MODELING UPDATE

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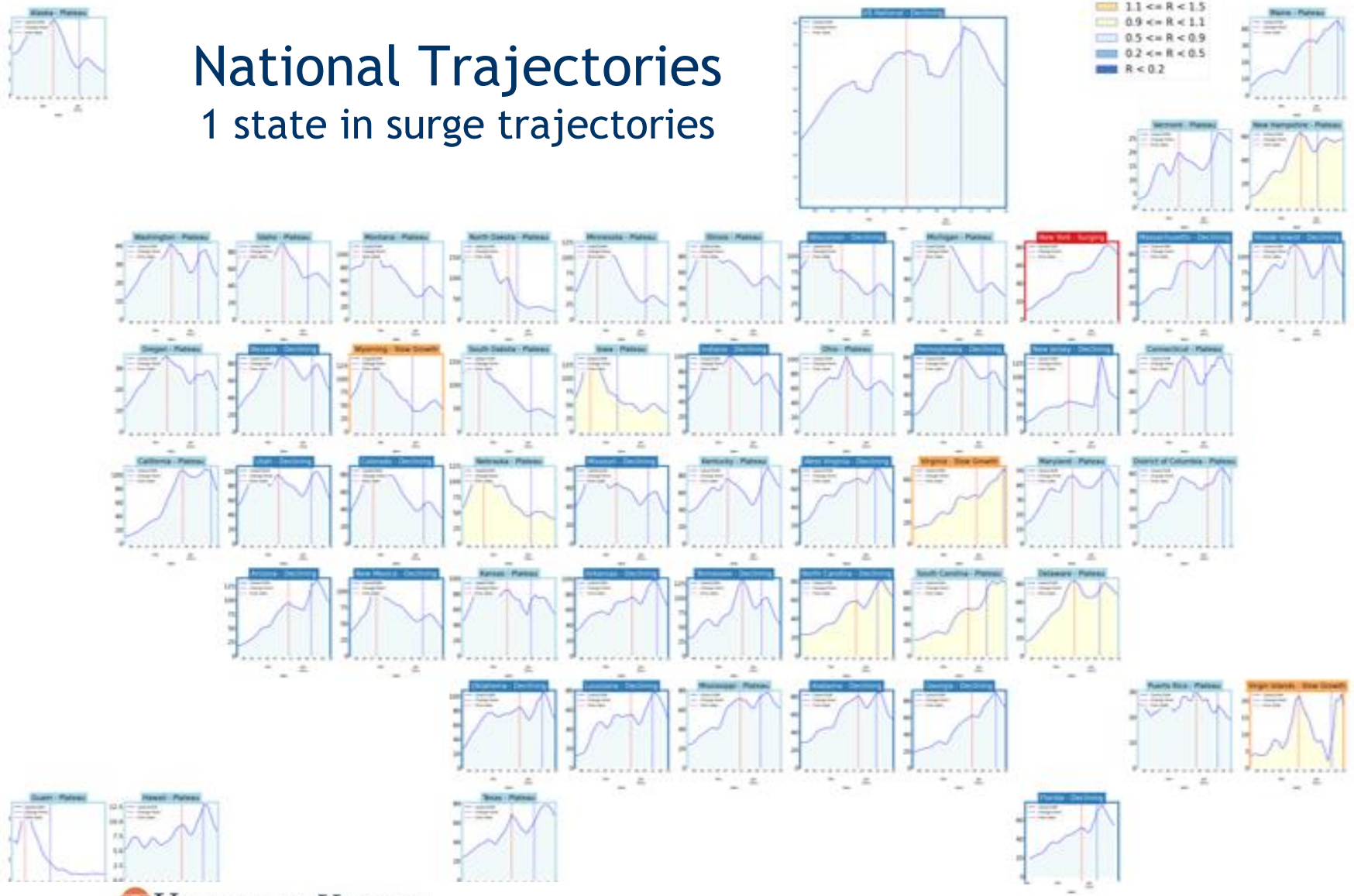
To protect the health and promote the well-being of all people in Virginia.

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 trajectories



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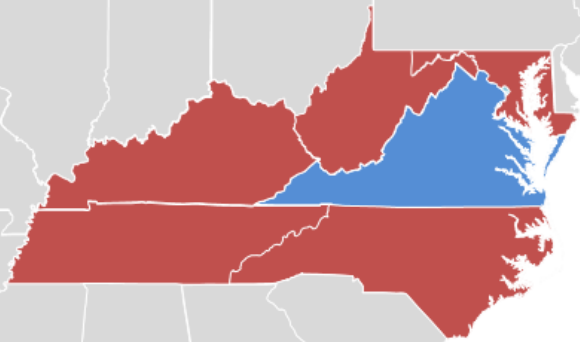
The spread has declined in most neighboring states

Over the last 7 days, Virginia had 53.7 (-26% from last week) new confirmed cases per day per 100,000



Very high case loads (>20):

- North Carolina (66.5 new cases per 100k, +7% from last week)
- Kentucky (61.3, -17%) *
- West Virginia (48.1, -20%)
- Tennessee (47.4, -25%)*
- Maryland (35.3, -6%)
- District of Columbia (29.8, -28%)

*Test positivity rates above 10%

High case loads (10-20): None

Lower case loads (<10): None

These data were updated January 26th and represent a seven-day average of the previous week

