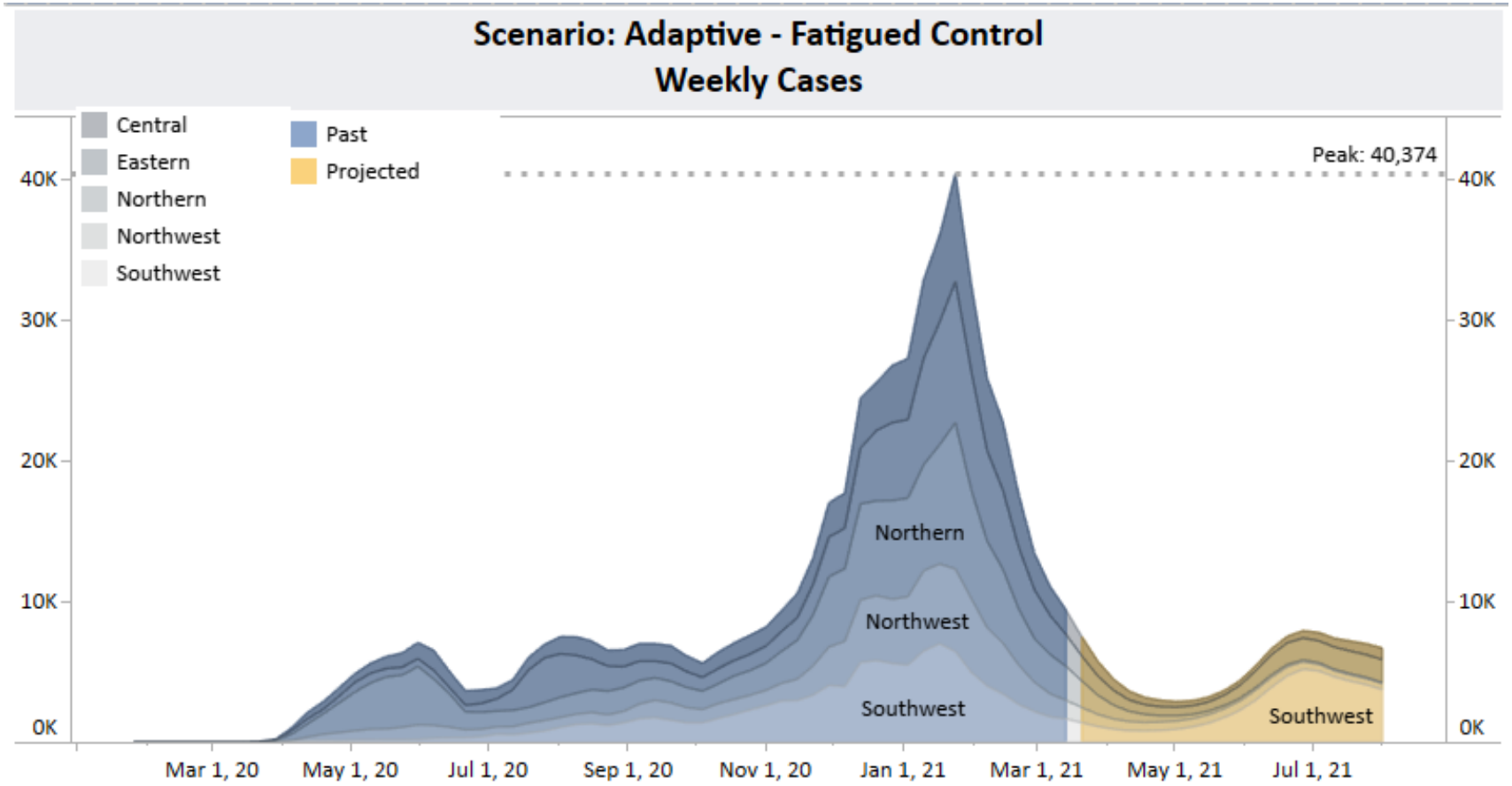
Deviations from Model's Expectations

Deviations from Model's Projection

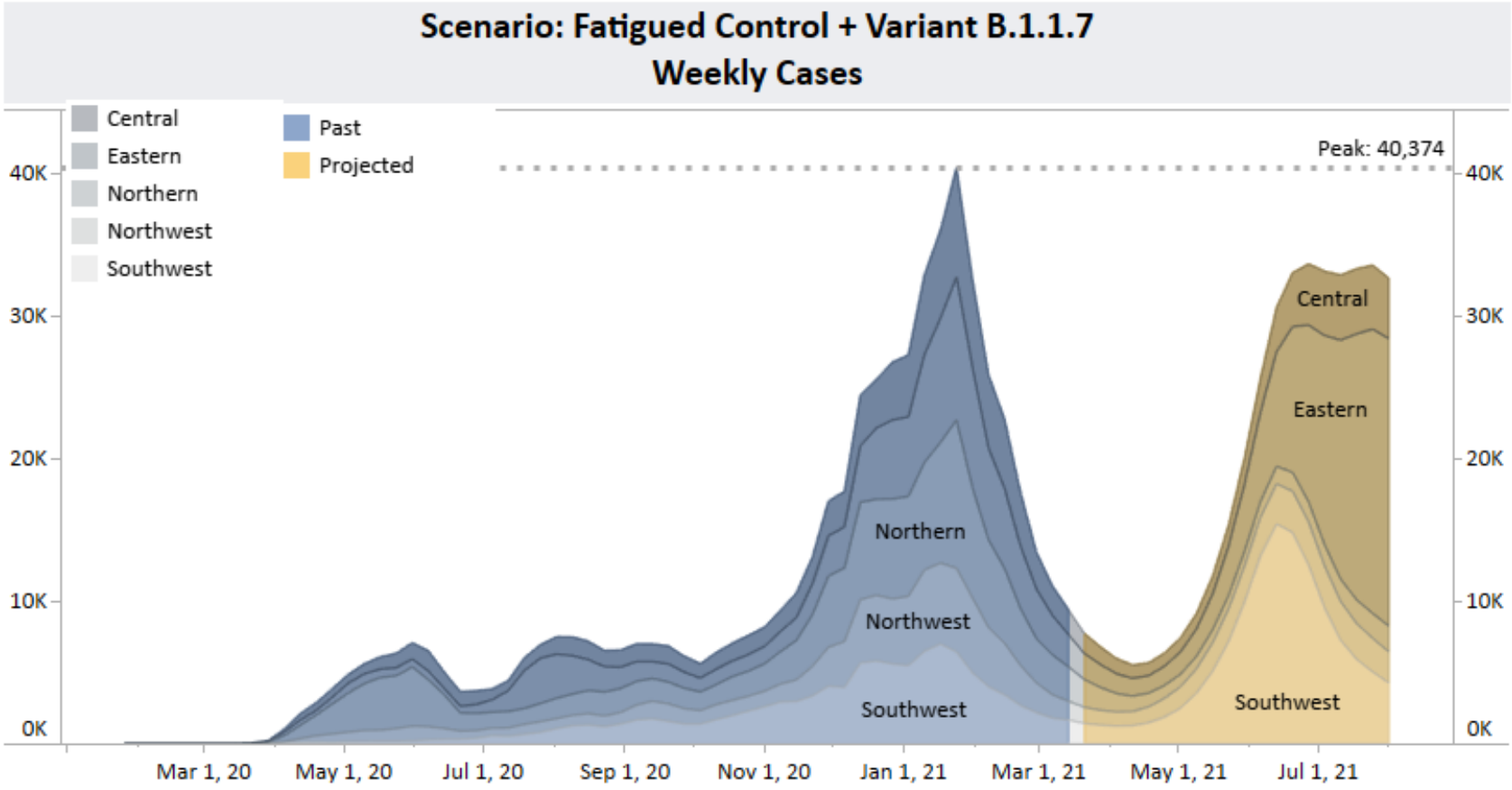
- The weekly case rate (per 100K) projected compared to observed by county
- Highlights where the growth or declines were unexpectedly strong
- Some spatial hotspots continued as expected others were significantly strong



