Modeling & Forecasting COVID-19 in NM

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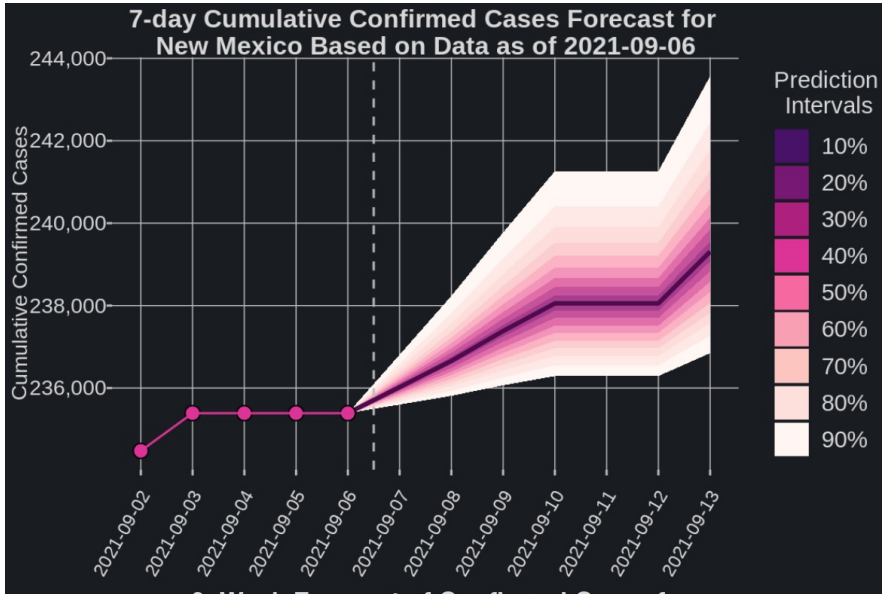
September 7, 2021

NNSA
National Nuclear Security Administration

Short- & Long-Term Forecast for NM: Cases

Cumulative Cases



6–Week Forecast of Confirmed Cases for New Mexico Based on Data as of 2021–09–06

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)^	Worst Case (95th Percentile)
2021–09–06		235,390*	
2021–09–13	236,847	239,308	243,568
2021–09–20	238,017	242,840	251,240
2021–09–27	239,056	246,099	258,710
2021–10–04	239,901	249,140	266,170
2021–10–11	240,639	252,162	273,698
2021–10–18	241,286	255,073	281,213

*Last reported confirmed cases count
^Closest–matching scenario

Daily Average

6–Week Forecast of Daily Average of Confirmed Cases for New Mexico Based on Data as of 2021–09–06

Week End Date	Best Case (5th Percentile)	Middle Case (50th Percentile)^	Worst Case (95th Percentile)
2021–09–06		515*	
2021–09–13	206	558	1,168
2021–09–20	164	503	1,108
2021–09–27	138	464	1,084
2021–10–04	115	438	1,087
2021–10–11	94	416	1,125
2021–10–18	77	397	1,180

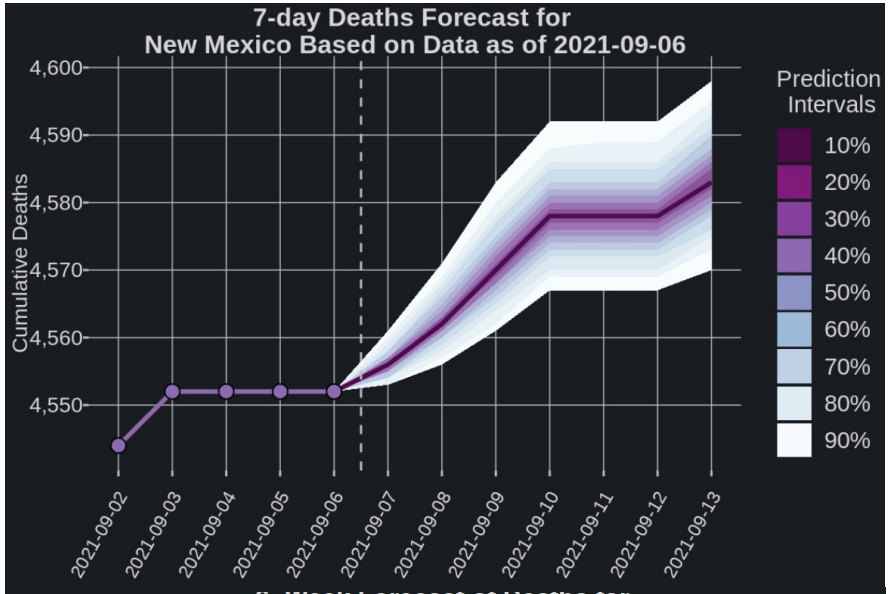
*Last reported confirmed cases count
^Closest–matching scenario

So what?