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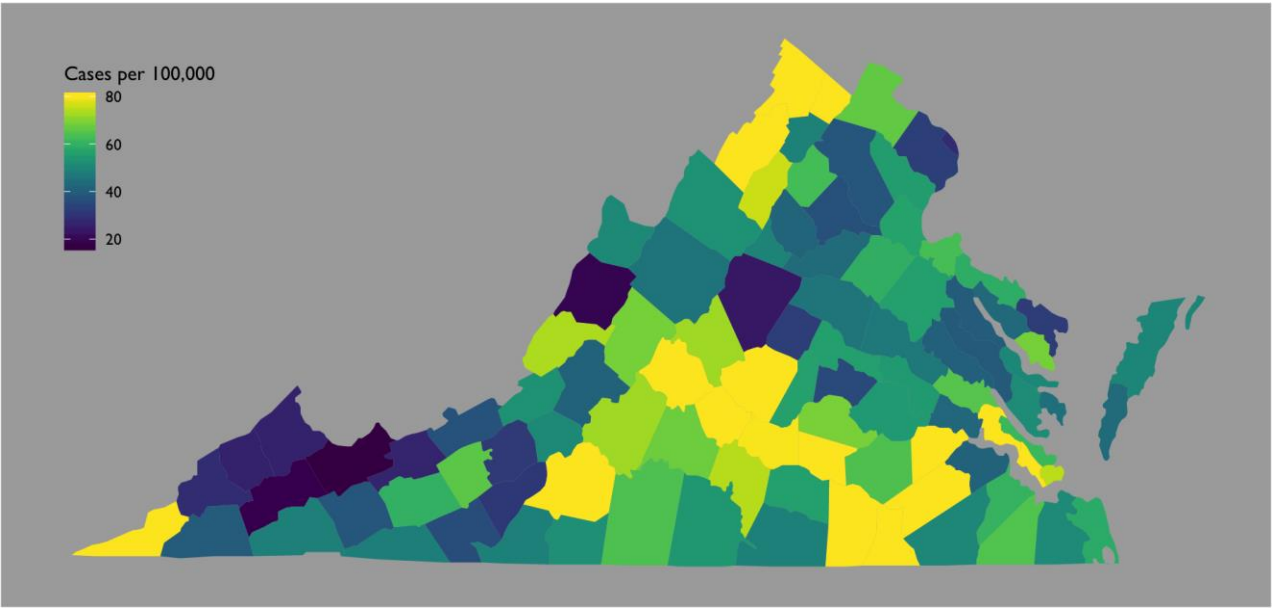
Case levels have declined but remain very high across the Commonwealth

CASE COUNT

Source: VDH



Yellow indicates at least 80 cases per 100,000

Case levels have declined across the Commonwealth

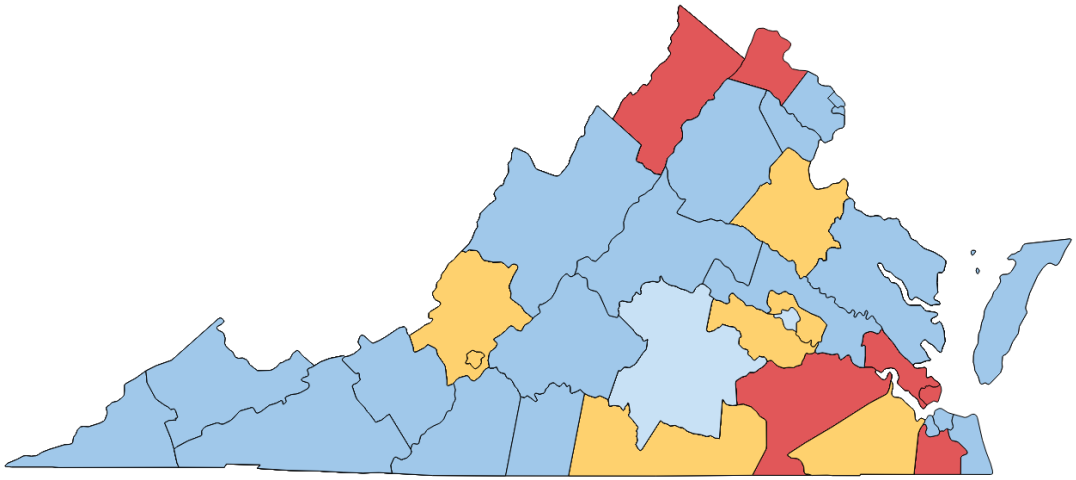
- 74 percent of counties have more than 40 cases per 100,000
- 6 percent have more than 100 cases per 100,000

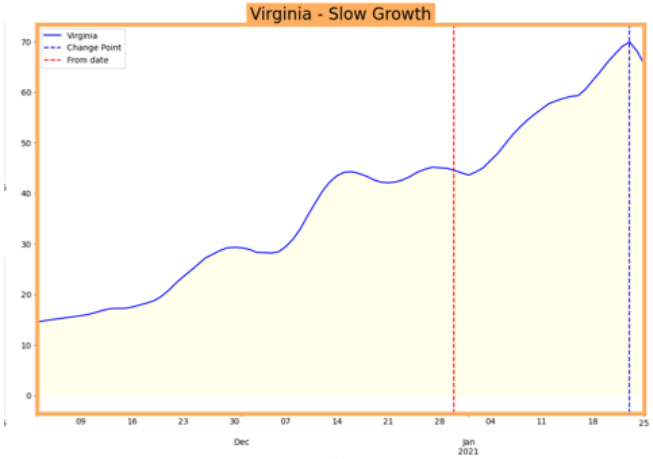
Cases in the Far Southwest region have declined substantially

These data were updated January 26th and represent a seven-day average of the previous week

Health Districts in Surge

Status	# Districts (prev week)
Declining	20 (10)
Plateau	2 (1)
Slow Growth	7 (11)
In Surge	6 (13)





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

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VA state-wide RE with 7 day moving window by confirmation date 01/25/21

