Modeling & Forecasting COVID-19 in NM

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August 9, 2021

NNSA
National Nuclear Security Administration

10 Aug 2021: EpiGrid modeling

- NM daily incidence is rapidly increasing, likely due to B.1.617.2's high level of contagiousness. Localized low-vaccine outbreaks are transforming into regional/county outbreaks. *This model is unlikely to be pessimistic unless vaccination and/or mitigation improves.*

- NM deaths similar to model.
    - The model does not account for better vaccination of cohorts with higher death rates, nor the compensating effect of B.1.617.2/Δ (Present) and B.1.1.7/α (Past). This implies that disease severity is increasing.

United States__New Mexico
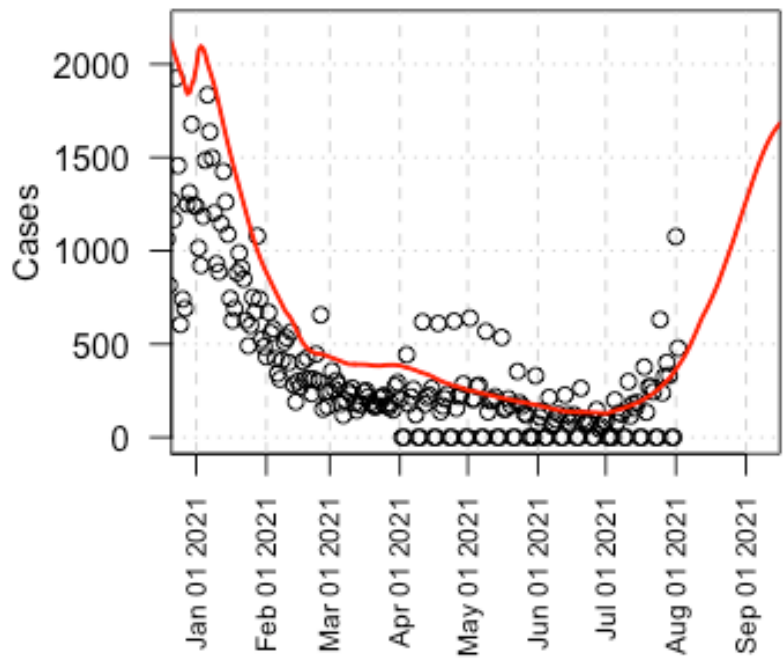
United States__New Mexico
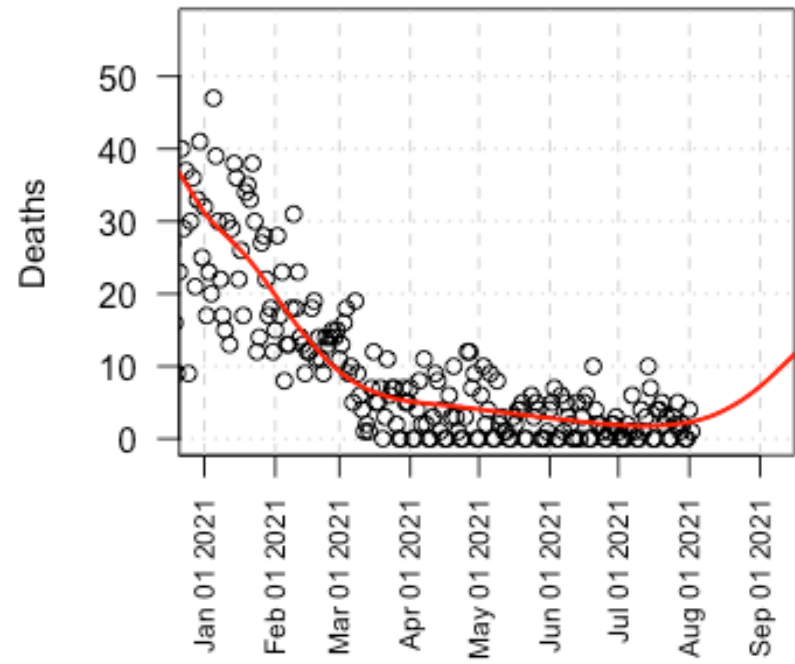
A look at the raw incidence data

- Sunday, Monday
- Tuesday
- Wednesday/Thursday
- Friday
- Saturday
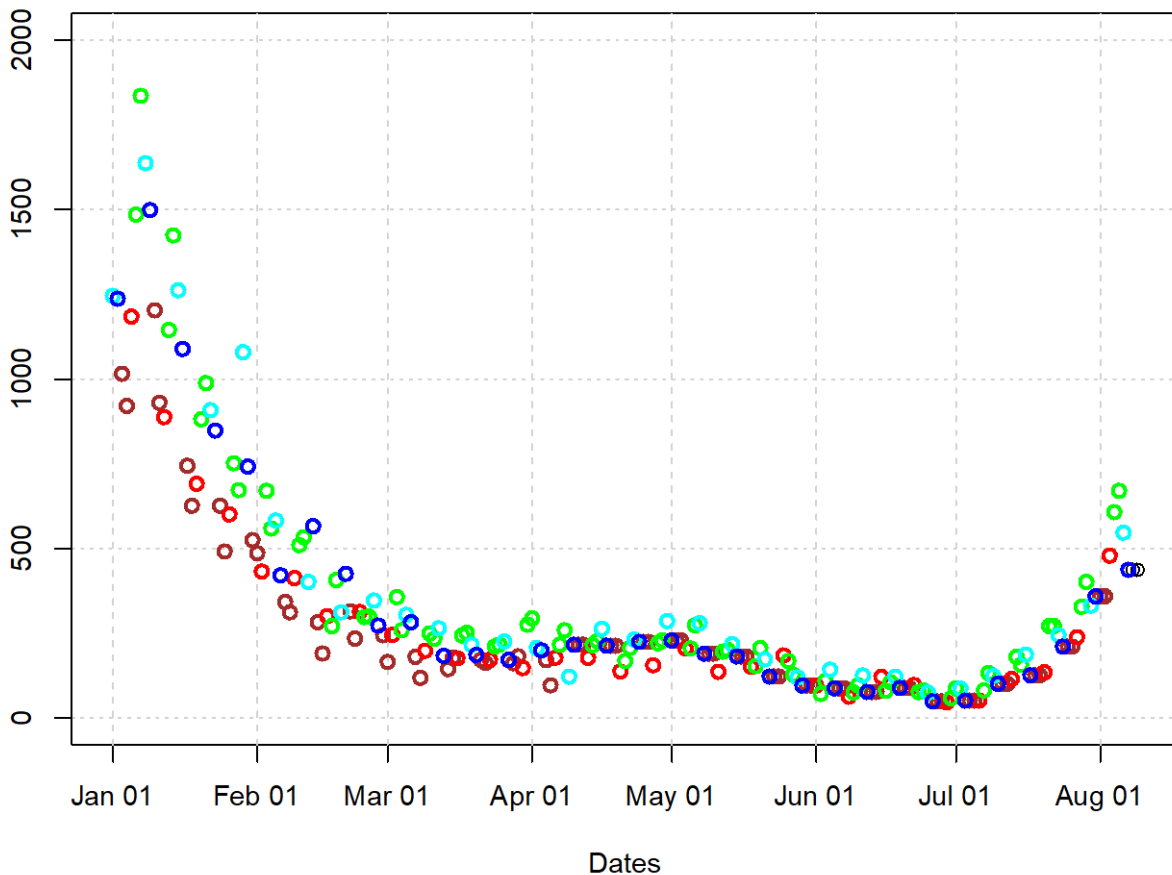
Cases rates are rising rapidly.

The 190 cases in the Lea county correctional facility are removed from data reported on March 26th. The 1/3 of reported cases that were > 2 weeks prior were removed from March 24th. Case reported for weekends starting April 10-12th are each divided by 3 to estimate individual day counts.

New Zealand-level of cases here on this plot
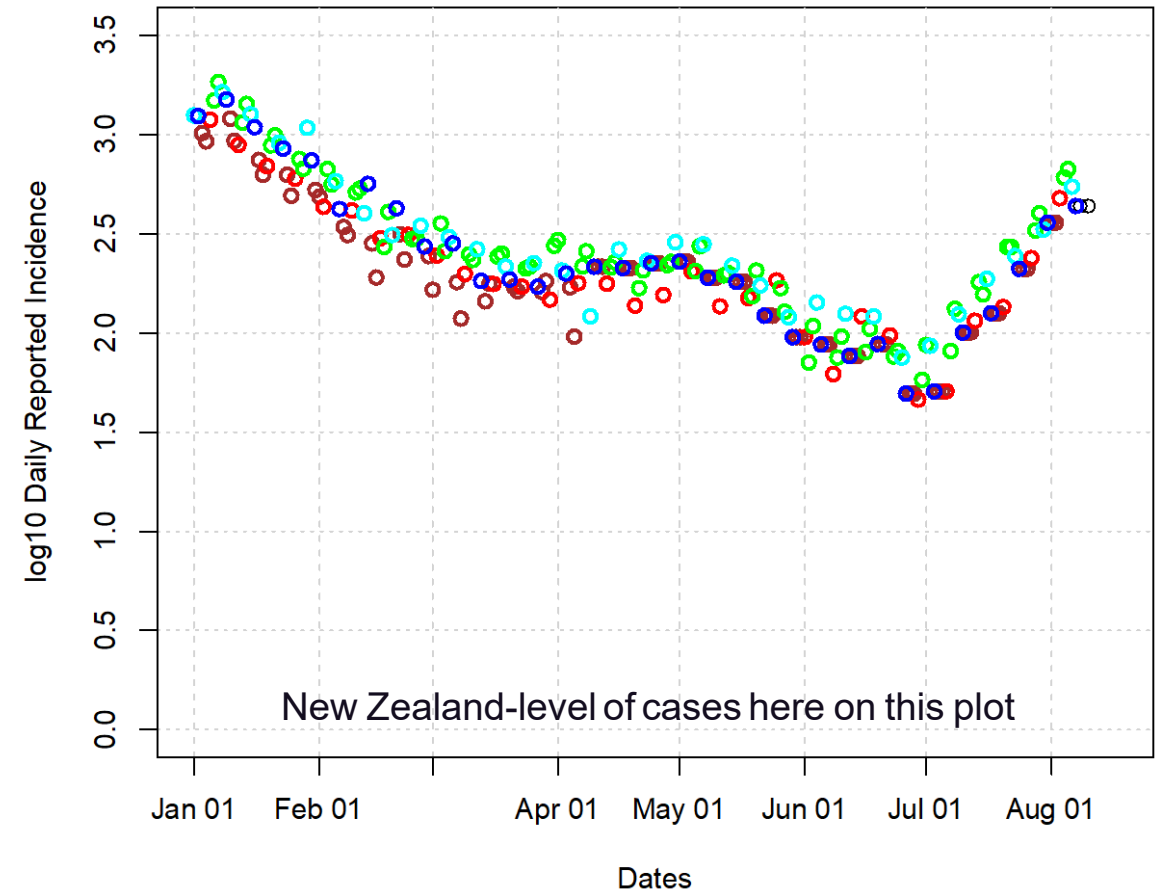
10 August 2021 Vaccine Analysis and Summary