Adaptive: Fatigued Control



Adaptive: Fatigued Control + B.1.1.7



Projections

68 per 100k

Peak Average Daily Cases Week Ending Jan 24, 2021

16 per 100k

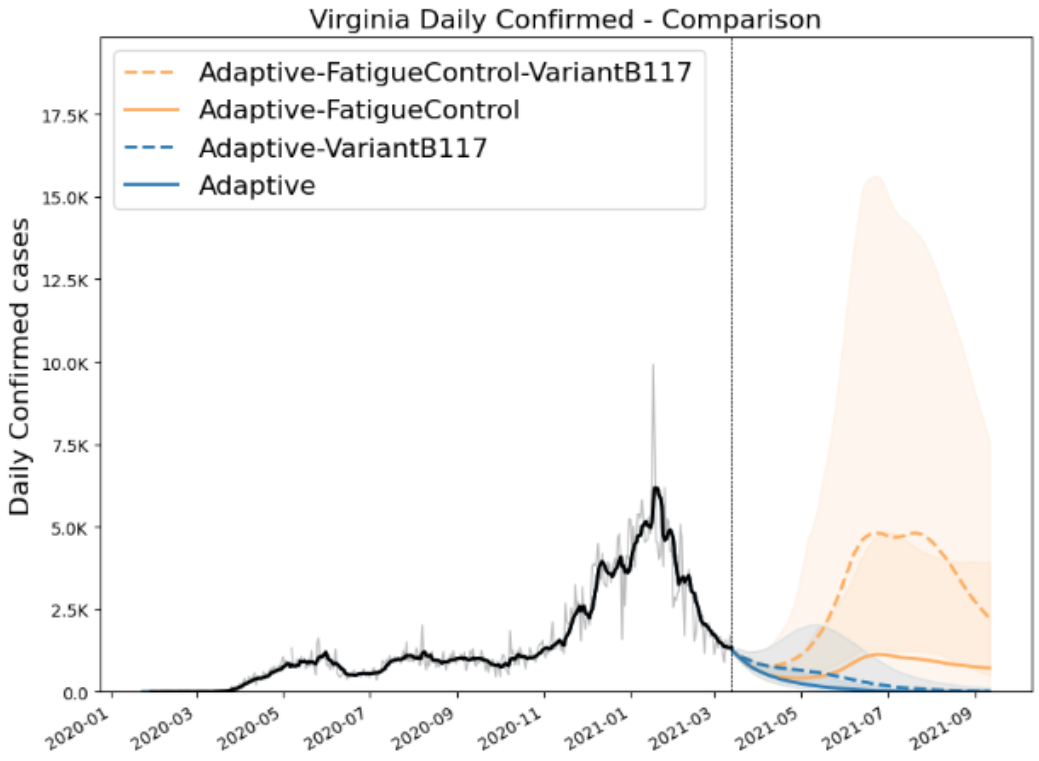
Average Daily Cases Week Ending March 14, 2021

57 per 100k

Potential Peak Average Daily Cases, Week Ending July 27, 2021 with B117 Variant & Pandemic Fatigue