Our model suggests that the number of daily cases is expected to be around 500 in the next few weeks

Short- & Long-Term Forecast for NM: Deaths

Cumulative Cases



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

Daily Average

6–Week Forecast of Daily Average of Deaths
for New Mexico Based on Data as of 2021–09–06

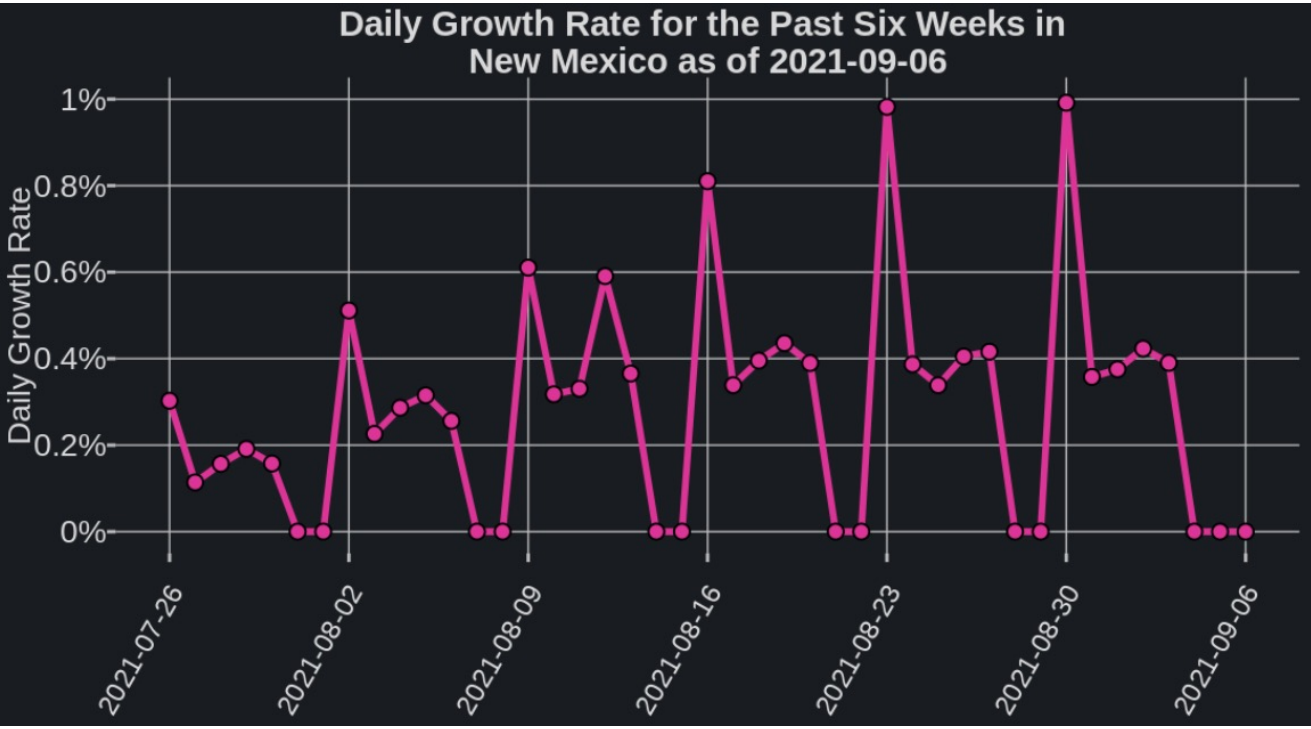
Week Start Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)^
2021–09–06		6*	
2021–09–13	1	4	9
2021–09–20	1	4	9
2021–09–27	1	4	9
2021–10–04	1	4	9
2021–10–11	1	4	9
2021–10–18	1	4	9

*Last reported confirmed deaths
^Closest–matching scenario

So what?