- **~1292k first doses have been administered in NM.**
- **~1132k completed vaccine series in NM.**
- **~61.6% of all residents in New Mexico are vaccinated.**
- **Estimating ~389k infections (including unenumerated).**
- **~1441k New Mexicans have a history of vaccination and/or infection (68.7%)**
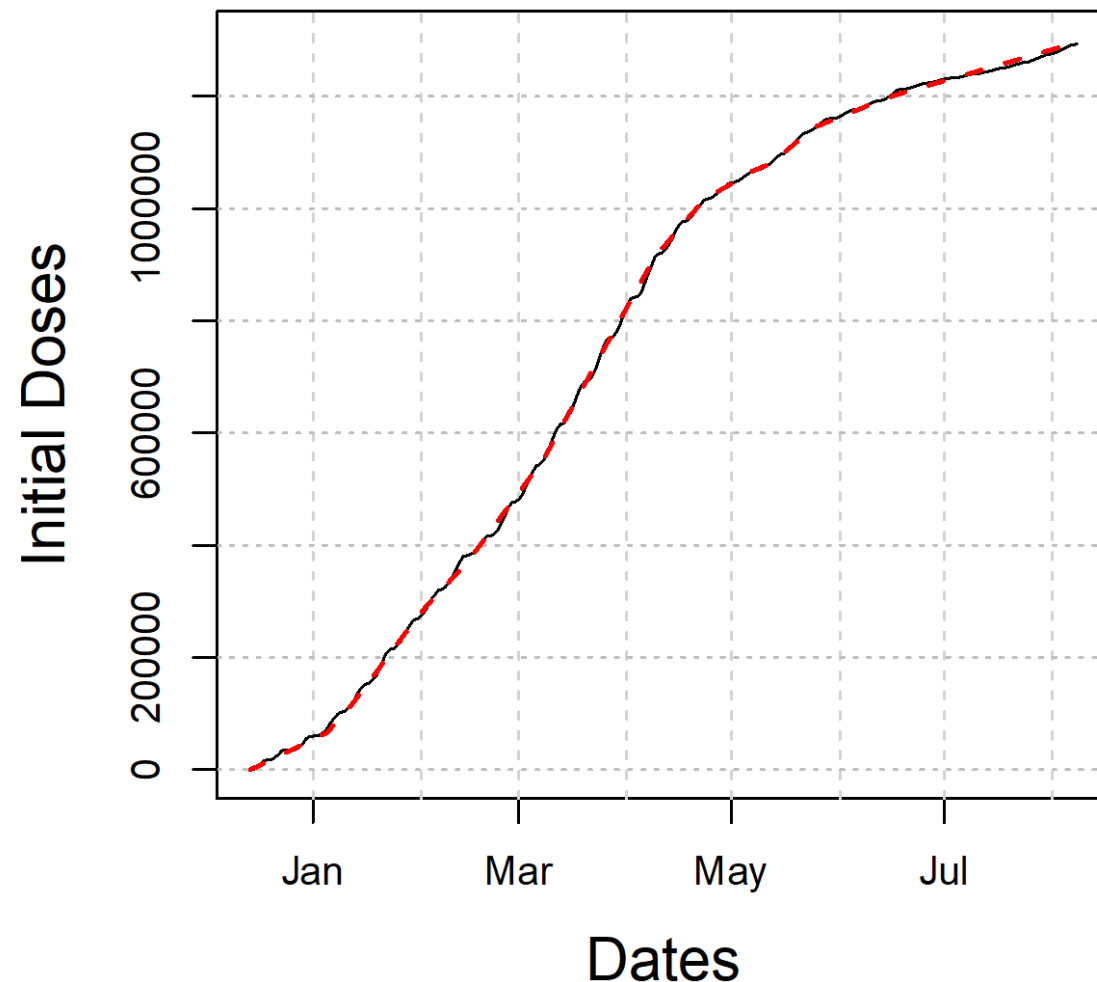- **88% vaccine effectiveness (two doses), 30% (one dose)**
- **Estimating ~1239k New Mexicans are immune, due to immune erosion. (59.1%)**
- **Net *unmitigated* reproductive number is nearly unchanged from 2020.**
- **Burn-out population is *lower*.**
- **Erosion of immunity is *the* critical long-term problem maintain the pandemic. Further immune escape is possible with large epidemics.**
- ***Rapid, complete vaccination before immune escape can worsen is beneficial to the whole population.***
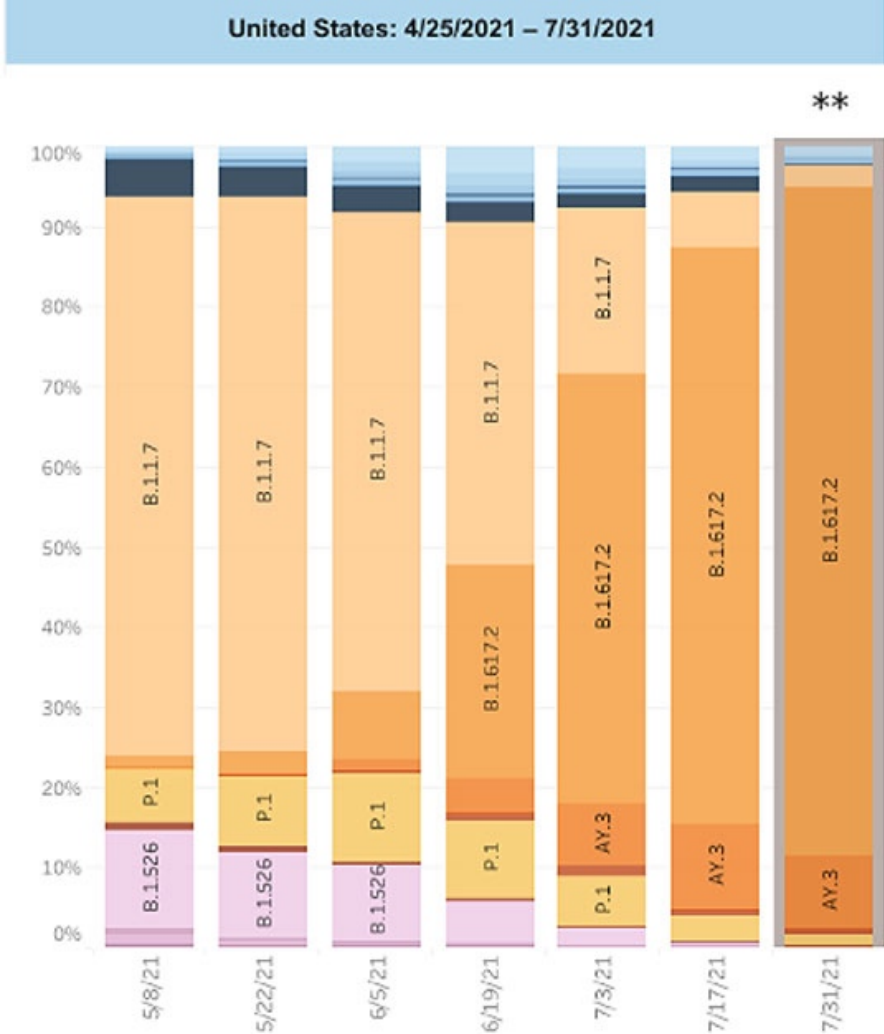
Black – vaccination for all New Mexicans

Red – First dose data used in EpiGrid.

Variants

United States: 4/25/2021 – 7/31/2021

https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/08062021/images/variants1_0806...