Region	R_e Jan 25	Weekly Change
State-wide	**0.809**	**-0.340**
Central	0.820	-0.398
Eastern	0.942	-0.167
Far SW	0.698	-0.109
Near SW	0.746	-0.351
Northern	0.708	-0.636
Northwest	0.910	-0.010

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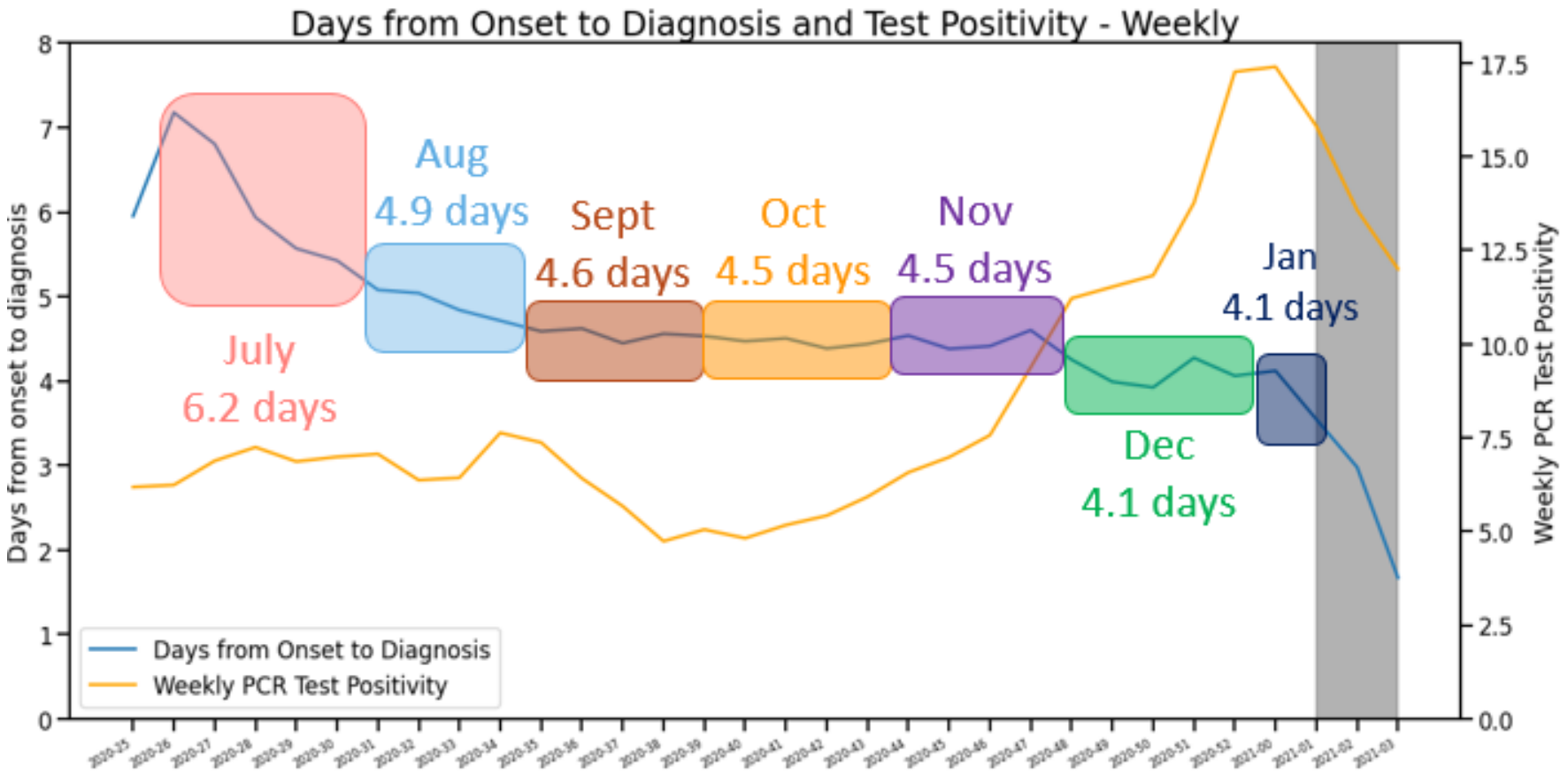
Changes in Case Detection – Symptom Onset to Diagnosis



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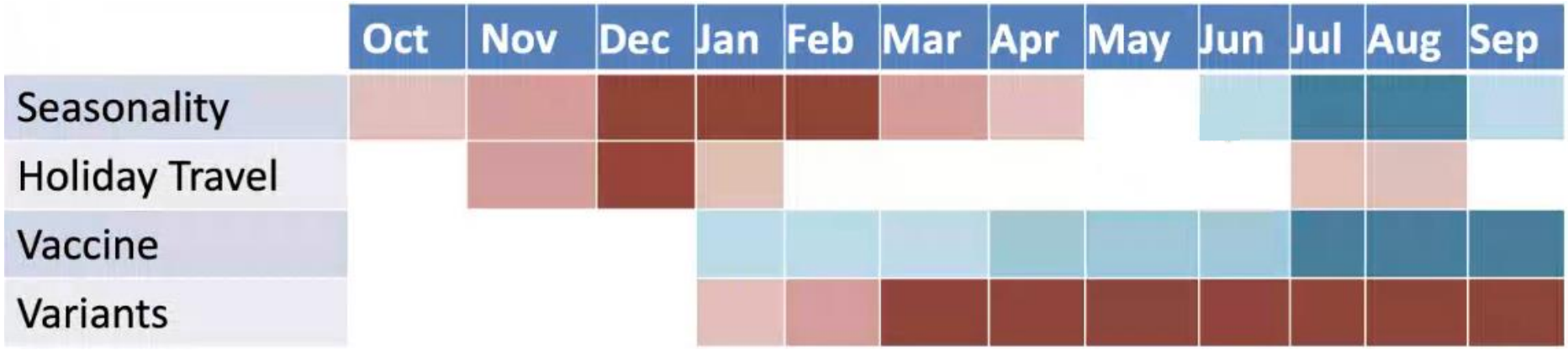
Risks



