Modeling & Forecasting COVID-19 in NM

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August 24, 2021
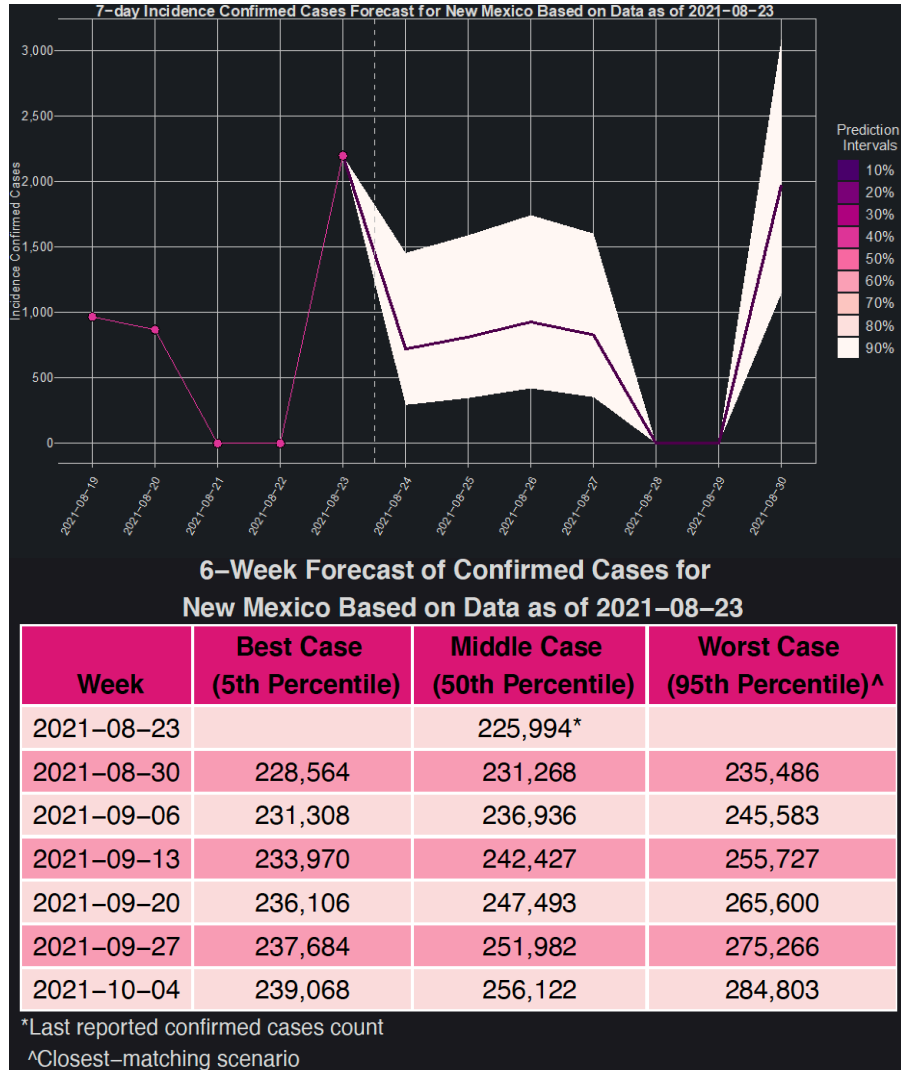
NNSA
National Nuclear Security Administration

Short- & Long-Term Forecast for NM: Cases

7-day Incidence Confirmed Cases Forecast for New Mexico Based on Data as of 2021-08-23

6-Week Forecast of Confirmed Cases for New Mexico Based on Data as of 2021-08-23

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021-08-23		225,994*	
2021-08-30	228,564	231,268	235,486
2021-09-06	231,308	236,936	245,583
2021-09-13	233,970	242,427	255,727
2021-09-20	236,106	247,493	265,600
2021-09-27	237,684	251,982	275,266
2021-10-04	239,068	256,122	284,803

*Last reported confirmed cases count
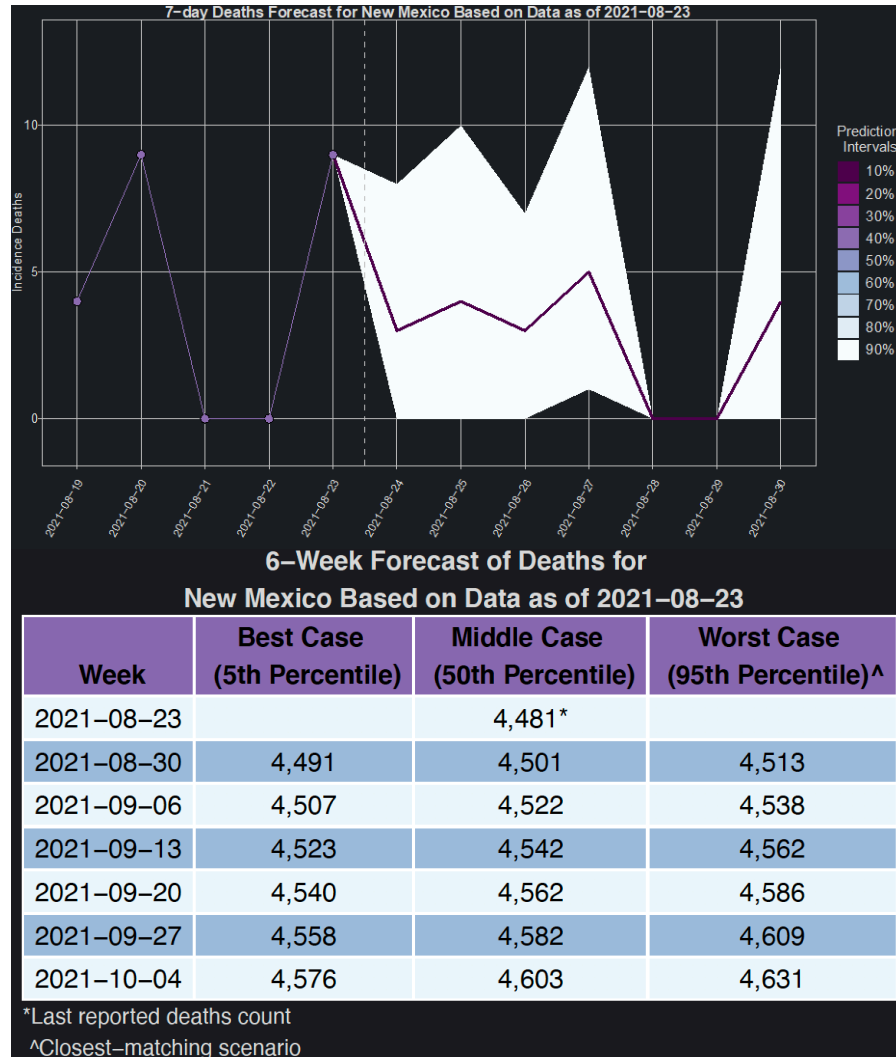^Closest-matching scenario

6-Week Forecast of Daily Average of Confirmed Cases for New Mexico Based on Data as of 2021-08-23

Week End Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021-08-23		808*	
2021-08-30	366	752	1,354
2021-09-06	391	807	1,457
2021-09-13	355	786	1,484
2021-09-20	281	712	1,460
2021-09-27	218	634	1,439
2021-10-04	172	570	1,484

*Last reported confirmed cases count
^Closest-matching scenario

So what?

Our model suggests that the number of daily cases is expected to range between 350 and 1,500 in the next few weeks

Short- & Long-Term Forecast for NM: Deaths

7-day Deaths Forecast for New Mexico Based on Data as of 2021-08-23

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

6–Week Forecast of Deaths for New Mexico Based on Data as of 2021–08–23

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021–08–23		4,481*	
2021–08–30	4,491	4,501	4,513
2021–09–06	4,507	4,522	4,538
2021–09–13	4,523	4,542	4,562
2021–09–20	4,540	4,562	4,586
2021–09–27	4,558	4,582	4,609
2021–10–04	4,576	4,603	4,631

*Last reported deaths count
^Closest–matching scenario

6–Week Forecast of Daily Average of Deaths for New Mexico Based on Data as of 2021–08–23

Week Start Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021–08–23		4*	
2021–08–30	0	3	7
2021–09–06	0	3	7
2021–09–13	0	3	7
2021–09–20	0	3	7
2021–09–27	0	3	7
2021–10–04	0	3	7

*Last reported confirmed deaths
^Closest–matching scenario

So what?
Our model suggests that the number of daily deaths is expected to range between 0 and 7 in the next few weeks

Growth Rate for NM

Daily Growth Rate for the Past Six Weeks in New Mexico as of 2021-08-23
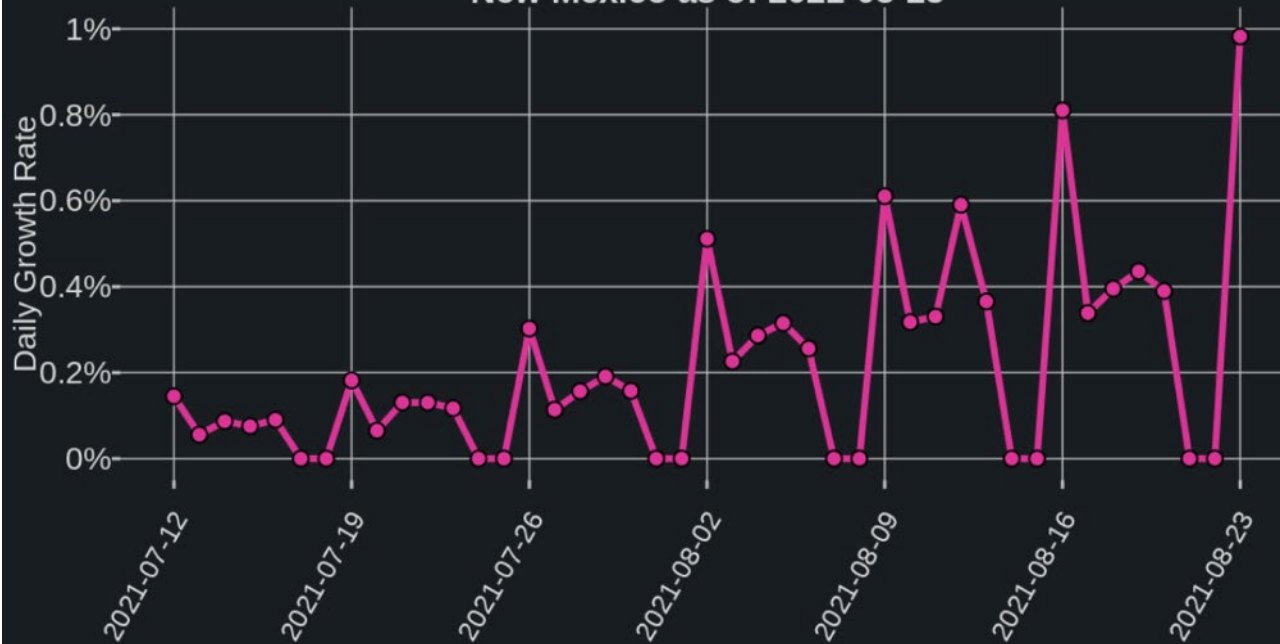
6-Week Forecast of the Average Weekly Growth Rate for New Mexico Based on Data as of 2021-08-23

| Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021-08-23		0.36%*	
2021-08-30	0.16%	0.33%	0.59%
2021-09-06	0.17%	0.35%	0.60%
2021-09-13	0.16%	0.33%	0.58%
2021-09-20	0.13%	0.30%	0.54%
2021-09-27	0.095%	0.26%	0.51%
2021-10-04	0.083%	0.23%	0.49%

*Last weekly mean daily growth rate
^Closest-matching scenario

So what?