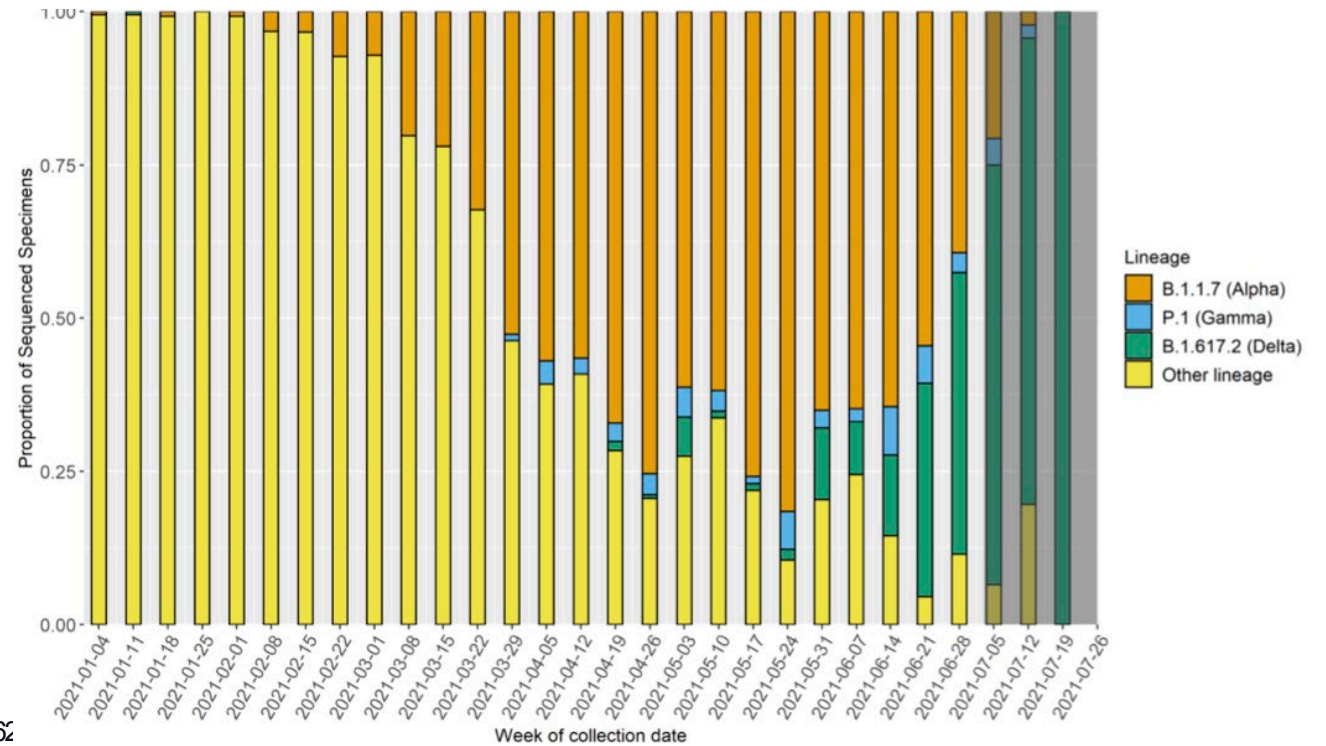B.1.617.2, "Δ" is the "Indian variant"
B.1.1.7, "α" is the "UK variant"
P.1 is the "Brazilian variant", others …

Variant replacement with B.1.617.2 is nearly complete. Further mutation is a pre-requisite for increased infectivity.
Note that data from both NM and CDC are >~1 week old.

New Mexico's data

T-80 Mobility – northern counties (data ending)
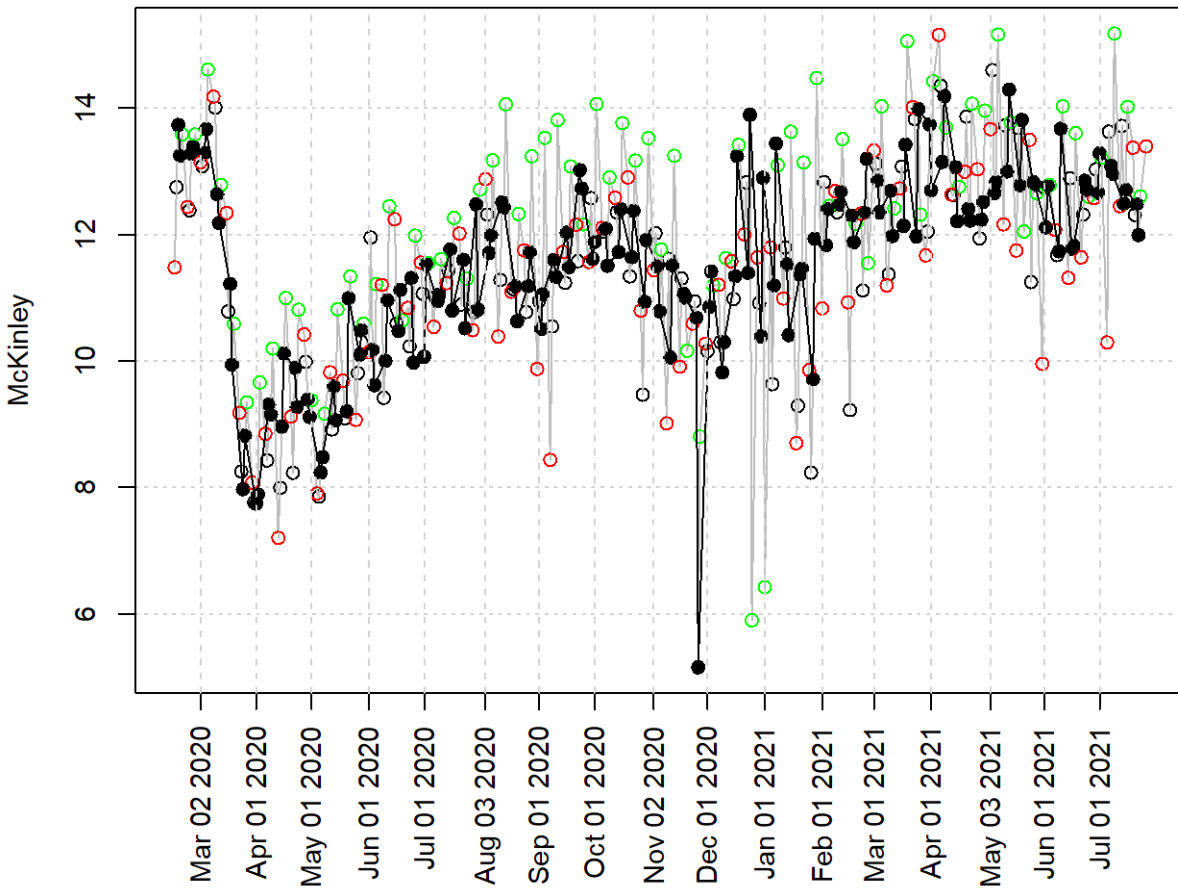
Increasing:
Stable: Bernalillo, Los Alamos, Sandoval, Santa Fe, Taos, Valencia
Decreasing: McKinley, Rio Arriba, San Juan

- Weekends not shown
- Monday
- Wednesday/Thursday
- Friday (usually higher)

McKinley

Bernalillo
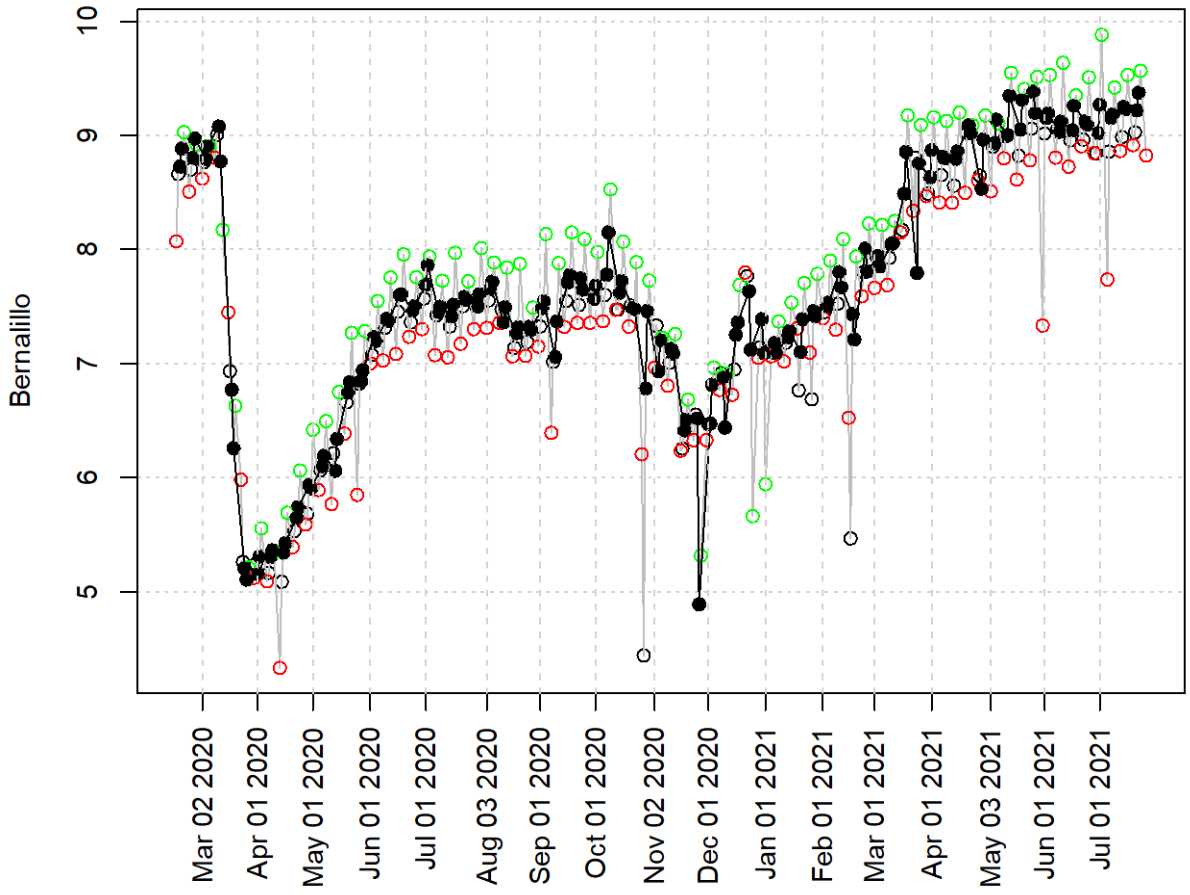
T-80 Mobility – southern counties and Curry (data ending)