Large Increase
Medium Increase
Small Increase
Little Change
Small Decrease
Medium Decrease
Large Decrease

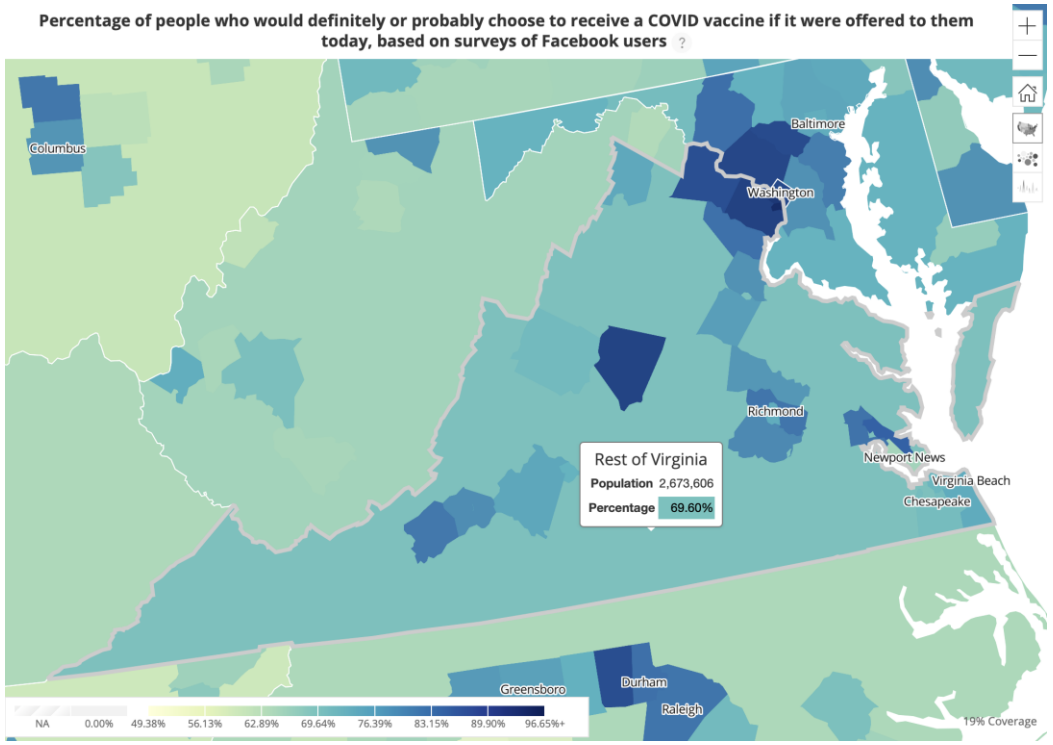
There are several factors that will continue to drive the spread for the next few months

- Seasonal effects for COVID-19 appear to be driving spread as it gets colder
- Holiday activities appear to have increased spread
- The vaccines are becoming available but are not being delivered in quantities sufficient to meaningfully reduce the spread for now
- The B.1.1.7 Variant of Concern or other COVID variants may increase the rate of spread or change the severity as they enter Virginia

Vaccine Acceptance

Facebook administered survey: Percent of people who would definitely or probably choose to receive a COVID vaccine if offered today

VA typically achieves 50-60% coverage with seasonal influenza vaccine (typically over the course of 3 months)



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

Scenarios – Seasonal Effects

- Variety of factors continue to drive transmission rates
  - Seasonal impact of weather patterns, travel and gatherings related to holidays, fatigue with infection control practices
- Plausible levels of transmission can be bounded by past experience
  - Assess transmission levels at the county level since May 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
- New planning Scenarios:
  - **Best of the Past**: Lowest level of transmission (10th percentile)
  - **Fatigued Control**: Highest level of transmission (95th percentile) increased by additional 5%

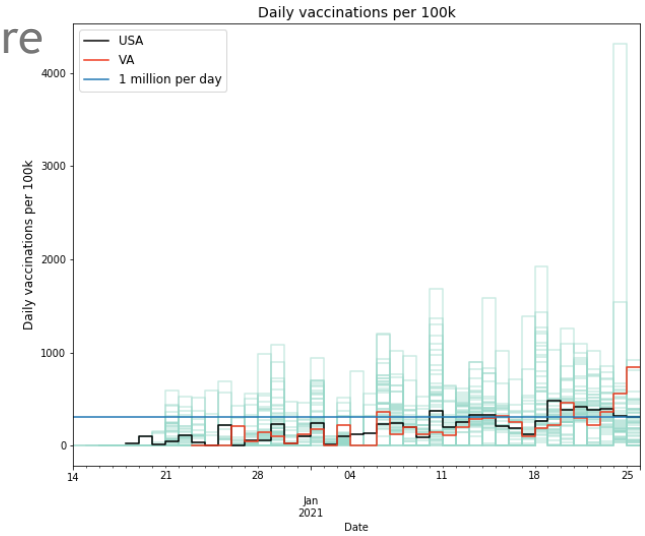
Scenarios – Novel Variants

- Several novel variants of SARS-CoV2 are being tracked
  - Some are more transmissible, some may escape immunity from previous natural infection and/or vaccination, others may be more severe
- New Variant B.1.1.7 is best understood and is in Virginia
  - Several different studies have estimated the increase in transmission to be 30-55%, we use 50% increase from the current baseline projection
  - Gradually replace the current transmissibility with the augmented transmissibility over the course of 4 months as estimated by a recent MMWR report from CDC
- Additional planning Scenarios:
  - **NewVariants**: Current projected transmissibility increases gradually over 4 months to level 50% more transmissible