As of August 24th, the average growth rate in NM is at 0.36% (up from 0.23%)
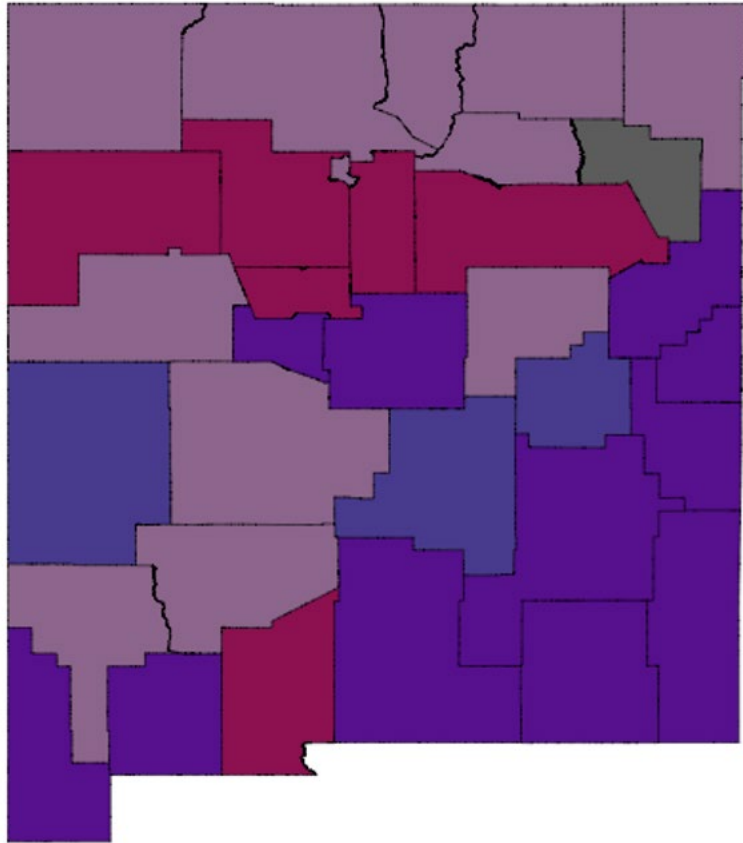
Cumulative Cases & Daily Growth Rate for NM: Aug 23
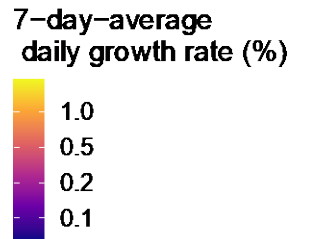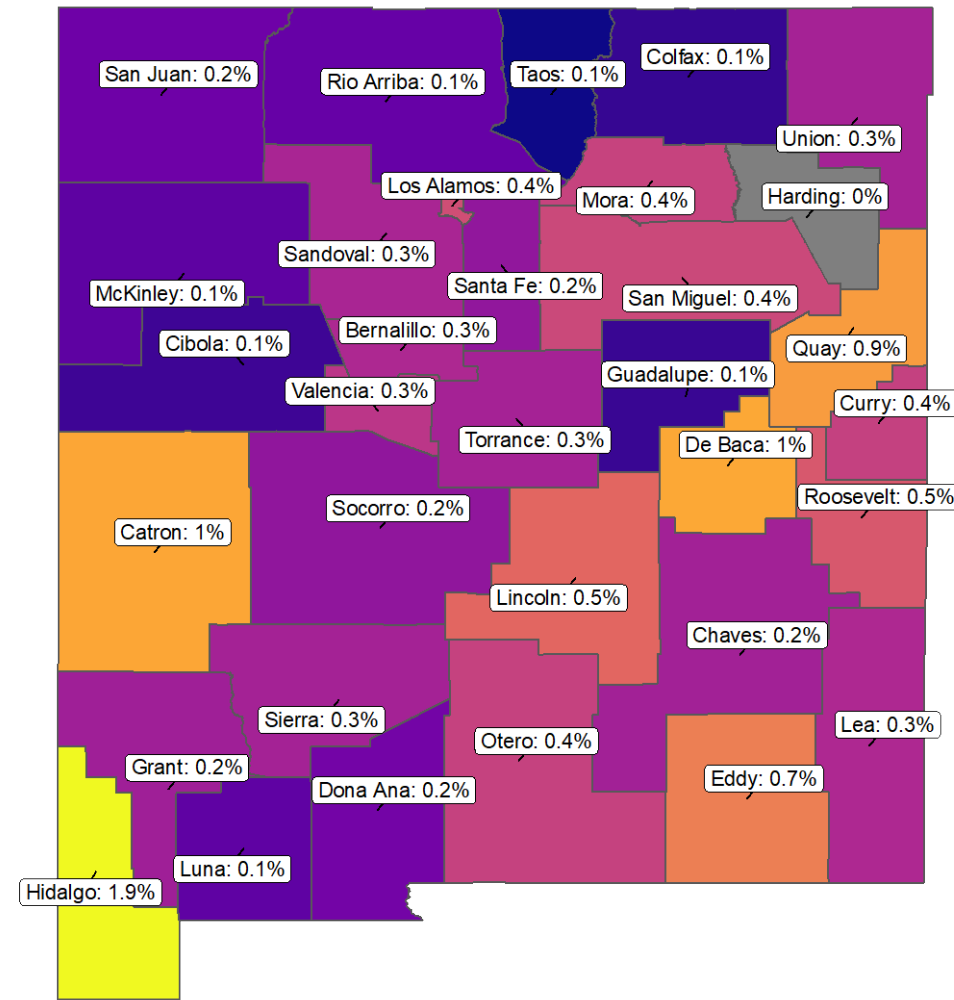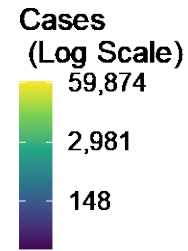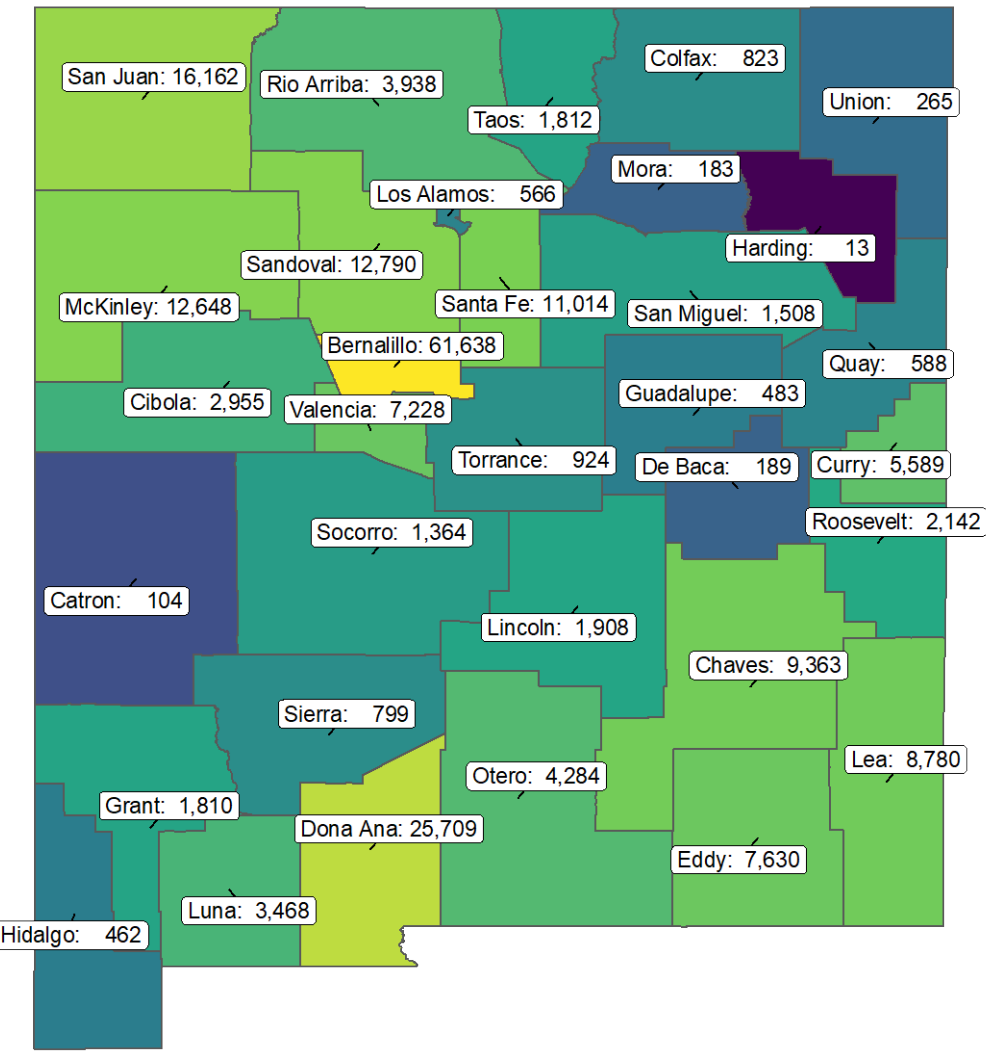
So what? Cumulative growth rates are increasing

*Growth rate is in cumulative cases

Weekly Growth Rate for NM: Another View (Aug 23)

Impacted New Mexicans

Counties with New Cases This Week

Growth Rate	Low	Med	High
Accelerating	0k	33k	1.19M
Constant	0k	209k	203k
Decelerating	0k	236k	223k

Cases Per Capita

Counties With No New Cases In ...