Increasing: Dona Ana, Luna
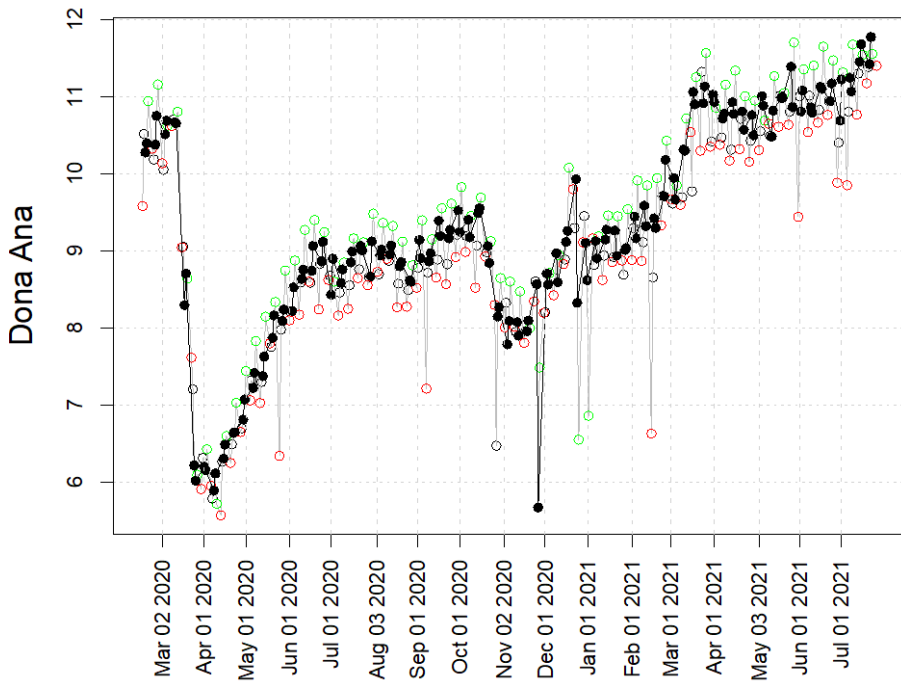Flat or slight decrease: Chaves, Curry, Eddy, Grant, Lea, Lincoln, Luna, Otero, Roosevelt
Decreasing: Curry, Socorro

Eddy

Dona Ana

Lea
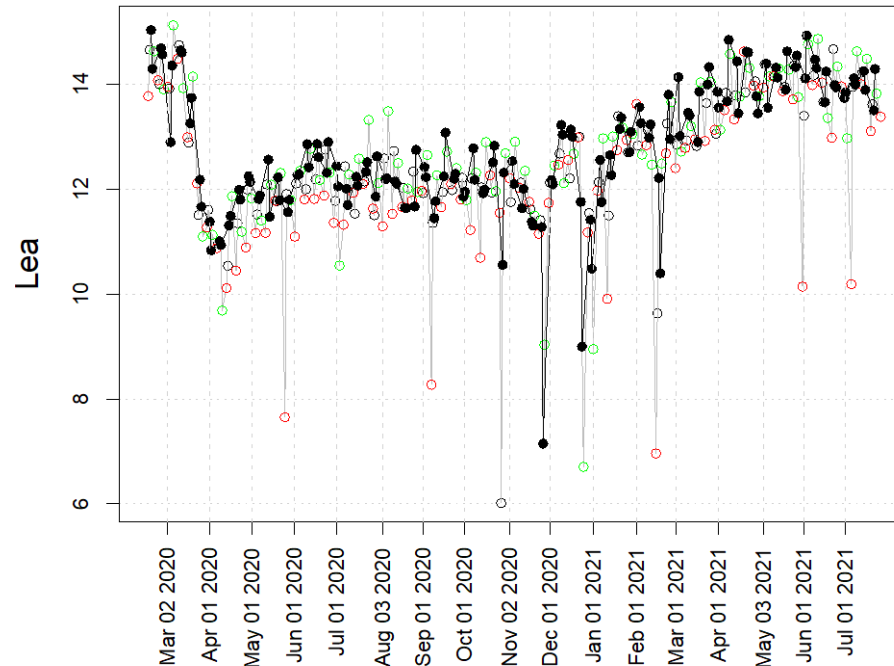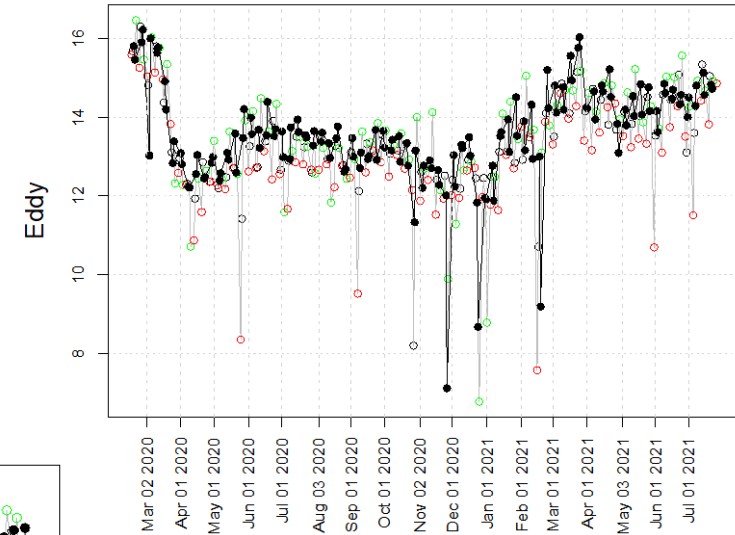
- Weekends NOT shown
- Monday
- Wednesday/Thursday
- Friday (usually higher)

What is happening in the rest of the U.S.? The 10 most populous states plus New Mexico

Trend over the last 3 weeks: Increasing: Florida, Georgia, Texas, Illinois, Michigan, New York, California, New Mexico, North Carolina. Recent increases: Ohio, Pennsylvania. Steady: -
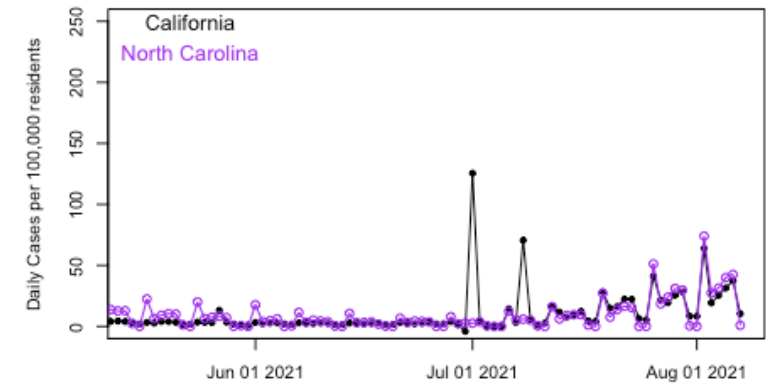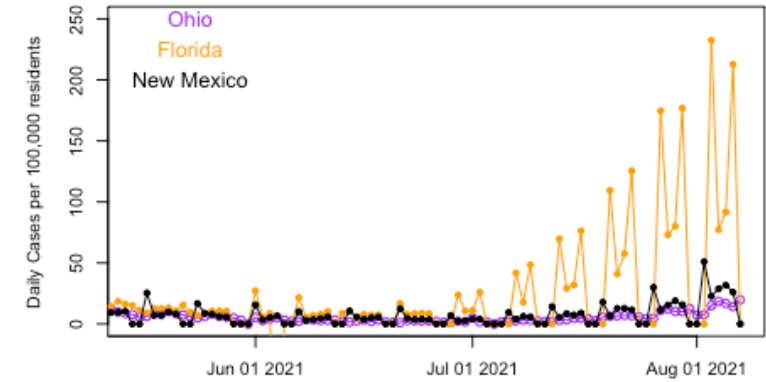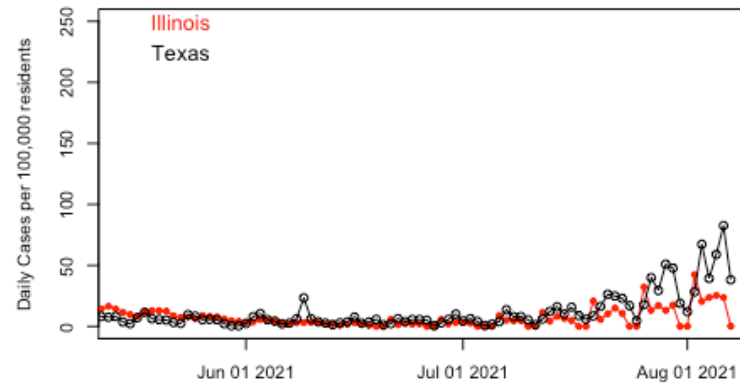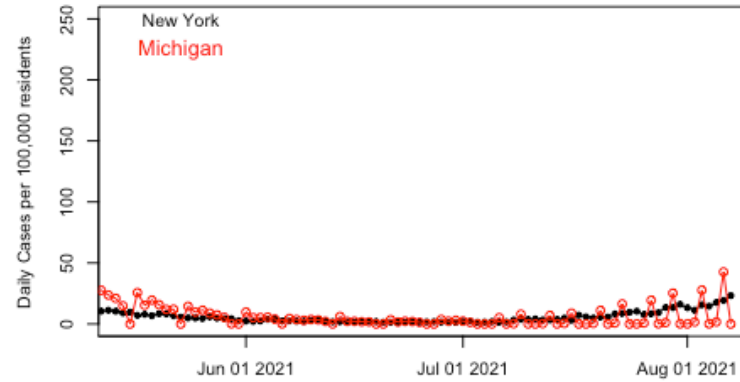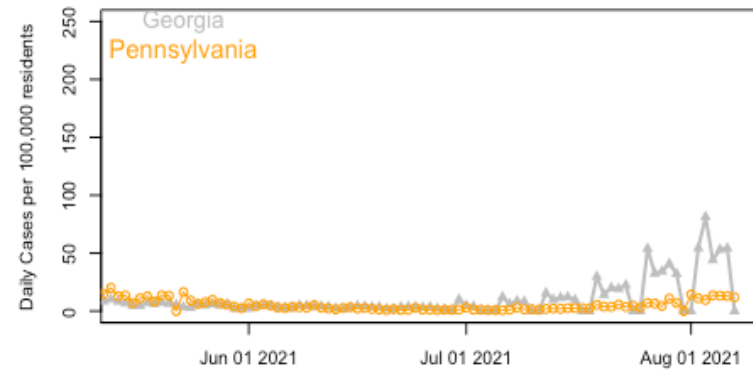
Cases plotted versus vaccination by county