Scenarios – Vaccines

- Vaccination has started, and efforts are underway to increase its pace
  - Exact achievable rollouts and level of coverage are unknown
- Vaccine efficacy varies over course of vaccine
  - FDA EUAs show 50% efficacy achieved 2 weeks after 1st dose, and 95% 2 weeks after 2nd
  - Assuming 3.5 week (average of Pfizer and Moderna) gap between doses
- Vaccine hesitancy poses a future problem
  - Currently demand far outpaces supply so we assume all courses will be administered until we reach the hesitancy threshold, for 50% with 25M per month this is reached in Aug 2021.

US Vaccination Rates



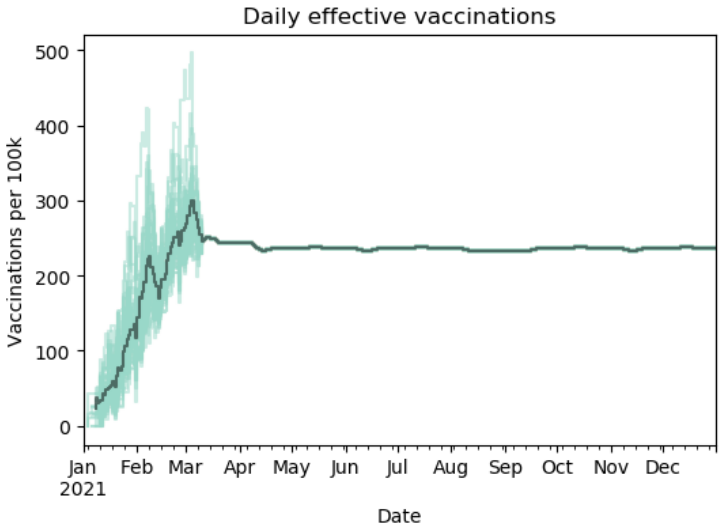
Line represents 1M doses a day goal

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

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 24)
  - Future courses based on current goals and consensus
    - **Rate**: 25M started per month in US, ~250 /100K a day
    - **Location**: Per capita distribution across all counties
  - Rates in VA for Jan 17-24 are ~420 doses administered /100K a day (some are 2nd doses)

Modeled Vaccine Induced Immunity



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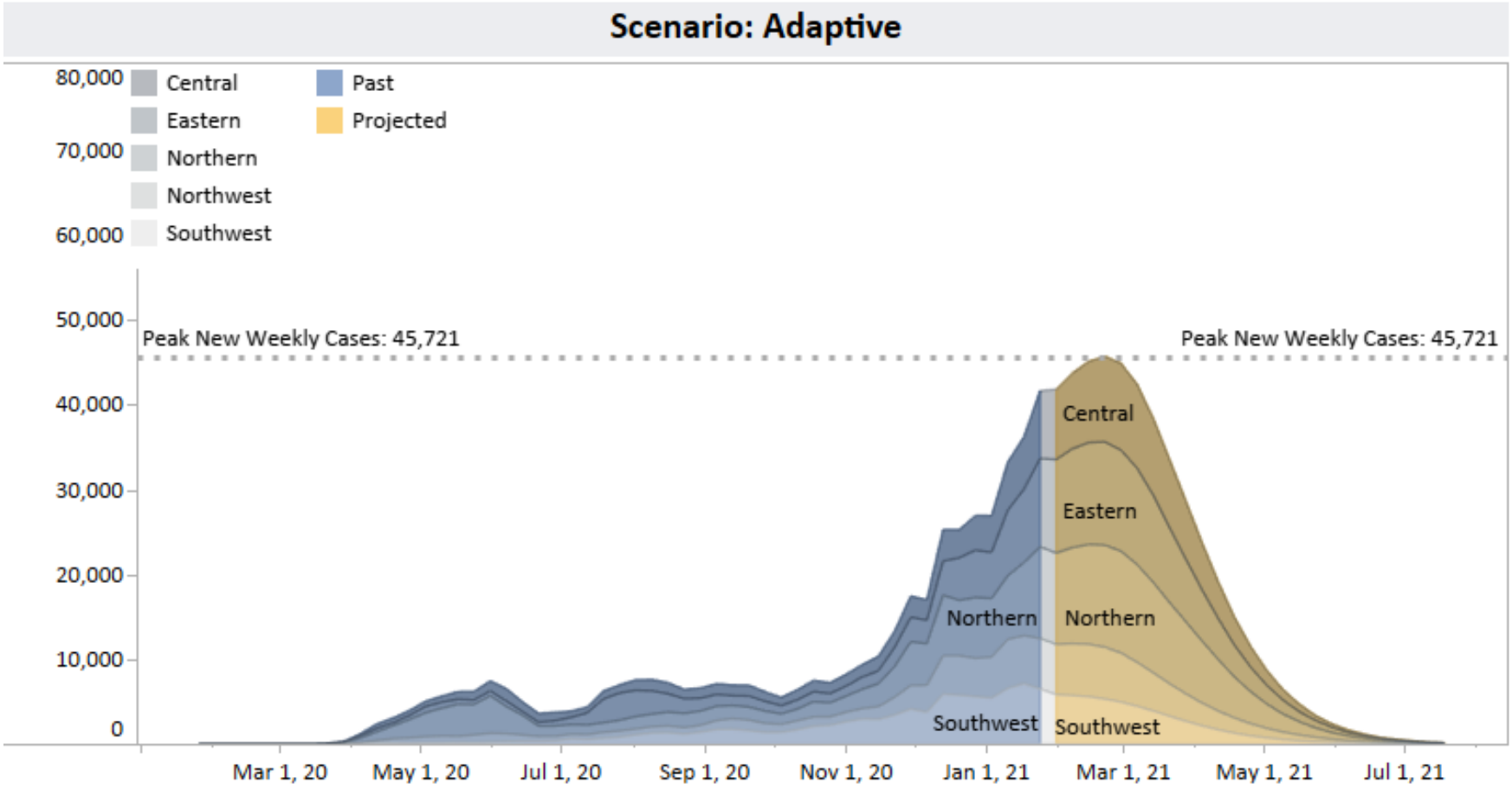
Scenarios – Seasonal Effects and Vaccines