13 per 100k

2020 Summer Peak Week Ending Aug 2, 2020



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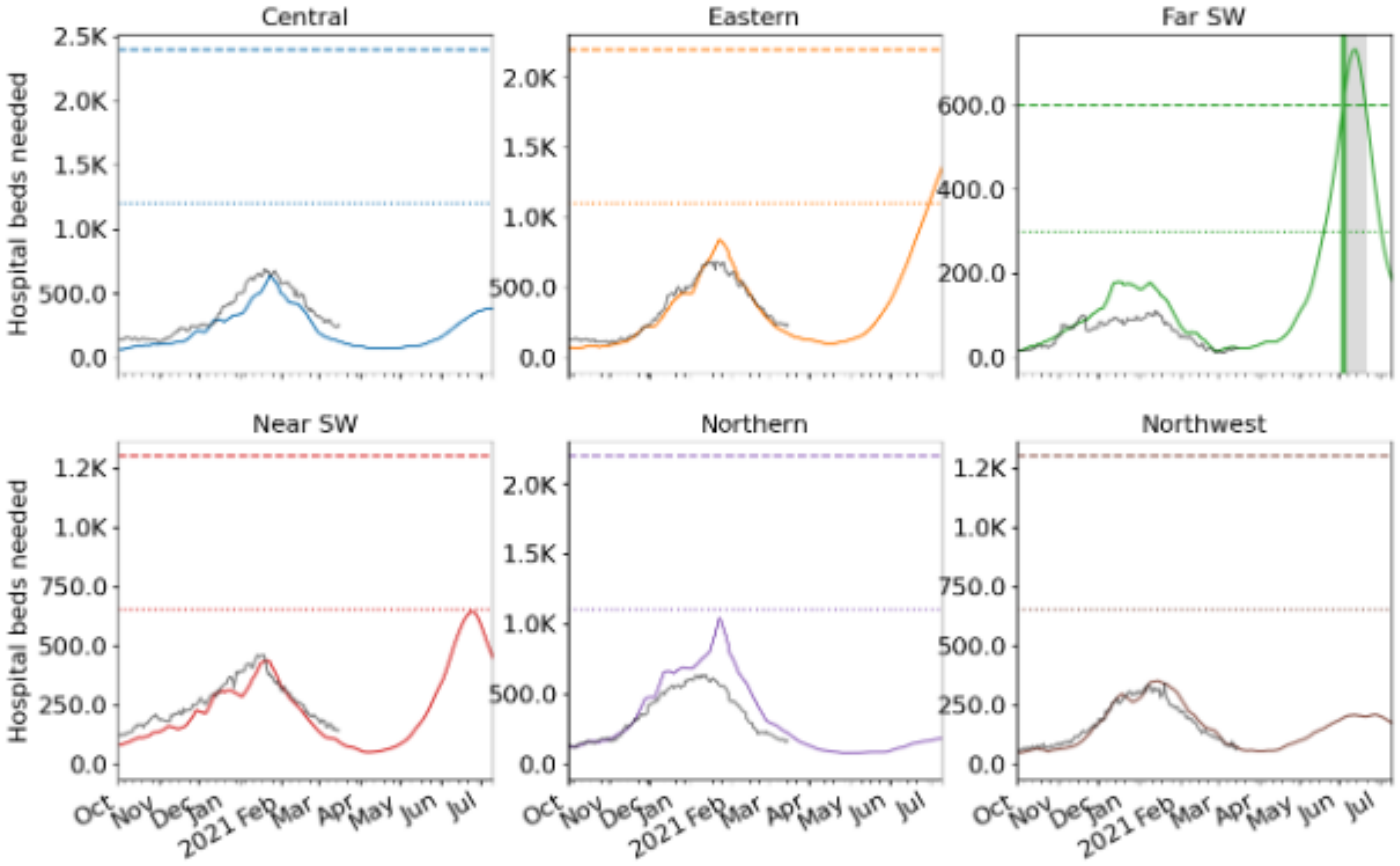
Hospital Demand and Capacity by Region

Capacities by Region – Fatigued Control + B.1.1.7

COVID-19 capacity ranges from 80% (dots) to 120% (dash) of total beds



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* Assumes average length of stay of 8 days

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Where to find modeling results

- **VDH COVID-19 Data Insights**
  https://www.vdh.virginia.gov/coronavirus/covid-19-data-insights/
  - **Model Explorer (Wed)**
  - **UVA Biocomplexity Institute Slides (Fri)**
  - **RAND Slides (Fri)**
  - **Weekly Update (Fri)**

- COVID-19 Medical Resource Demand Dashboard
  https://covid19.biocomplexity.virginia.edu/dashboards
  - Hospital Capacity Scenarios

- Internal Dashboards
  - Transmission Rates (R0) (Wed)
    https://dataviz.vdh.virginia.gov/#/views/TransmissionRate/Dashboard1
  - Google Mobility Report (Wed)
    https://dataviz.vdh.virginia.gov/views/GoogleMobility/Dashboard1
  - Detailed Internal Model (Wed)
    https://dataviz.vdh.virginia.gov/views/DailyModelInternal_15908727184890/AllModelResults?iframeSizedToWindow=true&:embed=y&:showAppBanner=false&:display_count=no&:showVizHome=no