mean cases per day per 100k population 2021-06-27 - 2021-08-08

Percent of entire population that is fully vaccinated
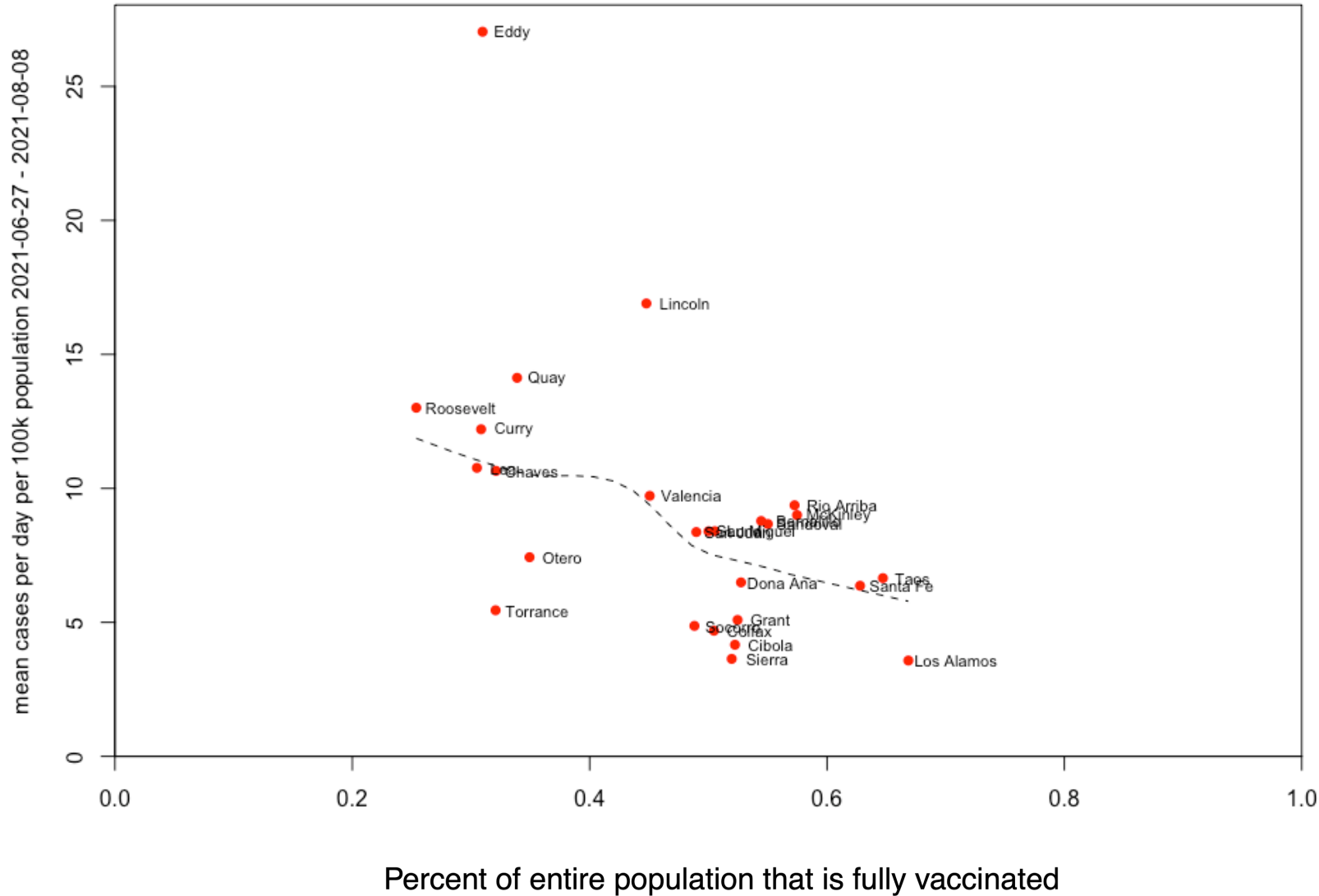
There is a relationship between vaccination and cases.

- Lincoln and Eddy Counties are high incidence with low vaccination.

- Sierra county might be an outlier (low)

- Seven counties are not on this plot due to relative isolation and small populations: Catron, De Baca, Guadalupe, Harding, Hidalgo, Mora and Union.

Cases decrease with vaccination (no matter how the vaccination data are plotted)

Short- & Long-Term Forecast for NM: Cases

7-day Incidence Confirmed Cases Forecast for New Mexico Based on Data as of 2021-08-08

6-Week Forecast of Confirmed Cases for New Mexico Based on Data as of 2021-08-08

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021-08-08		213,793*	
2021-08-15	215,045	216,316	218,219
2021-08-22	216,630	219,418	223,497
2021-08-29	218,219	222,816	229,501
2021-09-05	219,678	226,204	235,945
2021-09-12	220,938	229,424	242,436
2021-09-19	221,956	232,508	249,127

*Last reported confirmed cases count
^Closest-matching scenario

6-Week Forecast of Daily Average of Confirmed Cases for New Mexico Based on Data as of 2021-08-08

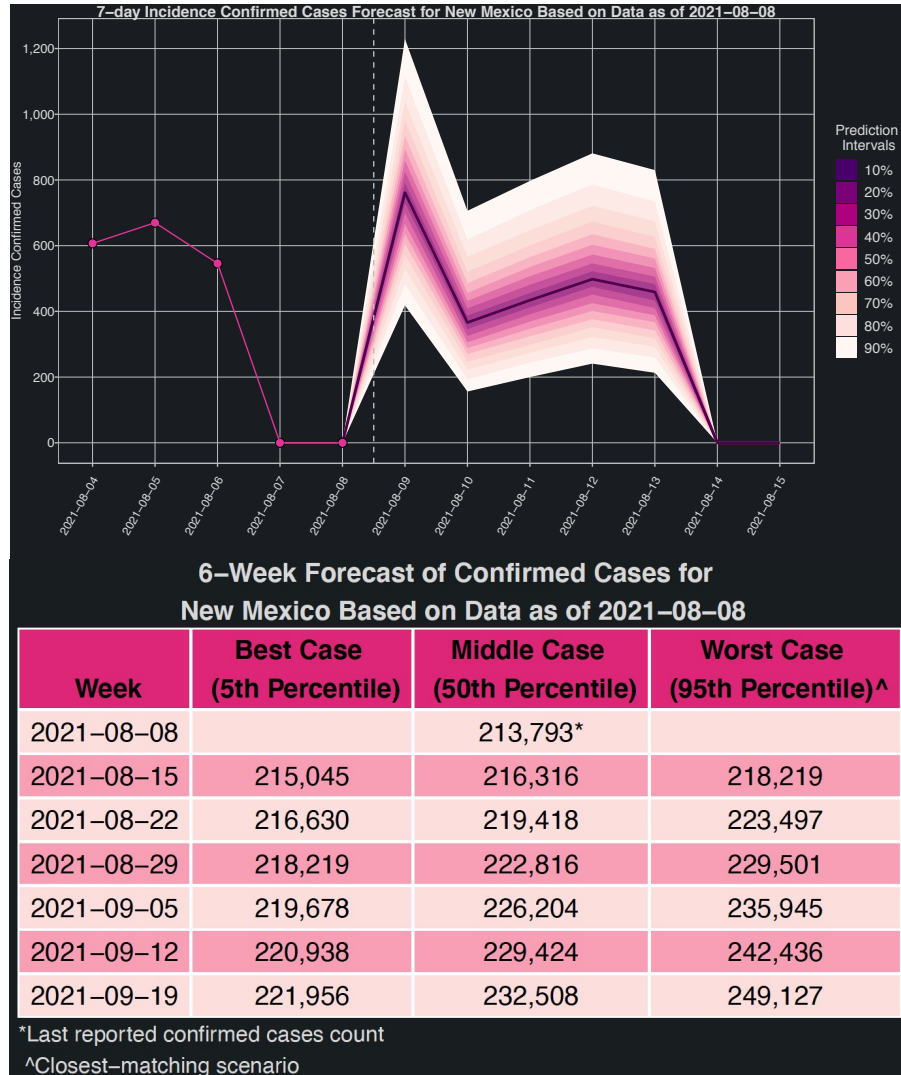| Week End Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021-08-08		482*	
2021-08-15	175	360	635
2021-08-22	216	443	770
2021-08-29	212	482	889
2021-09-05	187	476	976
2021-09-12	157	453	986
2021-09-19	130	432	979

*Last reported confirmed cases count
^Closest-matching scenario

So what?

We are tracking with worst case. Our model suggests that the number of daily cases is expected to range between 635 and 900 in the next few weeks

Short- & Long-Term Forecast for NM: Deaths

7–day Deaths Forecast for New Mexico Based on Data as of 2021–08–08

Incidence Deaths

Prediction Intervals
- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%
- 80%
- 90%

6–Week Forecast of Deaths for New Mexico Based on Data as of 2021–08–08

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)^	Worst Case (95th Percentile)
2021–08–08		4,425*	
2021–08–15	4,433	4,442	4,454
2021–08–22	4,447	4,460	4,476
2021–08–29	4,461	4,478	4,497
2021–09–05	4,476	4,496	4,518
2021–09–12	4,492	4,514	4,538
2021–09–19	4,507	4,532	4,558