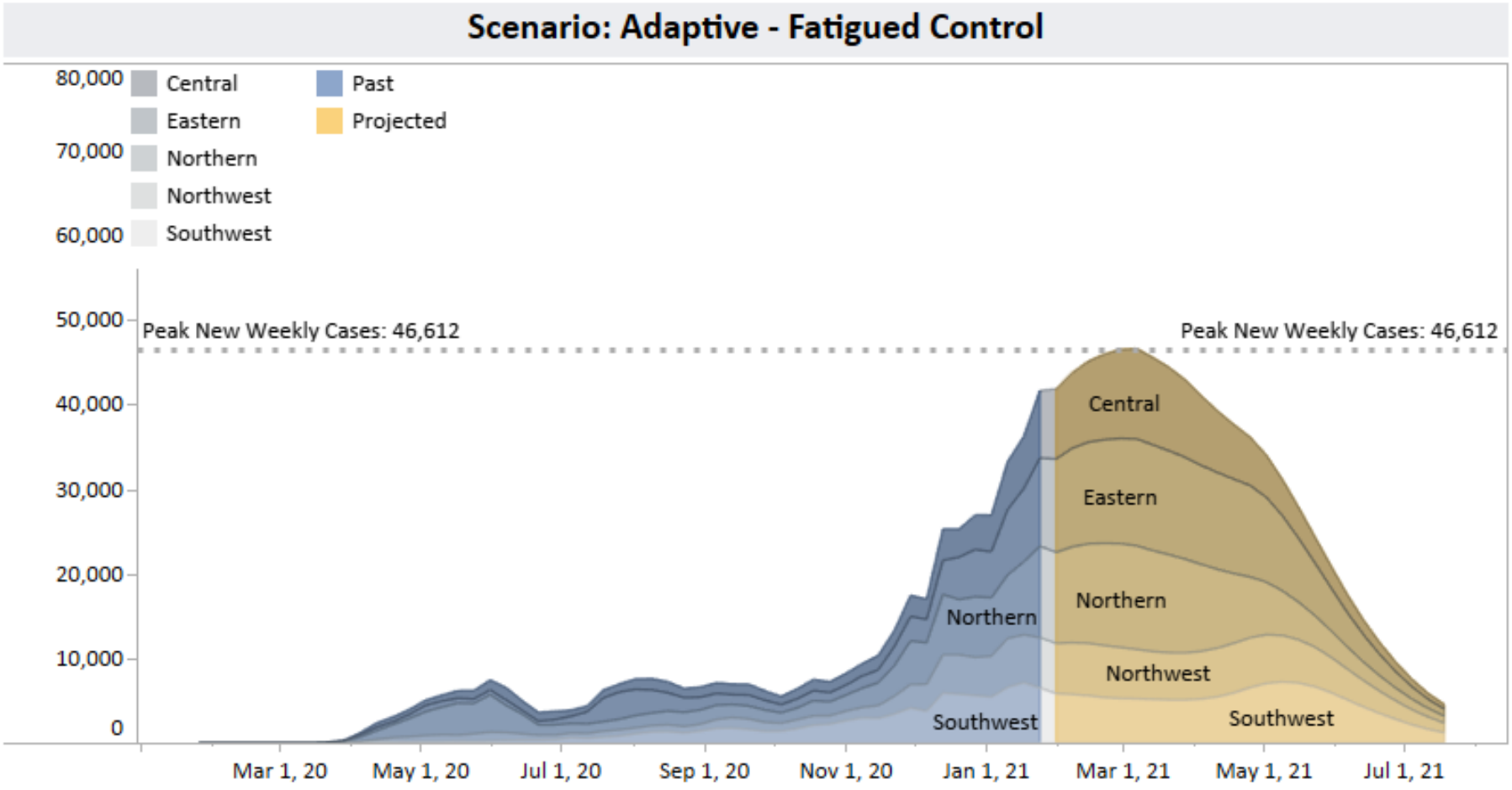
Three scenarios combine these seasonal effects and use the updated vaccine schedule

- **Adaptive**: No seasonal effects from base projection
  - If things continue as they are
- **Adaptive-FatigueControl**: Fatigued control seasonal effects
  - If we revert to slightly worst transmission experienced in last 6 months
- **Adaptive-BestPastControl**: Best of the past control seasonal effects
  - If we revert to best control experienced in last 6 months
- **Adaptive-NewVariants**: Boosting of transmissibility from the emergence and eventual ubiquity of more transmissible variants
  - If new variants begin to predominate and boost transmission, this assumes current seasonal affects remain the same (eg like Adaptive)
- Counterfactuals with no vaccine ("NoVax") are provided for comparison purposes