Last Week	Two Weeks	3+ Weeks
0k	0k	0.5k

So what?

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

- **Dona Ana, Hidalgo, Luna, Otero, Quay, San Miguel, Torrance, Valencia are accelerating quickly**
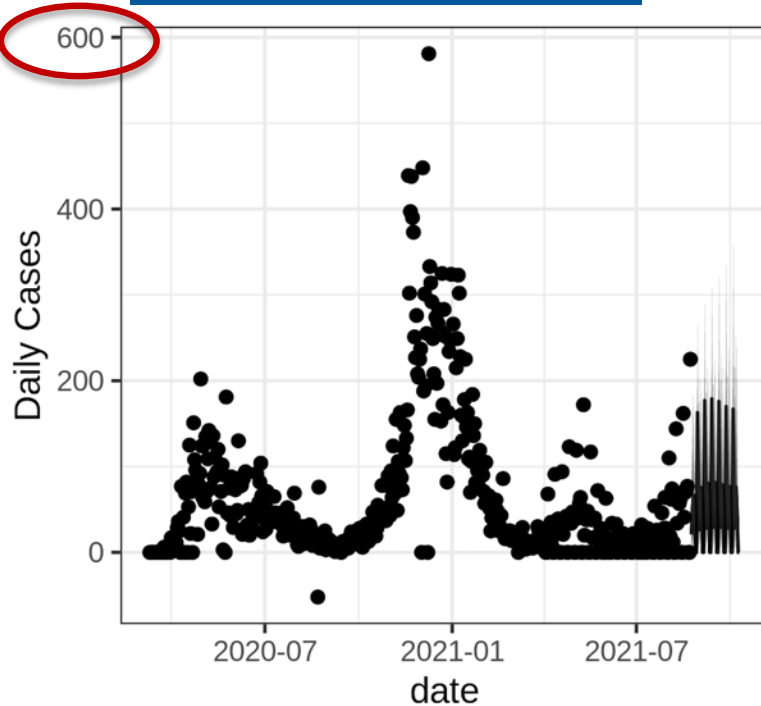
Number of New Mexicans living in regions with particular combinations of per capita case counts and 7-day growth rates
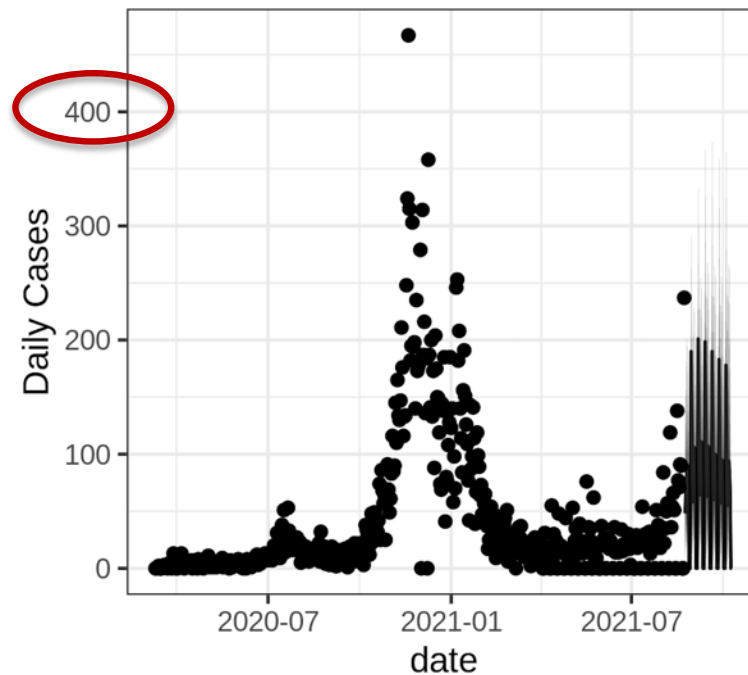
Low <10 cases/100k per week
Med   10-99 cases/100k per week
High   >100   cases/100k per week

> Additional Regional Forecasts
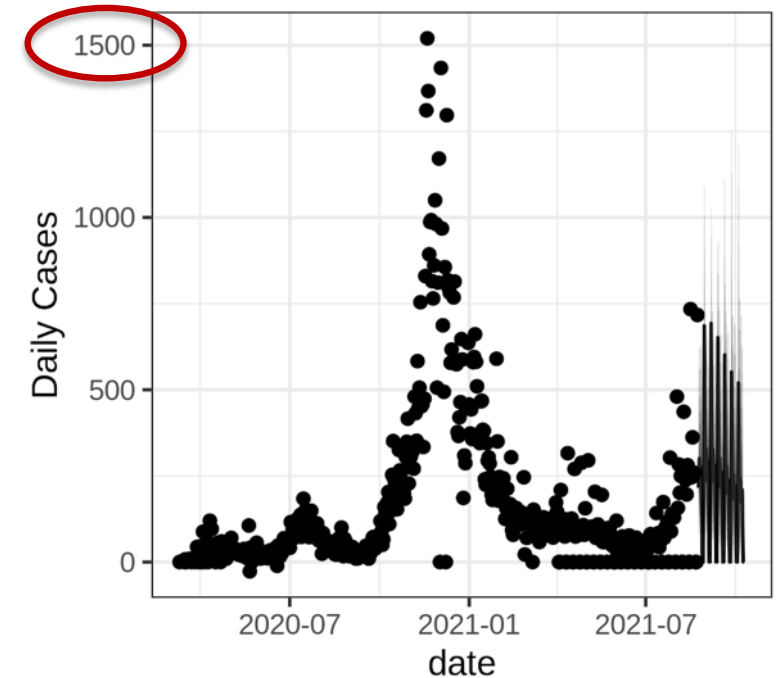
Central & North Regions Daily Cases Forecast

So what?

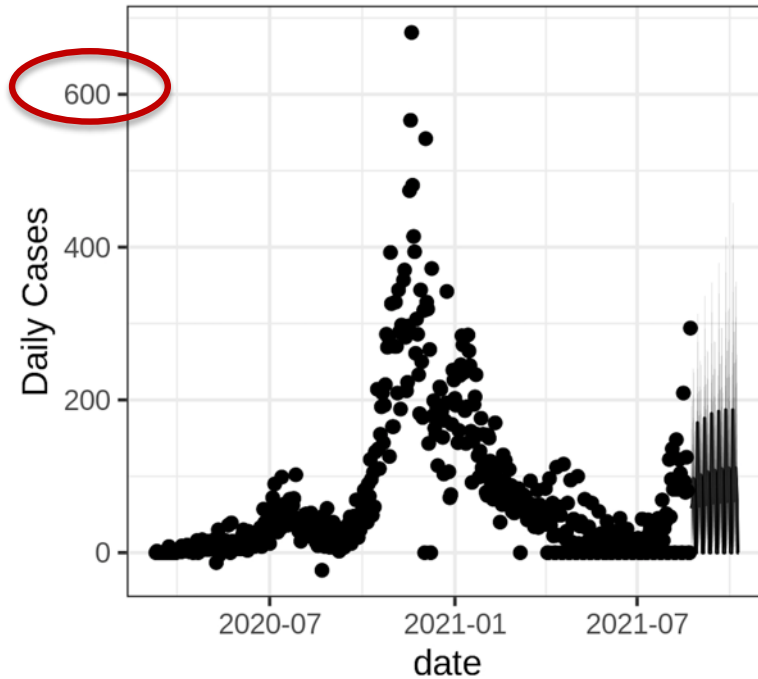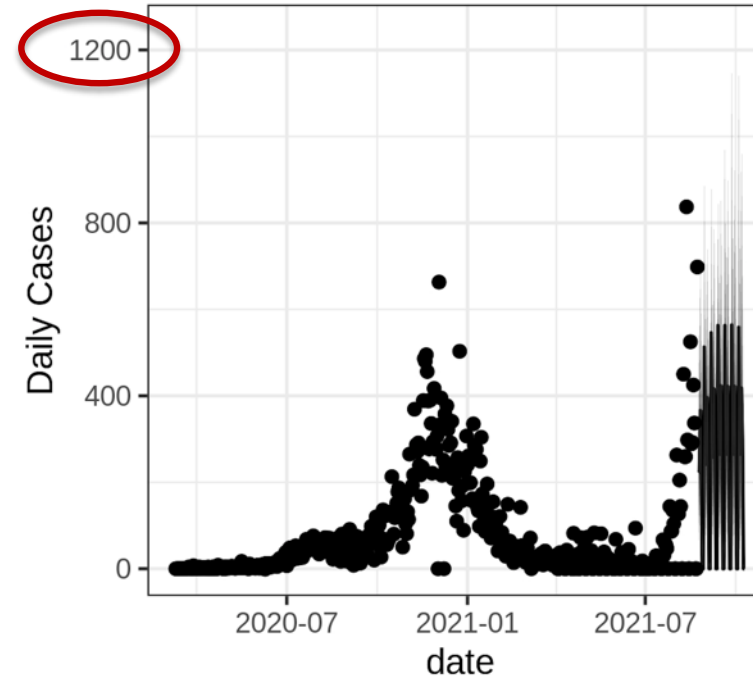**The central region is expected to see the most number of cases followed by the northeast and northwest regions, respectively**

South Regions Daily Cases Forecast

Southwest

Southeast

So what?