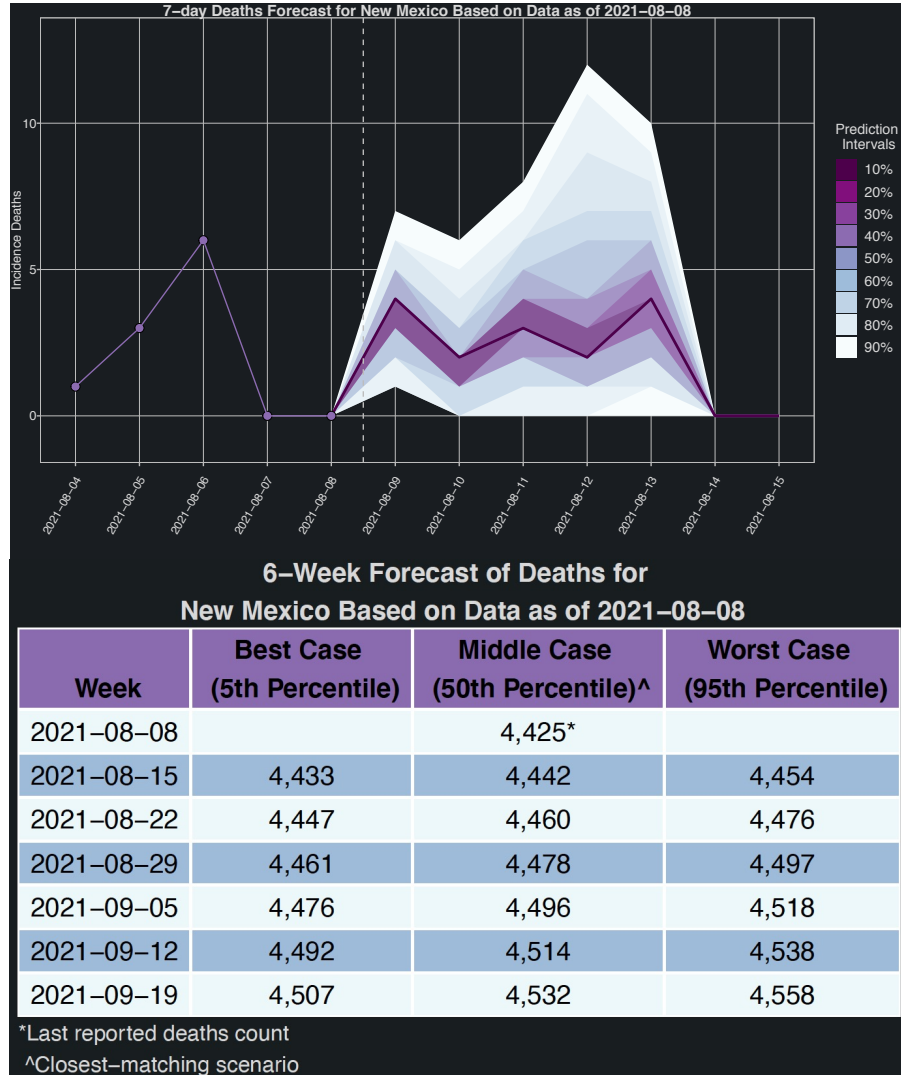*Last reported deaths count
^Closest–matching scenario

6–Week Forecast of Daily Average of Deaths for New Mexico Based on Data as of 2021–08–08

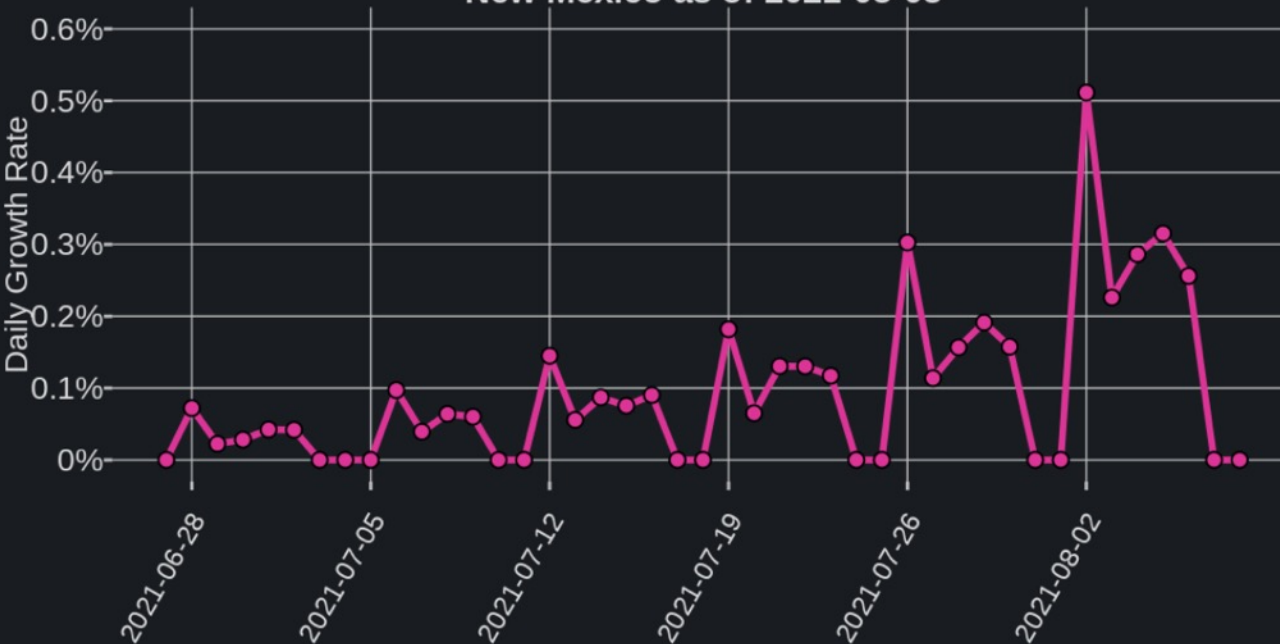| Week Start Date	Best Case (5th Percentile)	Middle Case (50th Percentile)^	Worst Case (95th Percentile)
2021–08–08		2*	
2021–08–15	0	2	6
2021–08–22	0	2	6
2021–08–29	0	2	6
2021–09–05	0	2	6
2021–09–12	0	2	6
2021–09–19	0	2	6

*Last reported confirmed deaths
^Closest–matching scenario

So what?
Our model suggests that the number of daily deaths is expected to range between 2 to 6 in the next few weeks

Growth Rate for NM

Daily Growth Rate for the Past Six Weeks in New Mexico as of 2021-08-08

6-Week Forecast of the Average Weekly Growth Rate for New Mexico Based on Data as of 2021-08-08

| Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021-08-08		0.23%*	
2021-08-15	0.083%	0.17%	0.29%
2021-08-22	0.10%	0.20%	0.34%
2021-08-29	0.10%	0.22%	0.38%
2021-09-05	0.095%	0.22%	0.40%
2021-09-12	0.082%	0.20%	0.39%
2021-09-19	0.066%	0.19%	0.39%

*Last weekly mean daily growth rate

^Closest-matching scenario

So what?

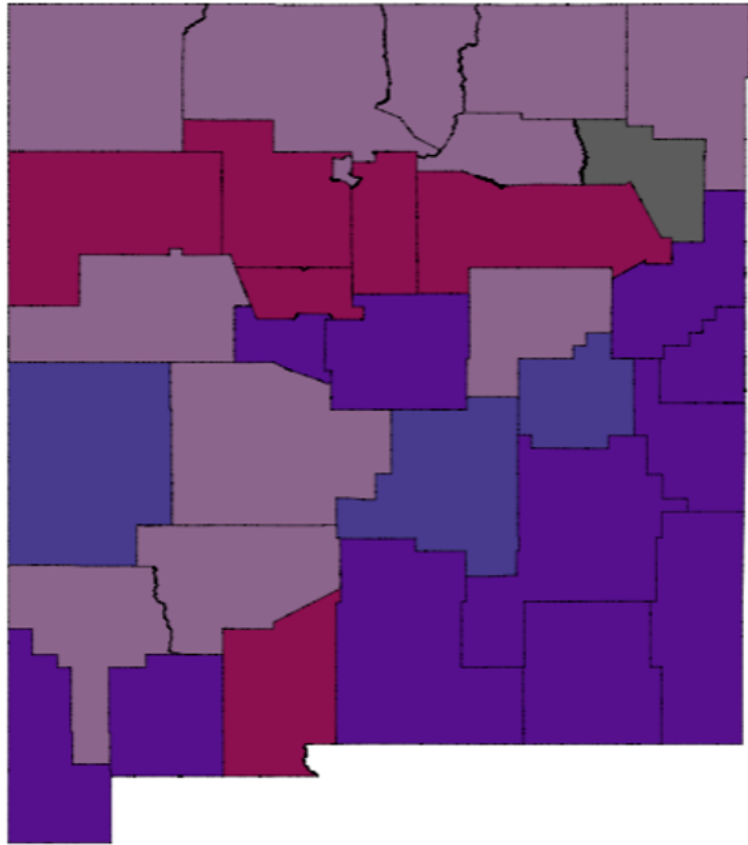As of August 8th, the average growth rate in NM is at 0.23% (up from 0.089%)