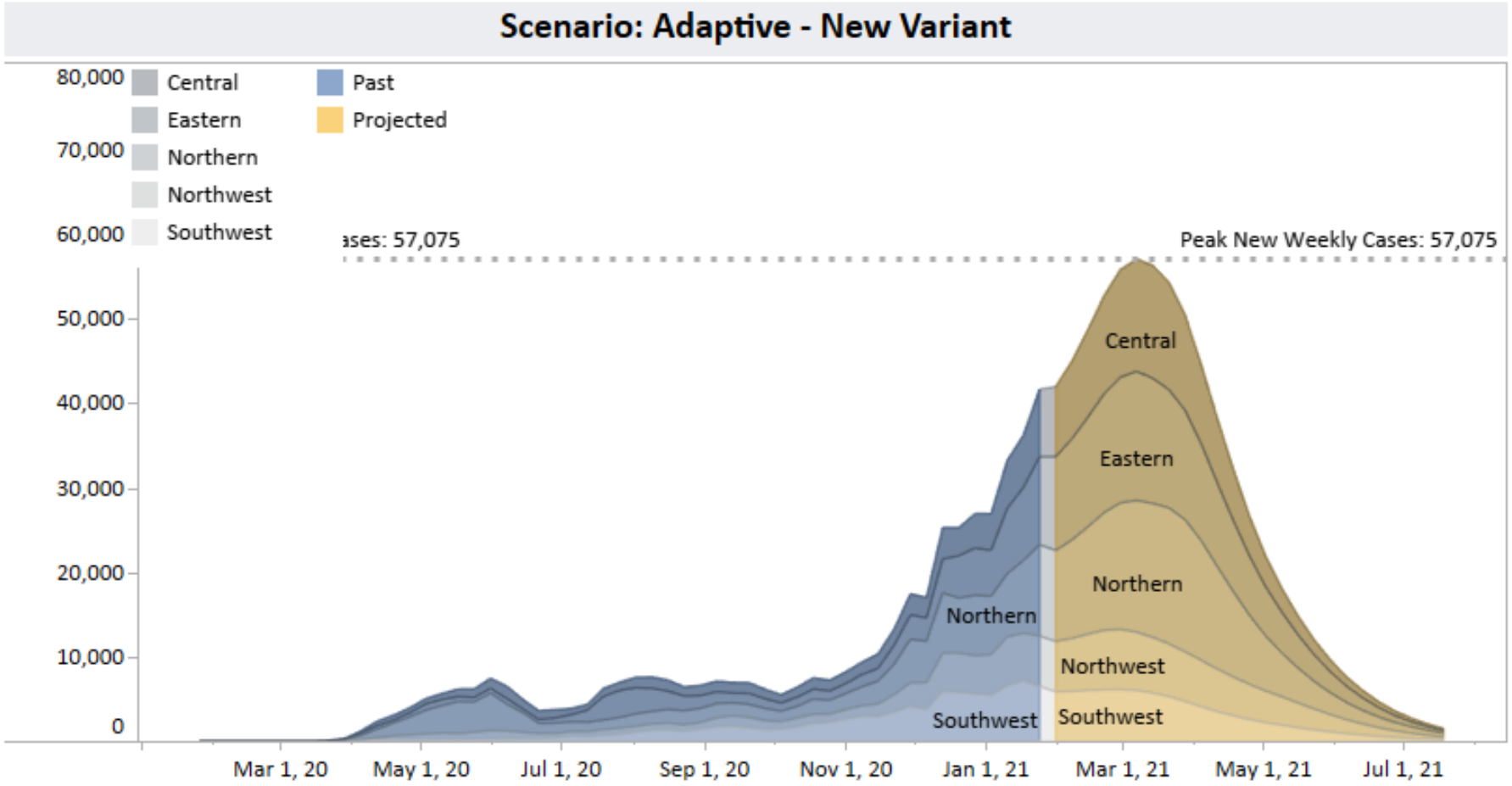
Scale of Projections: Adaptive



Adaptive: Fatigue Control



Adaptive: New Variant



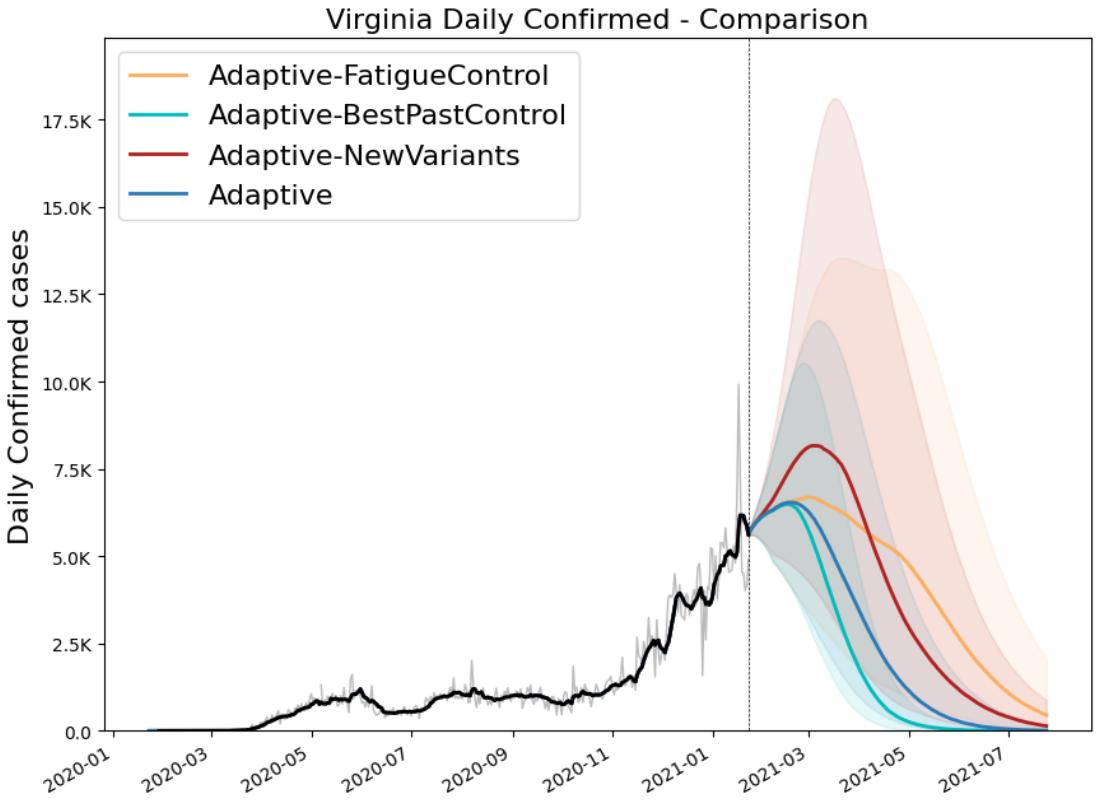
Projections

- Current Course
- “Adaptive fitting” approach
  - **Feb 21: 45,721**

Two “what-if” scenarios:

- Best Past Control
  - **Feb 21: 45,170**