The southwest region is expected to see the most number of cases followed by the southeast region

# > Non-Congregational Shelter Forecast

Non-Congregate Shelter Forecast

- Our goal is to inform the capacity of shelters for forecasting the need of additional rooms
- We calculate a ratio between the mean number of daily new cases over the previous two weeks to current occupied rooms
  - We apply this ratio to the forecast of COVID-19 cases from the LANL COFFEE model to estimate the number of rooms needed
- We use the spread in the case forecast to report a subsequent spread in the shelter forecast
- We calculate the number of new rooms need by applying the ratio of occupied rooms:new cases to the number of cases forecasted in each county

- We add a second forecast method for comparison by averaging the shelter forecast with the number of current shelters in use to smooth the forecast

- We add a third forecast method for comparison using a historical record of shelter usage based on a similar time period with the same number of new cases per day, averaged over the previous two weeks

Recommendations

- **In addition to the counties that already have shelters:**

- **Based on current trends in new cases per day and case forecasts, we recommend the following counties be considered for potential shelter locations:**
  - Eddy

Bernalillo County
Cumulative COVID-19 cases and 6-week forecast
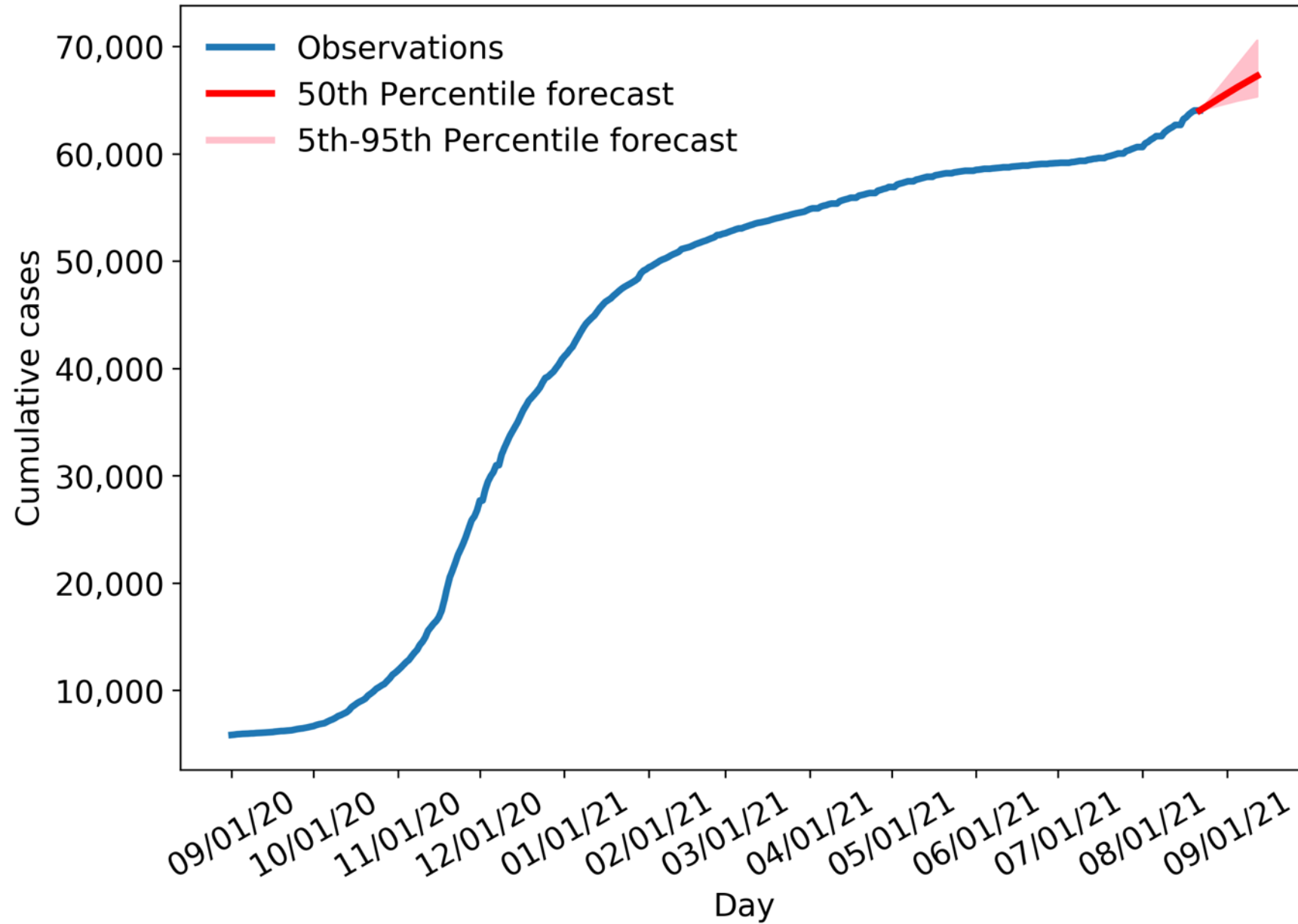
Bernalillo

Number of cases as of 8/22/21: **64,028**
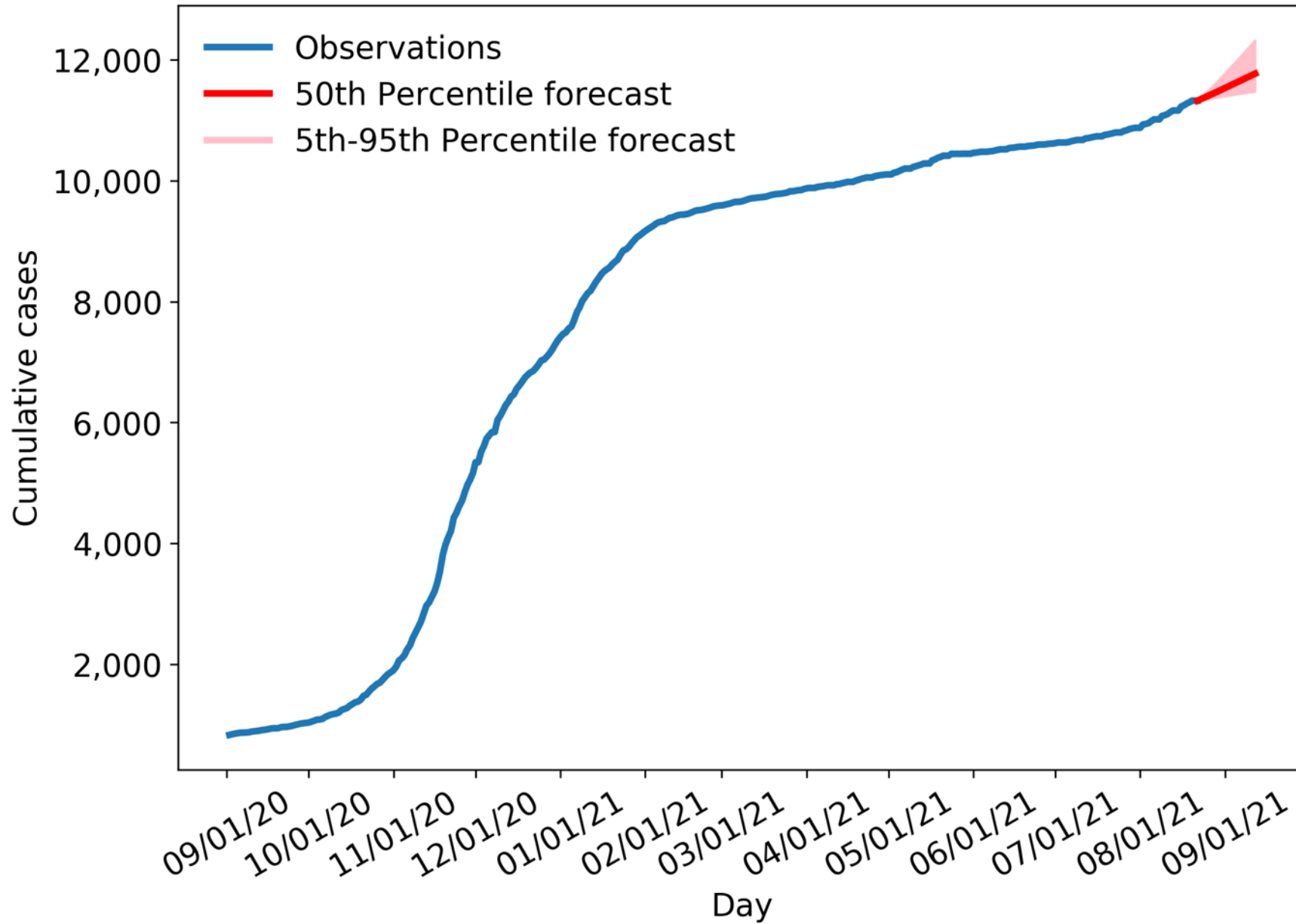Number of shelter rooms available: **221**
Total number of patients/medical workers
(including specialty): **35**
Occupied rooms:new cases ratio: **0.21**
2-week avg. new cases per day: **171**

	8/29/21	9/5/21	9/12/21
# of rooms needed (case ratio forecast)	33 (14-63)	32 (13-64)	30 (11-65)
# of rooms needed (smoothing forecast)	34	33	32
# of rooms needed (historical similarity)	41		