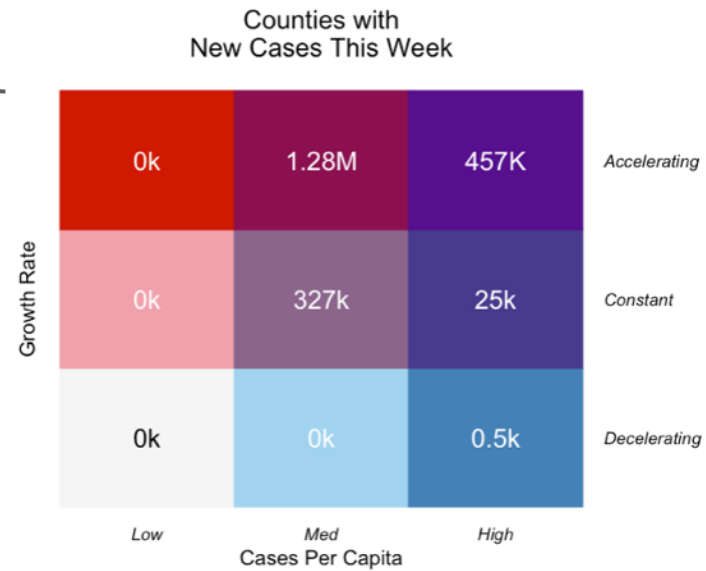# Cumulative Cases & Daily Growth Rate for NM: Aug 9
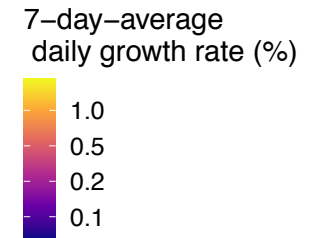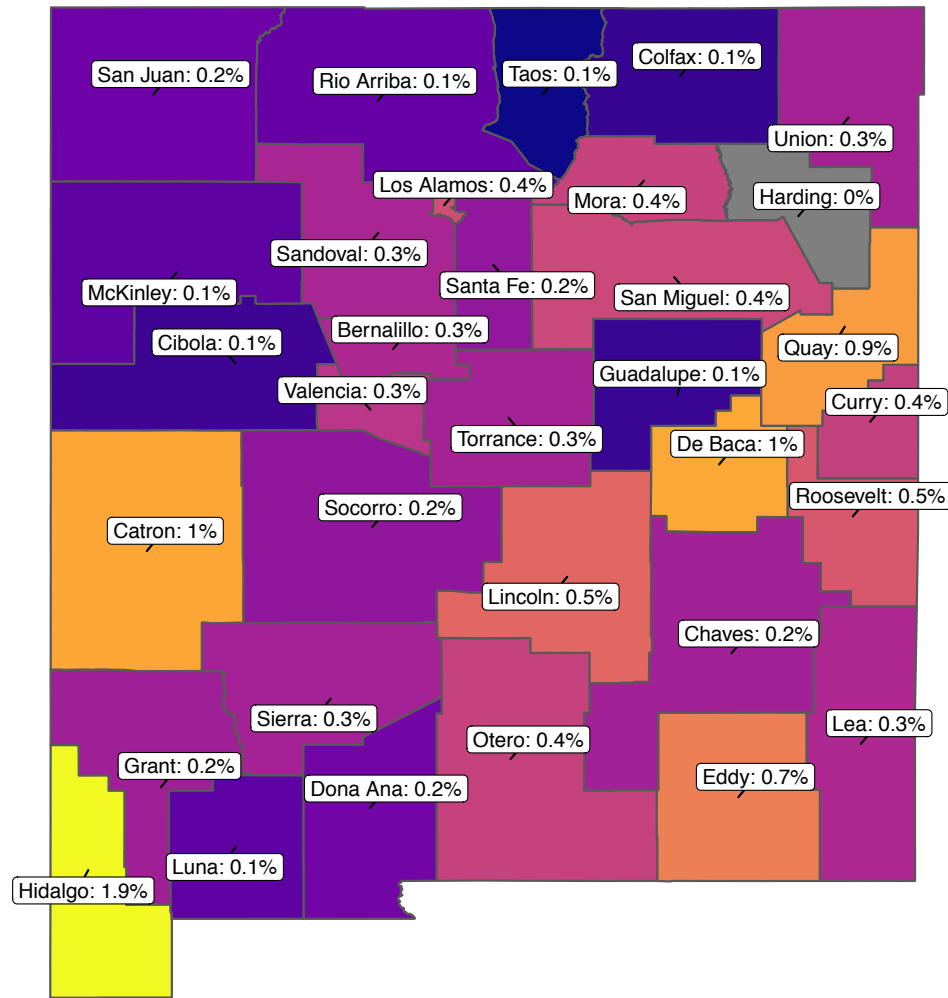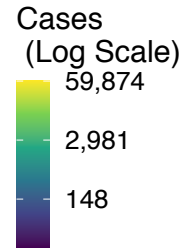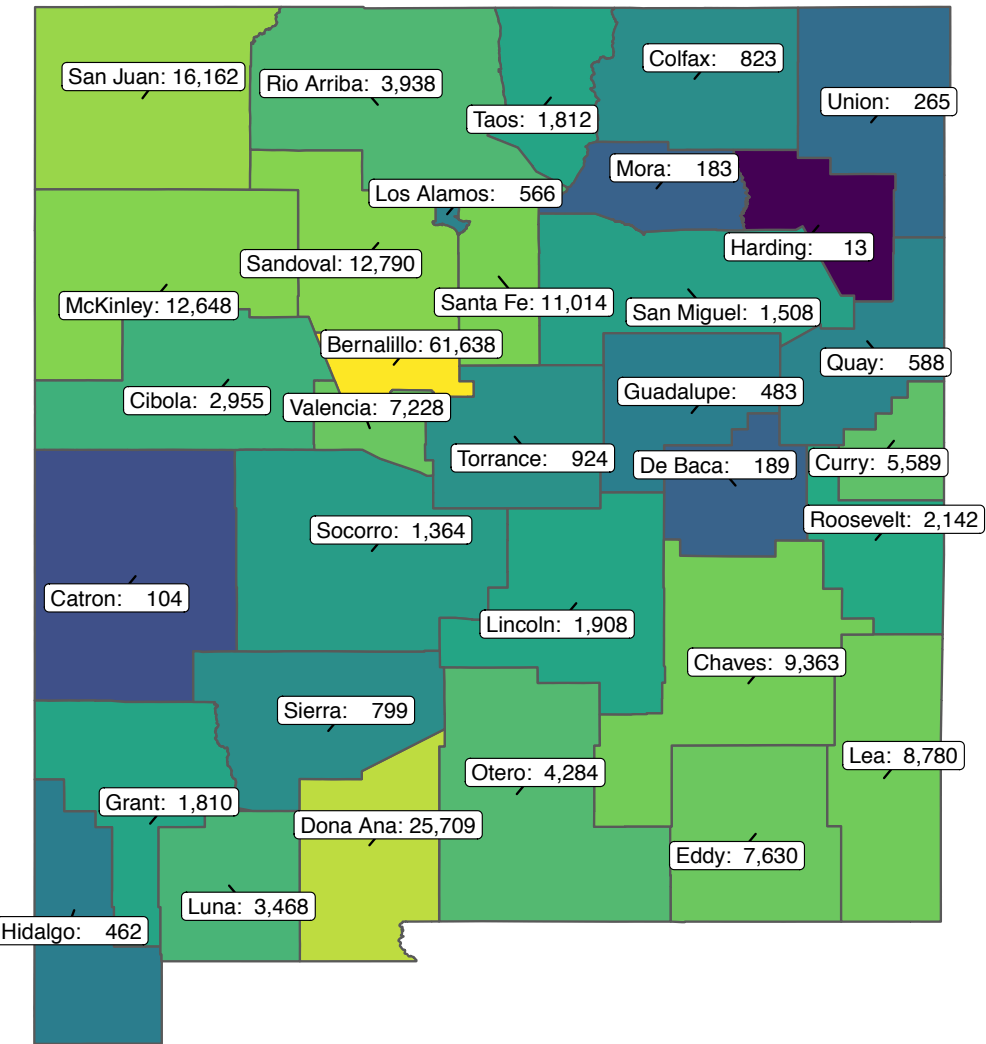
So what? Cumulative growth rates are increasing, particularly in the Southeast

*Growth rate is in cumulative cases

Weekly Growth Rate for NM: Another View (Aug 9)

Impacted New Mexicans

Counties with New Cases This Week

Growth Rate

	Low	Med	High	
	0k	1.28M	457K	Accelerating
	0k	327k	25k	Constant
	0k	0k	0.5k	Decelerating

Cases Per Capita

Counties With No New Cases In ...

Last Week	Two Weeks	3+ Weeks
4k	0k	7k

So what?

- Most people in New Mexico are living in a county that is **medium per-capita case counts with accelerating growth**

- **Dona Ana, Hidalgo, Luna, Otero, Quay, San Miguel, Torrance, Valencia are accelerating quickly**

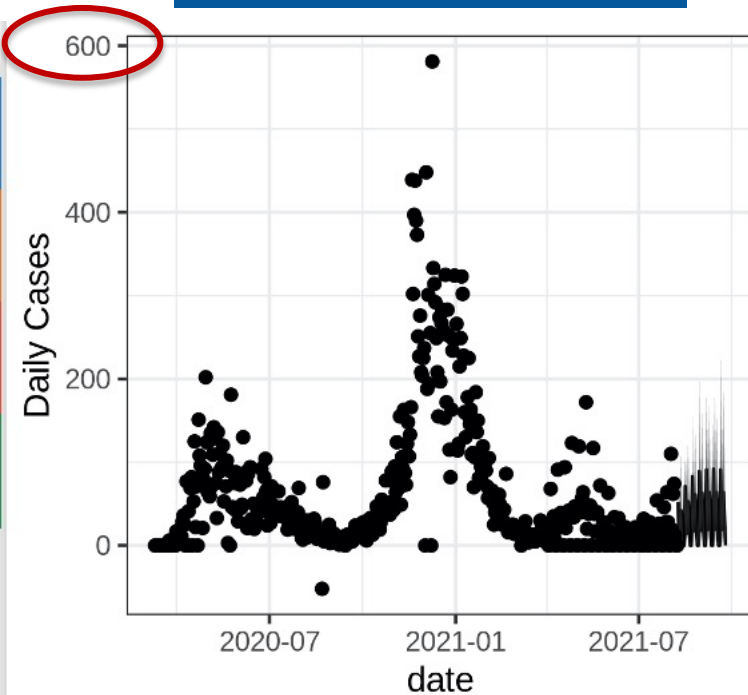Number of New Mexicans living in regions with particular combinations of per capita case counts and 7-day growth rates

Low   <10 cases/100k per week
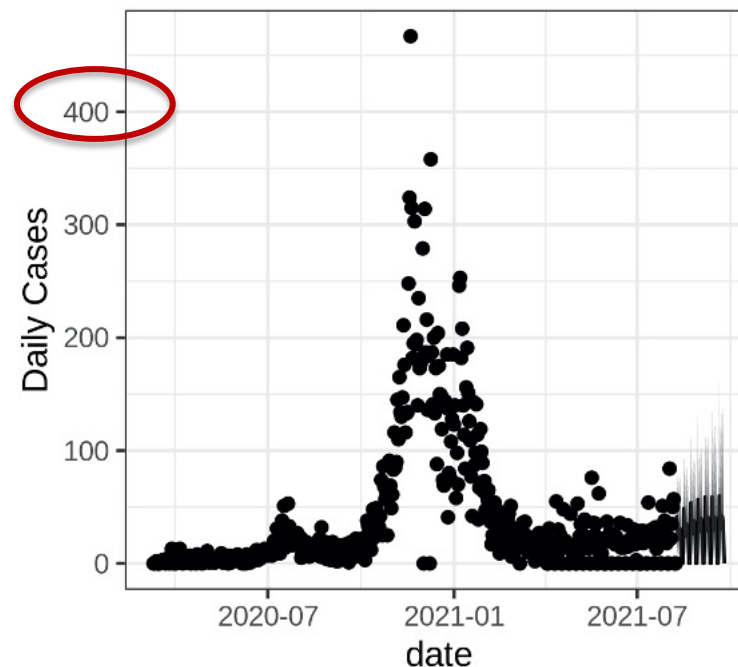Med   10-99 cases/100k per week
High   >100   cases/100k per week