- Fatigue Control
  - **Mar 7: 46,612**
- New Variant
  - **Mar 7 ~57,000 Cases Weekly Cases**

Virginia Projections



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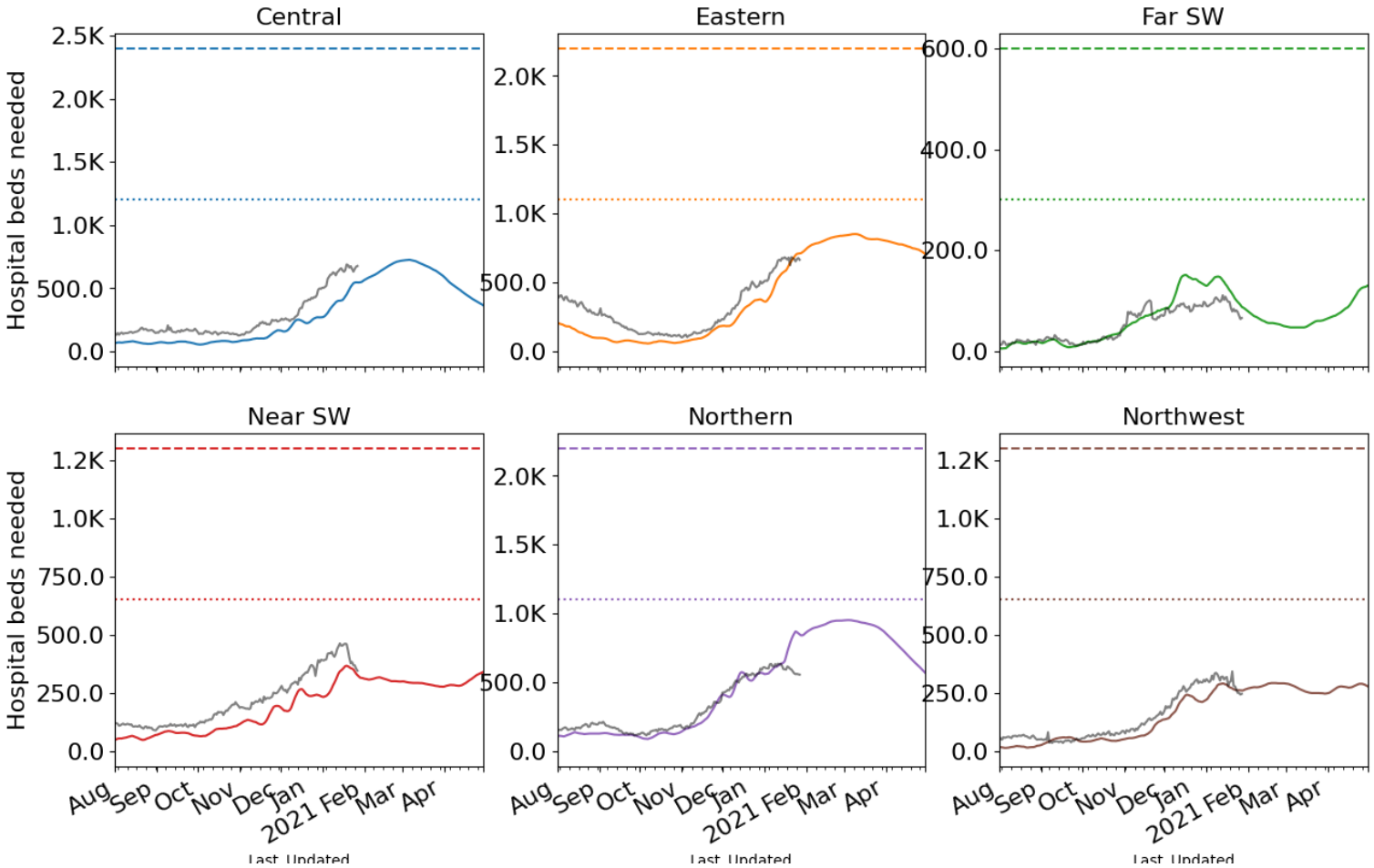
Hospital Demand and Capacity by Region

Capacities by Region - Adaptive

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