Santa Fe County
Cumulative COVID-19 cases and 6-week forecast

Santa Fe

Number of cases as of 8/22/21: **11,325**
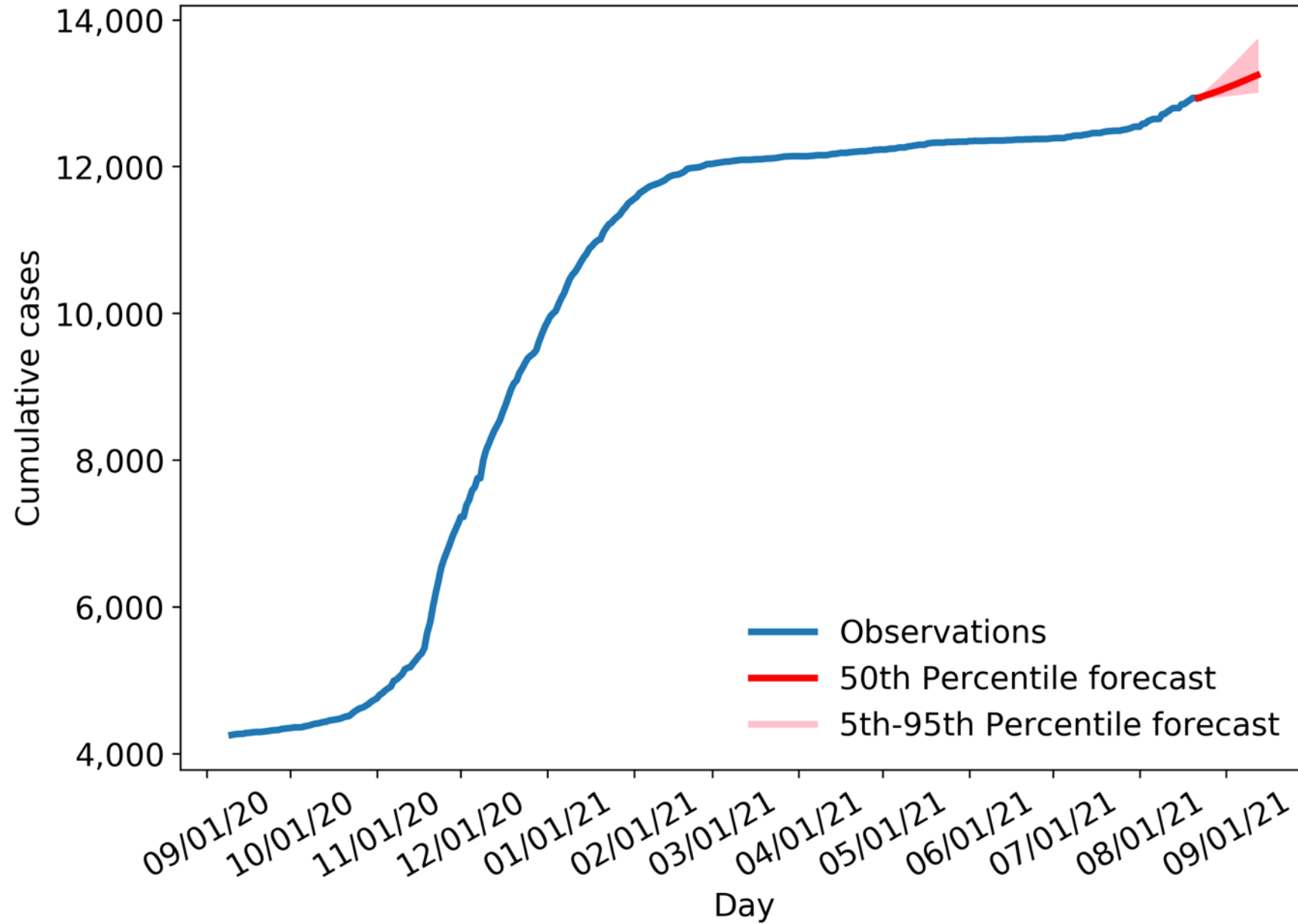Number of shelter rooms available: **44**
Total number of patients/medical workers (including specialty): **8**
Occupied rooms:new cases ratio: **0.36**
2-week avg. new cases per day: **22**

	8/29/21	9/5/21	9/12/21
# of rooms needed (case ratio forecast)	7 (3-16)	8 (3-17)	8 (2-18)
# of rooms needed (smoothing forecast)	8	8	8
# of rooms needed (historical similarity)	13		

McKinley County
Cumulative COVID-19 cases and 6-week forecast

McKinley

Number of cases as of 8/22/21: **12,935**
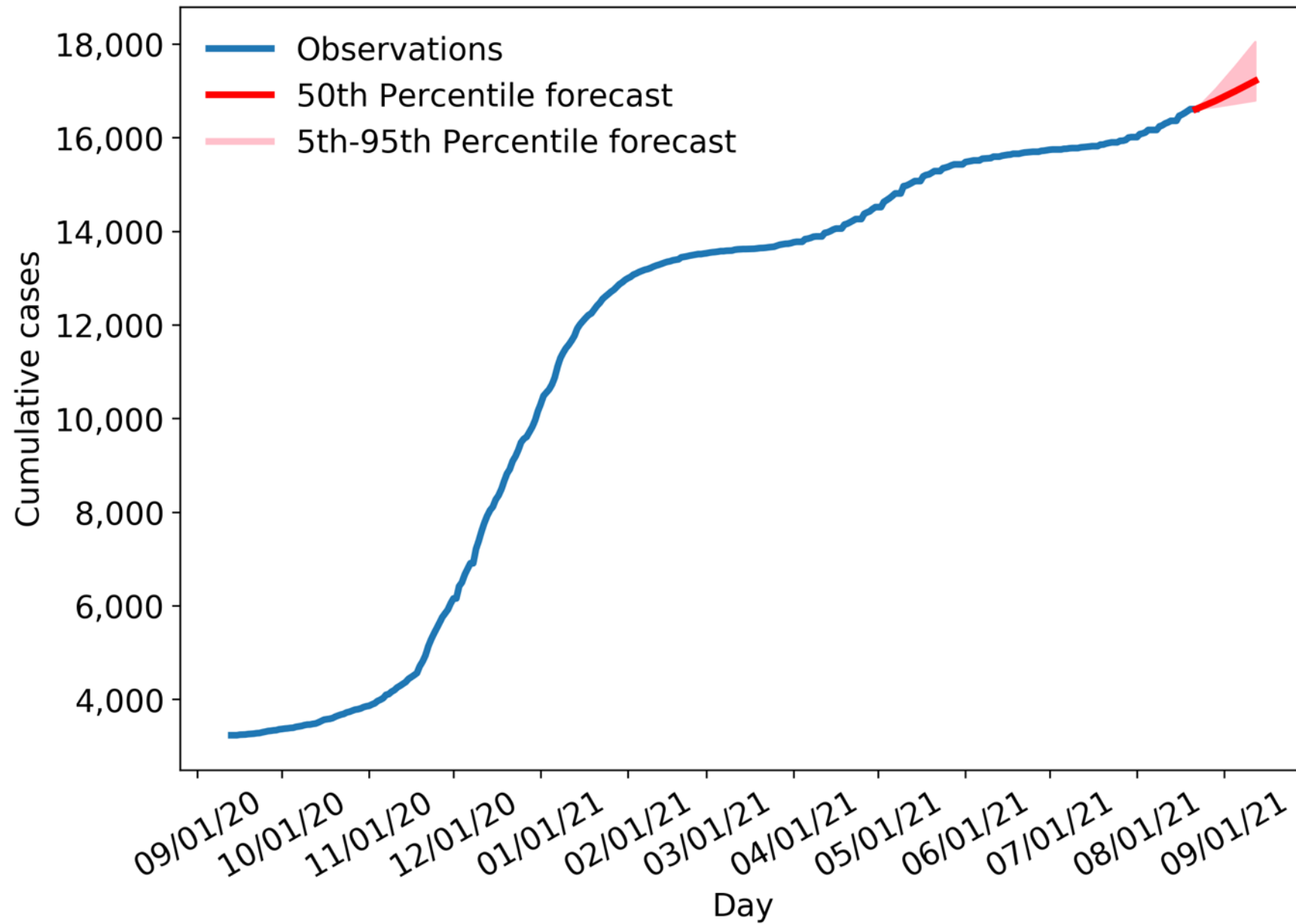Number of shelter rooms available: **410**
Total number of patients/medical workers (including specialty): **111**
Occupied rooms:new cases ratio: **5.4**
2-week avg. new cases per day: **21**

	8/29/21	9/5/21	9/12/21
# of rooms needed (case ratio forecast)	70 (19-187)	81 (24-20)	87 (26-217)
# of rooms needed (smoothing forecast)	91	88	88
# of rooms needed (historical similarity)	23		

San Juan County
Cumulative COVID-19 cases and 6-week forecast

San Juan

Number of cases as of 8/22/21: **16,607**
Number of shelter rooms available: **67**
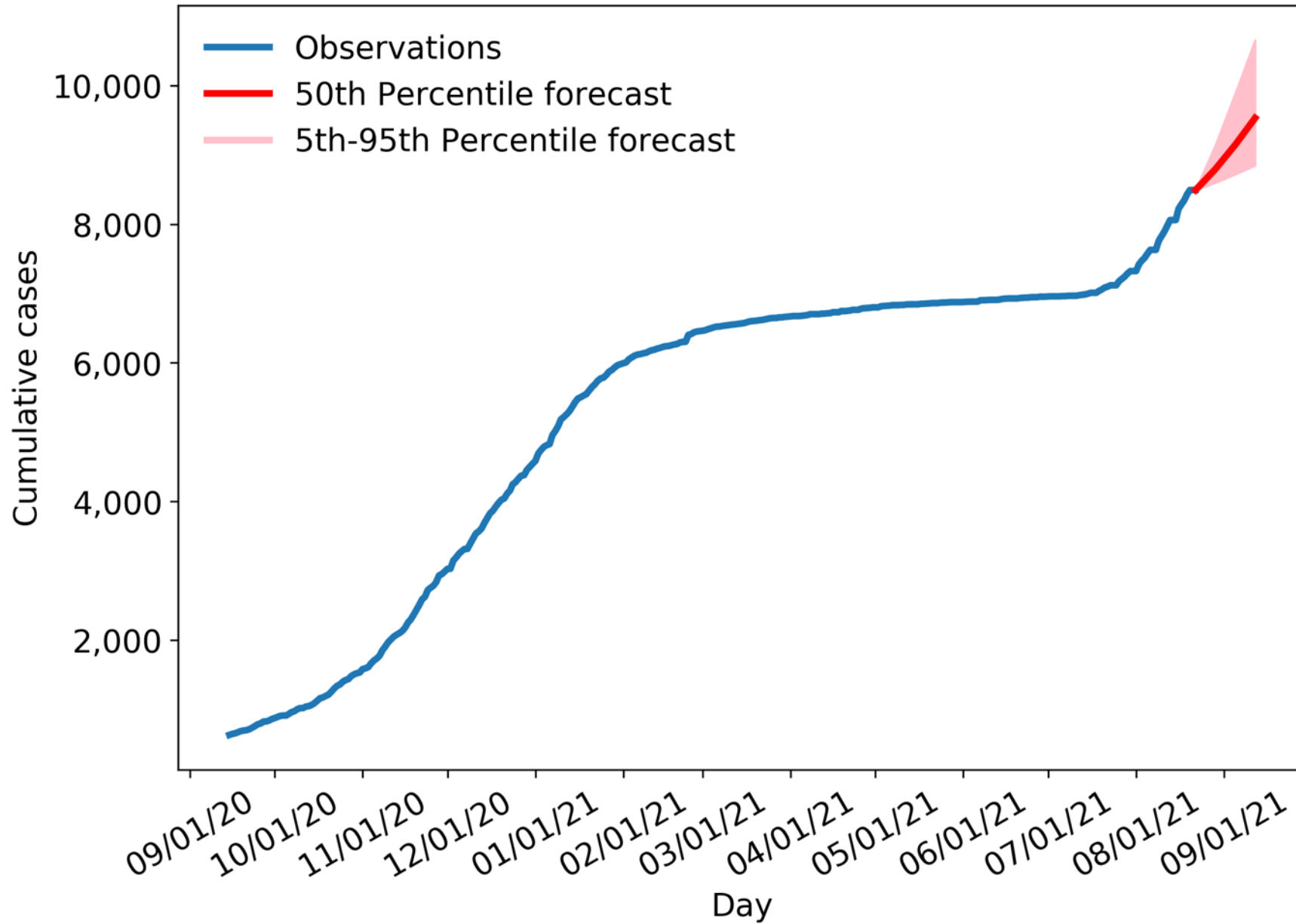Total number of patients/medical workers (including specialty): **1**
Occupied rooms:new cases ratio: **0.03**
2-week avg. new cases per day: **32**