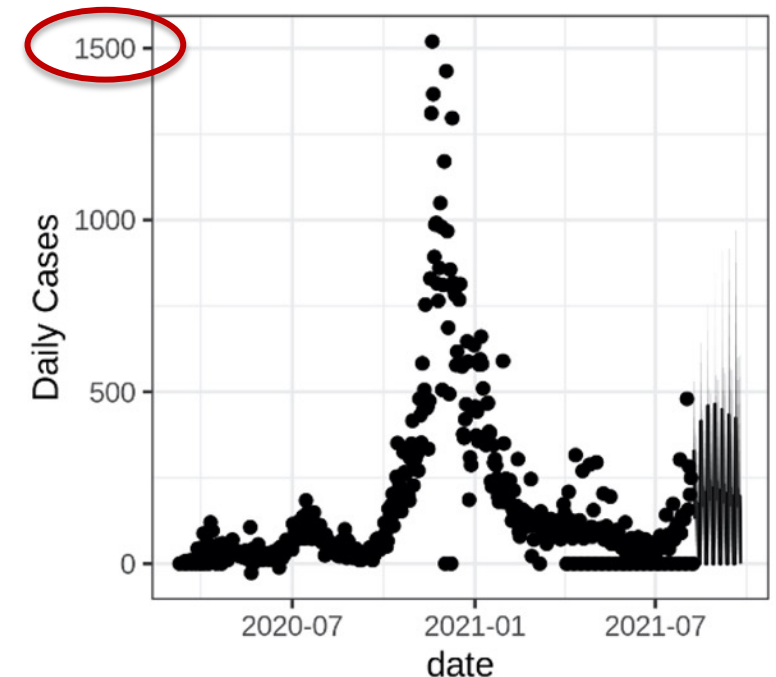# > Additional Regional Forecasts
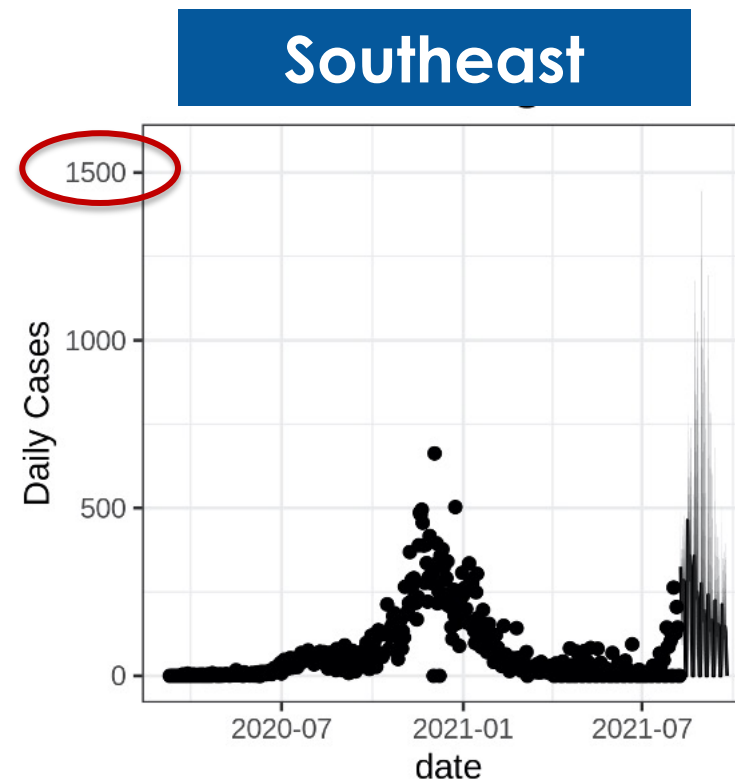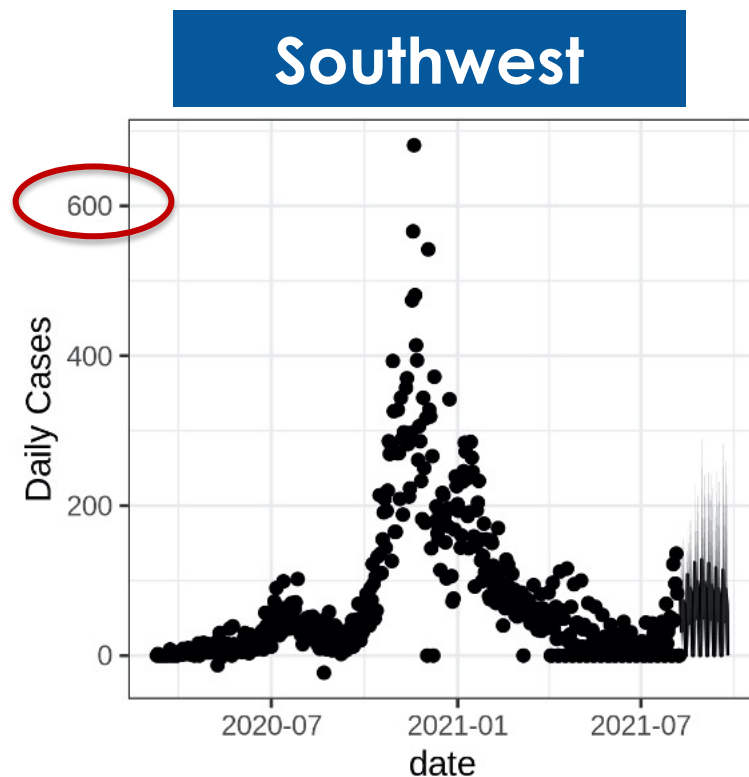
Central & North Regions Daily Cases Forecast

So what?

The central region is expected to see the most number of cases followed by the northwest and northeast regions, respectively
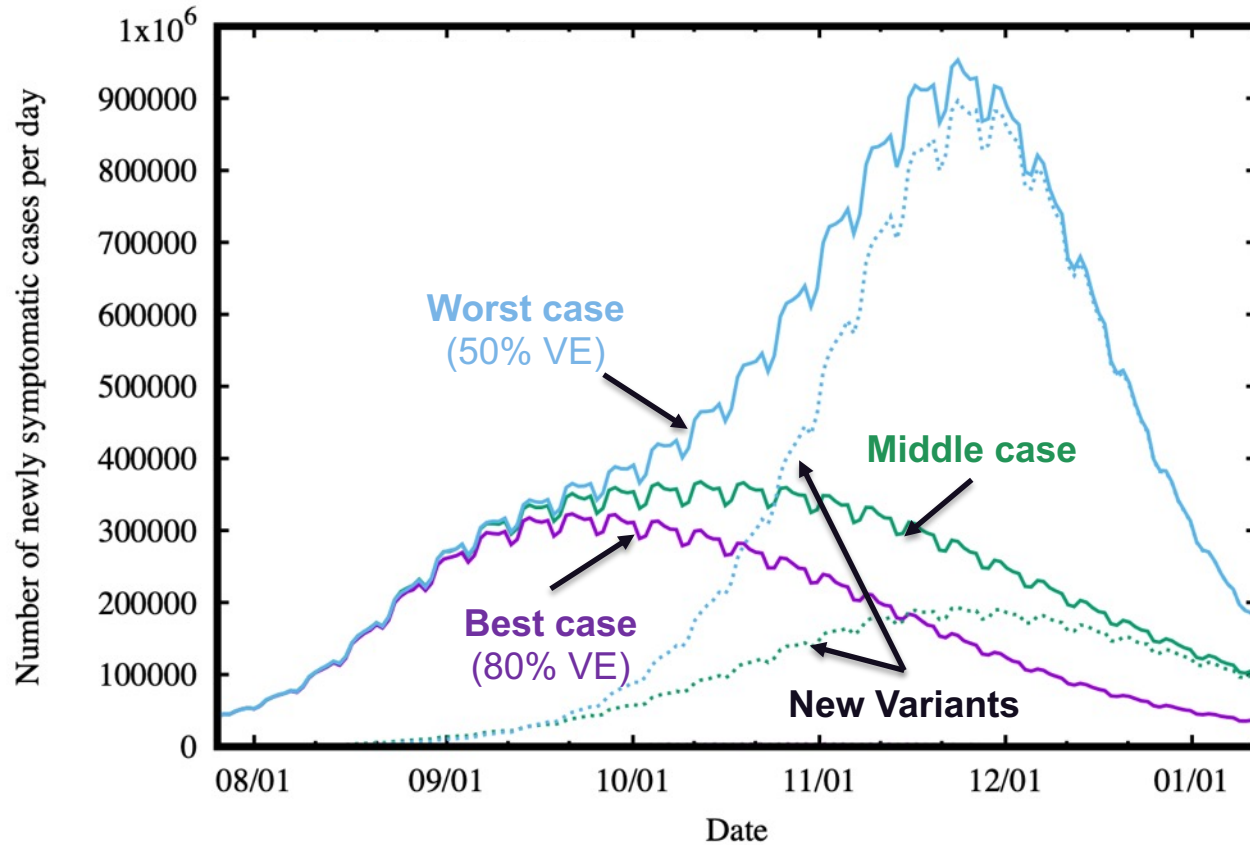
South Regions Daily Cases Forecast

> **EpiCast Projections**

So what?

- **Projections based on current vaccination uptake and cases at the county level for the US**
- **Impacts vary based on vaccine effectiveness assumptions**
- **A novel variant "omega" introduced through the arrival of 100 infected (SFO, ATL, NYC)**