	8/29/21	9/5/21	9/12/21
# of rooms needed (case ratio forecast)	1 (0-2)	1 (0-2)	1 (0-2)
# of rooms needed (smoothing forecast)	1	1	1
# of rooms needed (historical similarity)	1		

Eddy County
Cumulative COVID-19 cases and 6-week forecast

Legend:
- Observations
- 50th Percentile forecast
- 5th-95th Percentile forecast

Y-axis: Cumulative cases
X-axis: Day

Eddy

Number of cases as of 8/22/21: **8,494**
Number of shelter rooms available: **0**
Total number of patients/medical workers (including specialty): **0**
Occupied rooms:new cases ratio: **0**
2-week avg. new cases per day: **62**

|	8/29/21	9/5/21	9/12/21
# of rooms needed (case ratio forecast)	-	-	-
# of rooms needed (smoothing forecast)	-	-	-
# of rooms needed (historical similarity)	-		

24 Aug 2021: EpiGrid modeling

- Increases in NM daily incidence have *greatly* moderated. County-level and sub-county-level low-vaccine area outbreaks continue to drive a dominant part of the case load.
- Peak height may be pessimistic, in some areas the roll-over may be faster given vaccination.
- *Failure of continued adherence to the masking order, school infection control, etc. will nullify these curves.*
- 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/Δ


United States__New Mexico

United States__New Mexico
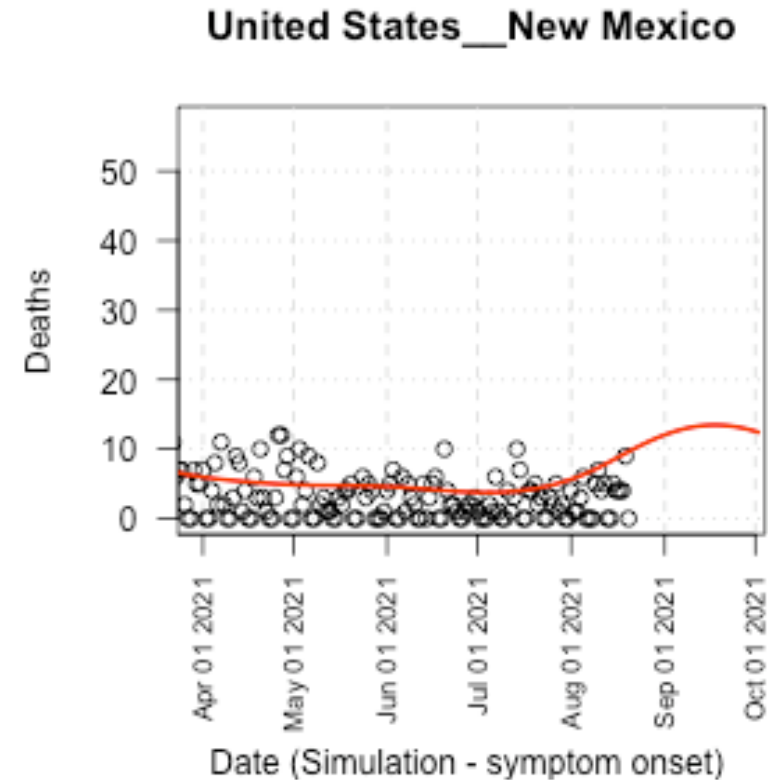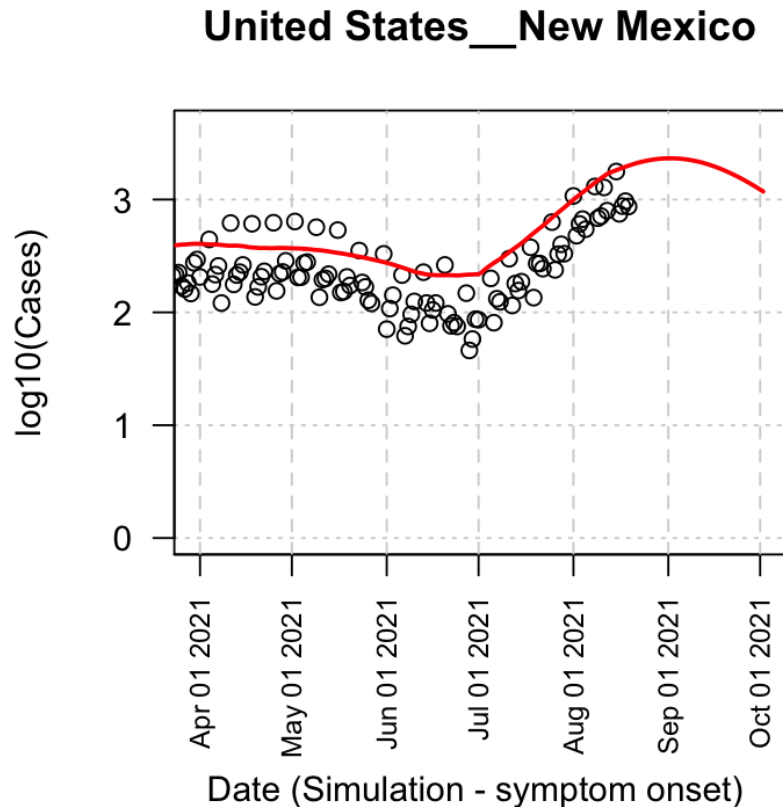
A look at the raw incidence data

- Sunday, Monday
- Tuesday
- Wednesday/Thursday
- Friday
- Saturday
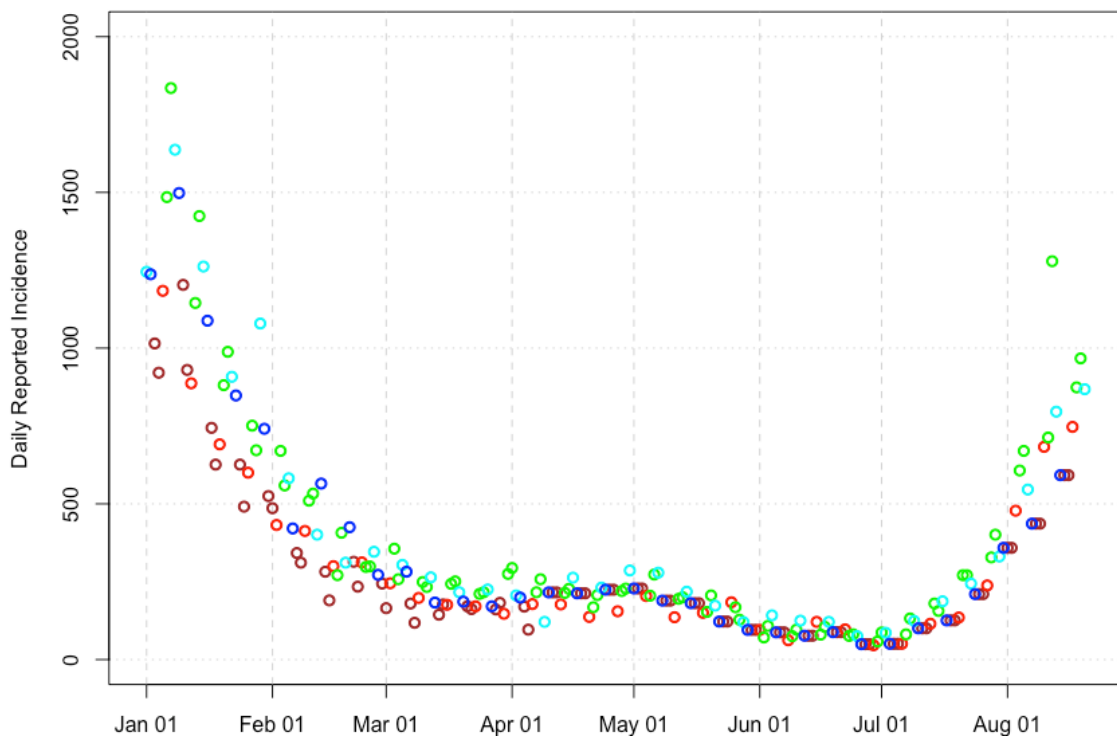
Cases rates are moderating (a little).

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.
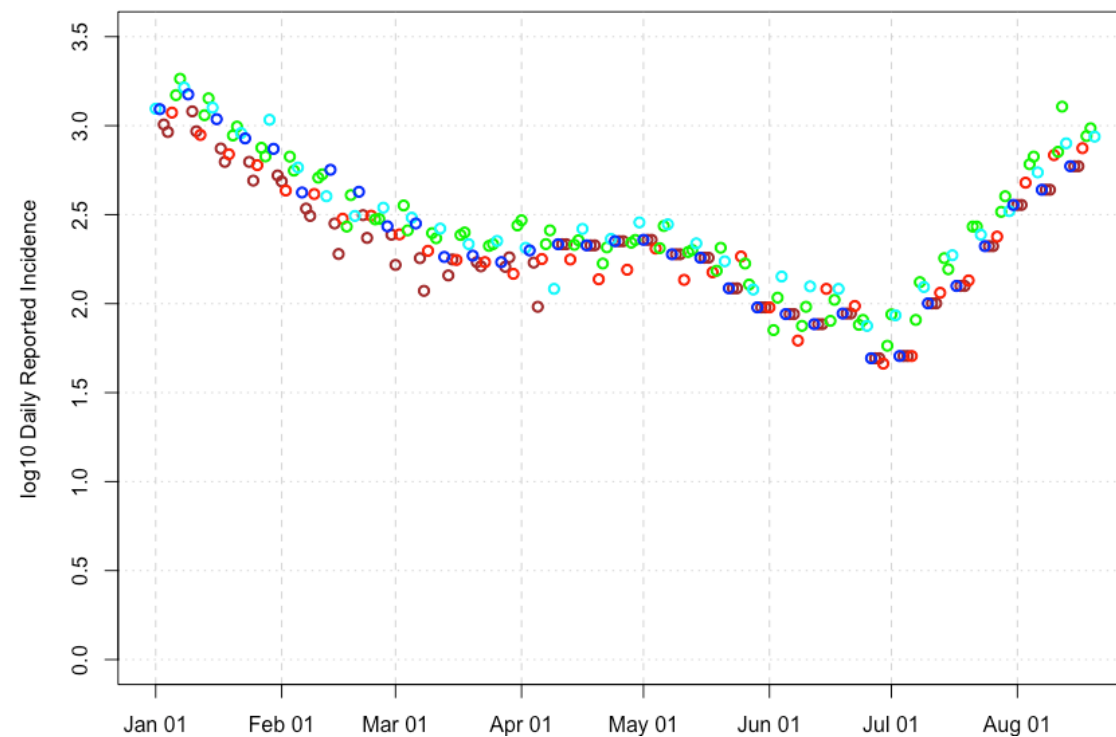
24 August 2021 Vaccine Analysis and Summary

- **~1331k first doses have been administered in NM.**
- **~1154k completed vaccine series in NM.**
- **Epigrid is modeling this as 1330k first doses.**
- **~63.5% of all persons in New Mexico are vaccinated.**

- **Licensure/Approval of Pfizer creates multiple opportunities to rapidly increase the number of vaccinated persons.**

- **Substantially better control likely with >10% increases in vaccination uptake.**

Black – vaccination for all New Mexicans

Red – First dose data used in EpiGrid.
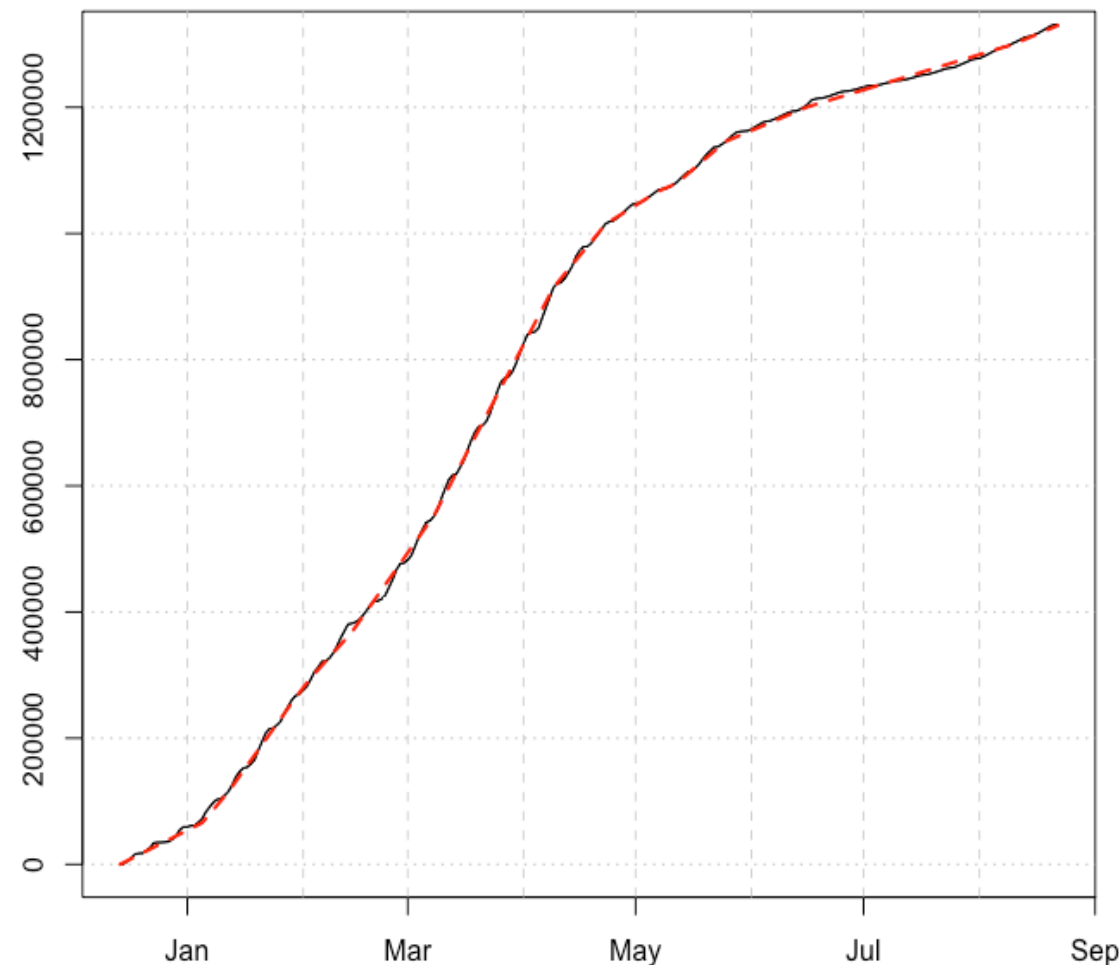
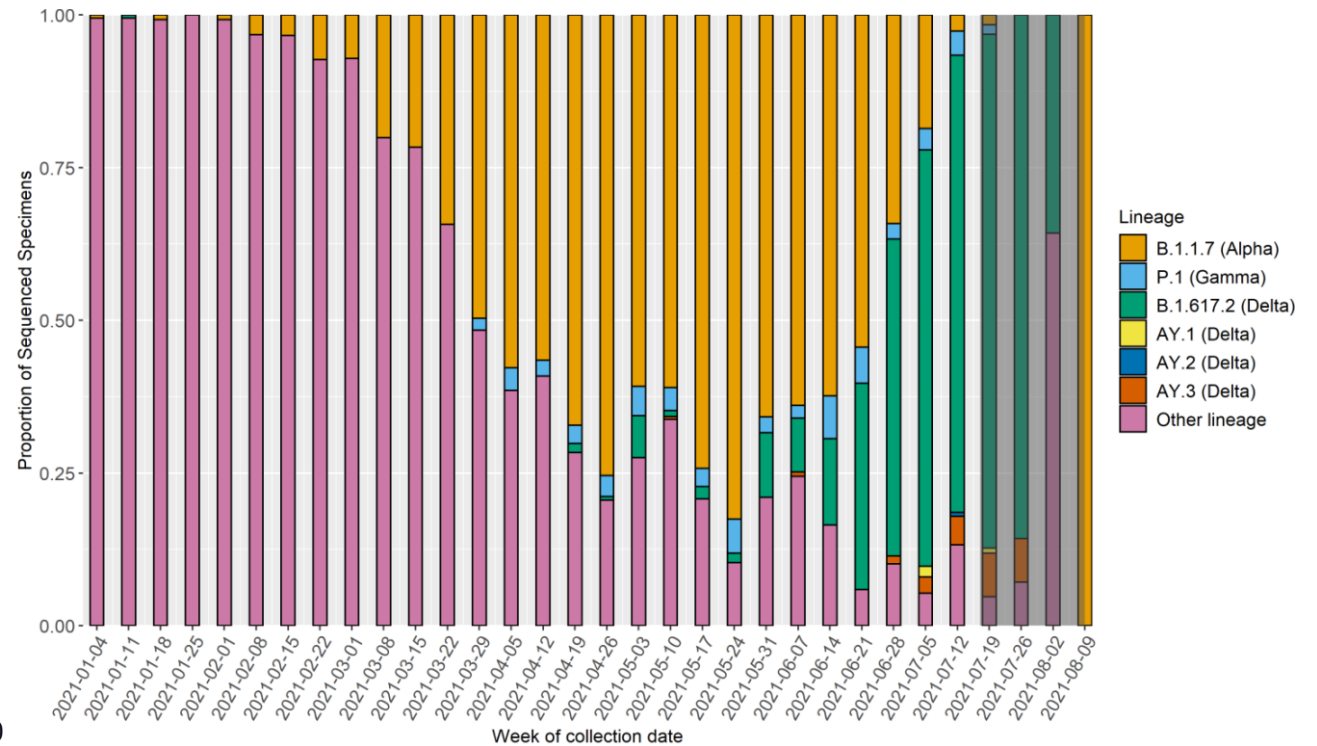# Variants: Still Delta (for now, keep watching …)

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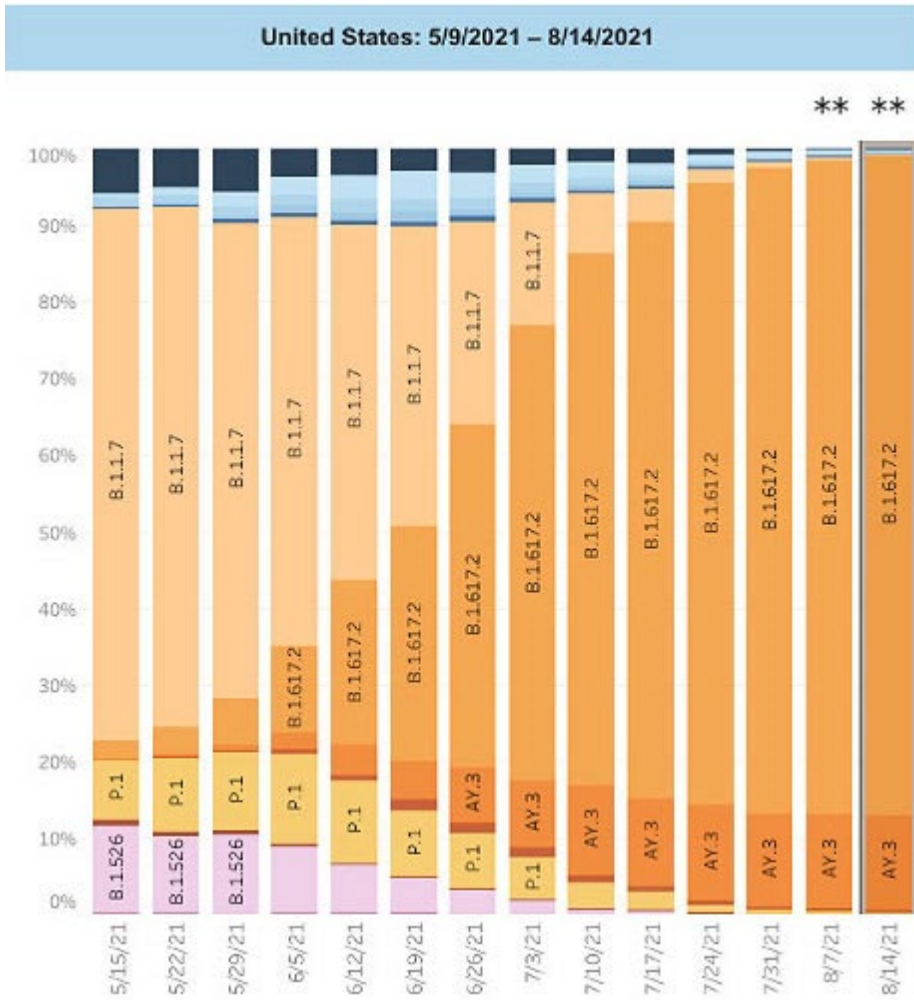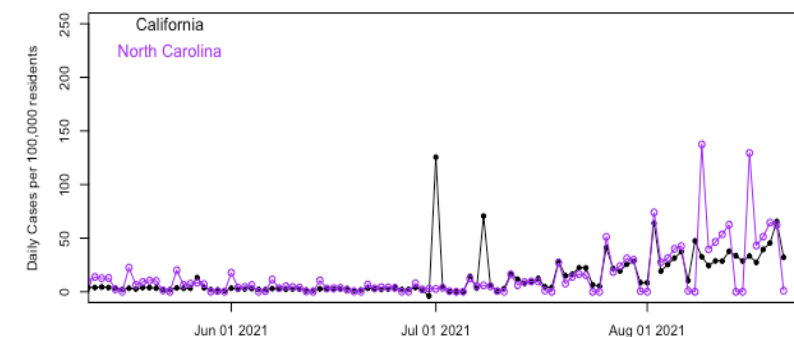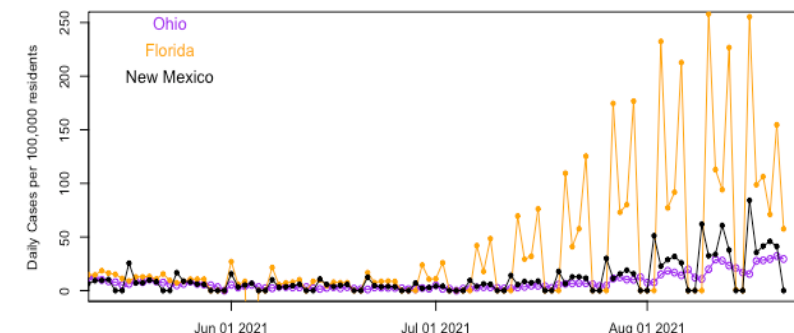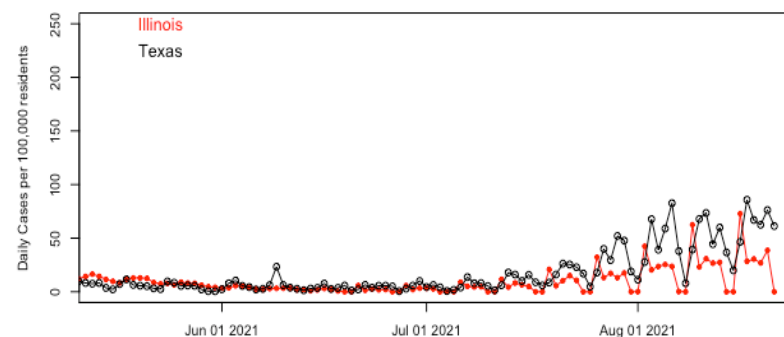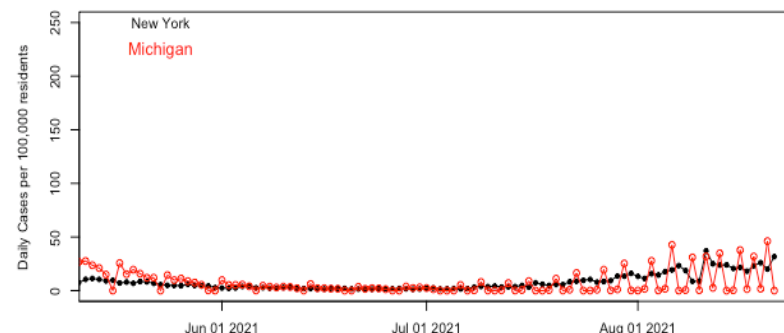

New Mexico data, Delta dominant

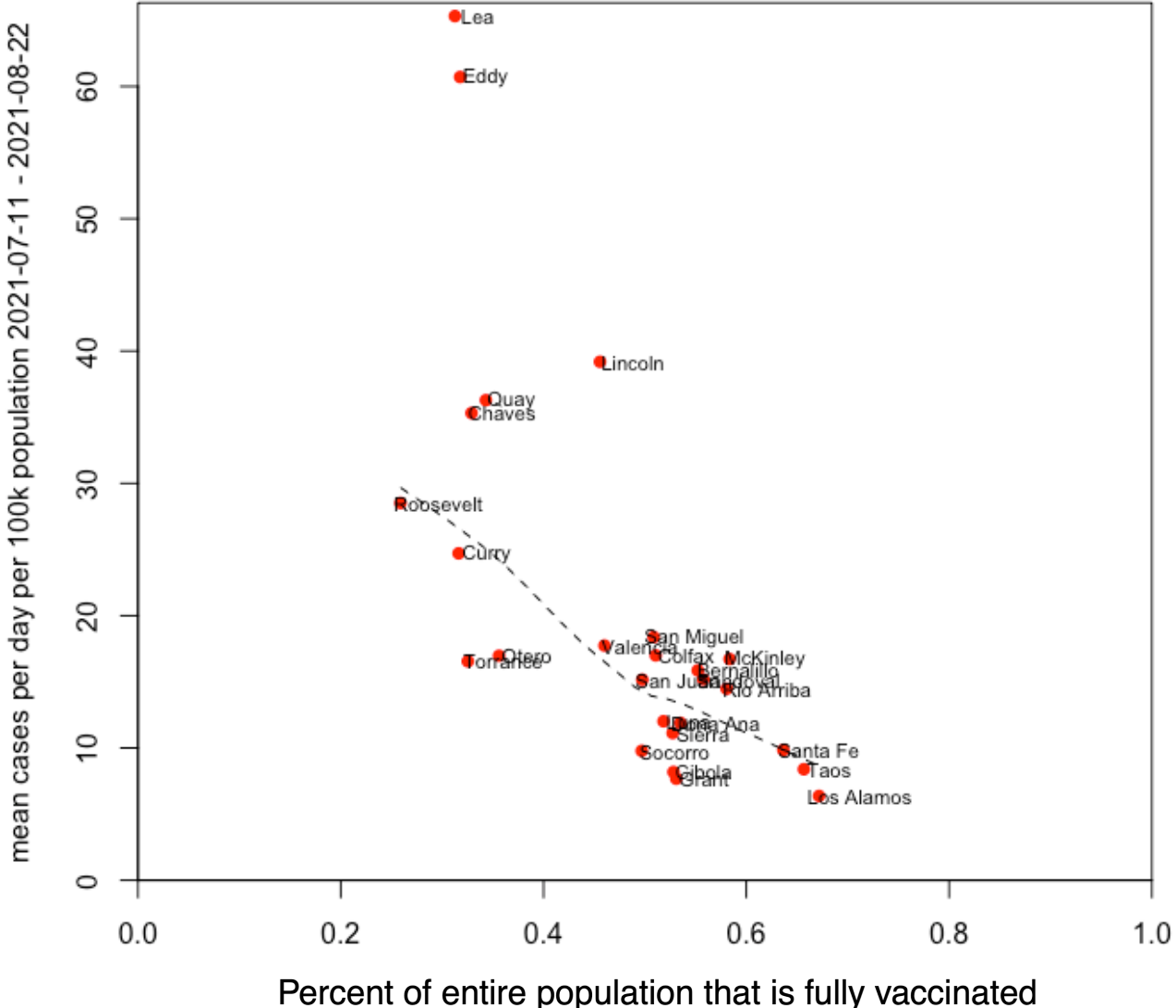# What is happening in the rest of the U.S.? The 10 most populous states plus New Mexico

Trend over the last 3 weeks: Increasing: Georgia, Illinois, Michigan, California(?), New Mexico(?). Recent increases: Ohio. Steady: New York, Florida, Texas, Pennsylvania, North Carolina.

	Cases	Deaths
New York	23.04	0.108
Michigan	17.02	0.153
Ohio	25.62	0.091
Florida	106.24	0.967
New Mexico	35.47	0.176
Illinois	28.17	0.149
Texas	59.88	0.456
California	38.86	0.162
North Carolina	50.22	0.307
Georgia	70.14	0.28
Pennsylvania	19.18	0.122

Daily rates per 100,000 residents averaged August 15th thru August 21st 2021.
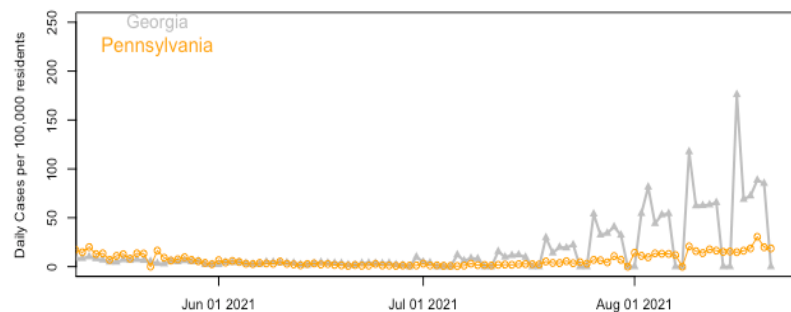
Cases plotted versus vaccination by county

mean cases per day per 100k population 2021-07-11 - 2021-08-22

Percent of entire population that is fully vaccinated

The relationship between vaccination and cases is strong.

- Rio Arriba county is less of an outlier than recently.

- Lea and Eddy Counties have high incidence, possibly even when accounting for low vaccine adoption. Lincoln in this category too.

- 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)