Our model suggests that the number of daily deaths is expected to range between 1 and 9 in the next few weeks

Growth Rate for NM



6-Week Forecast of the Average Weekly Growth Rate for New Mexico Based on Data as of 2021-09-06

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)^	Worst Case (95th Percentile)
2021-09-06		0.22%*	
2021-09-13	0.088%	0.24%	0.49%
2021-09-20	0.070%	0.21%	0.44%
2021-09-27	0.062%	0.19%	0.42%
2021-10-04	0.050%	0.18%	0.41%
2021-10-11	0.044%	0.17%	0.40%
2021-10-18	0.038%	0.16%	0.39%

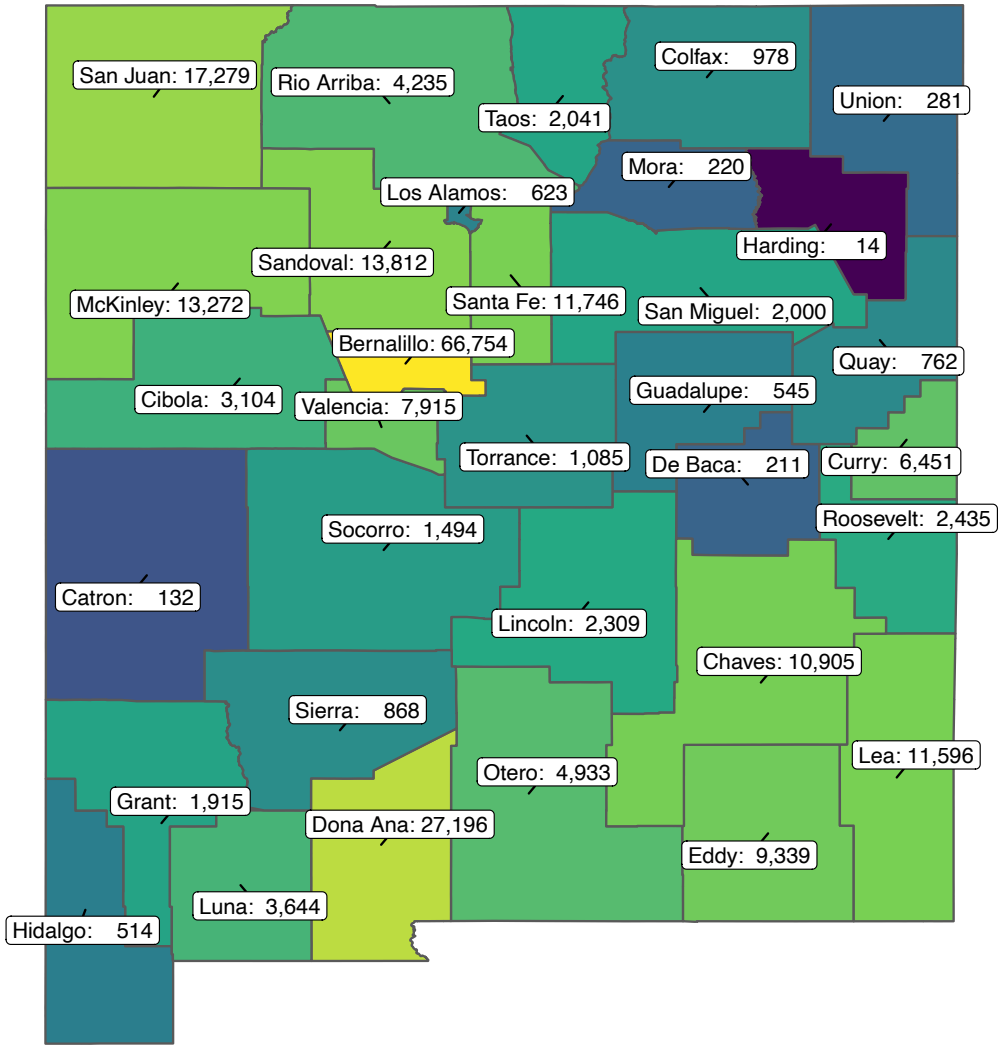
*Last weekly mean daily growth rate

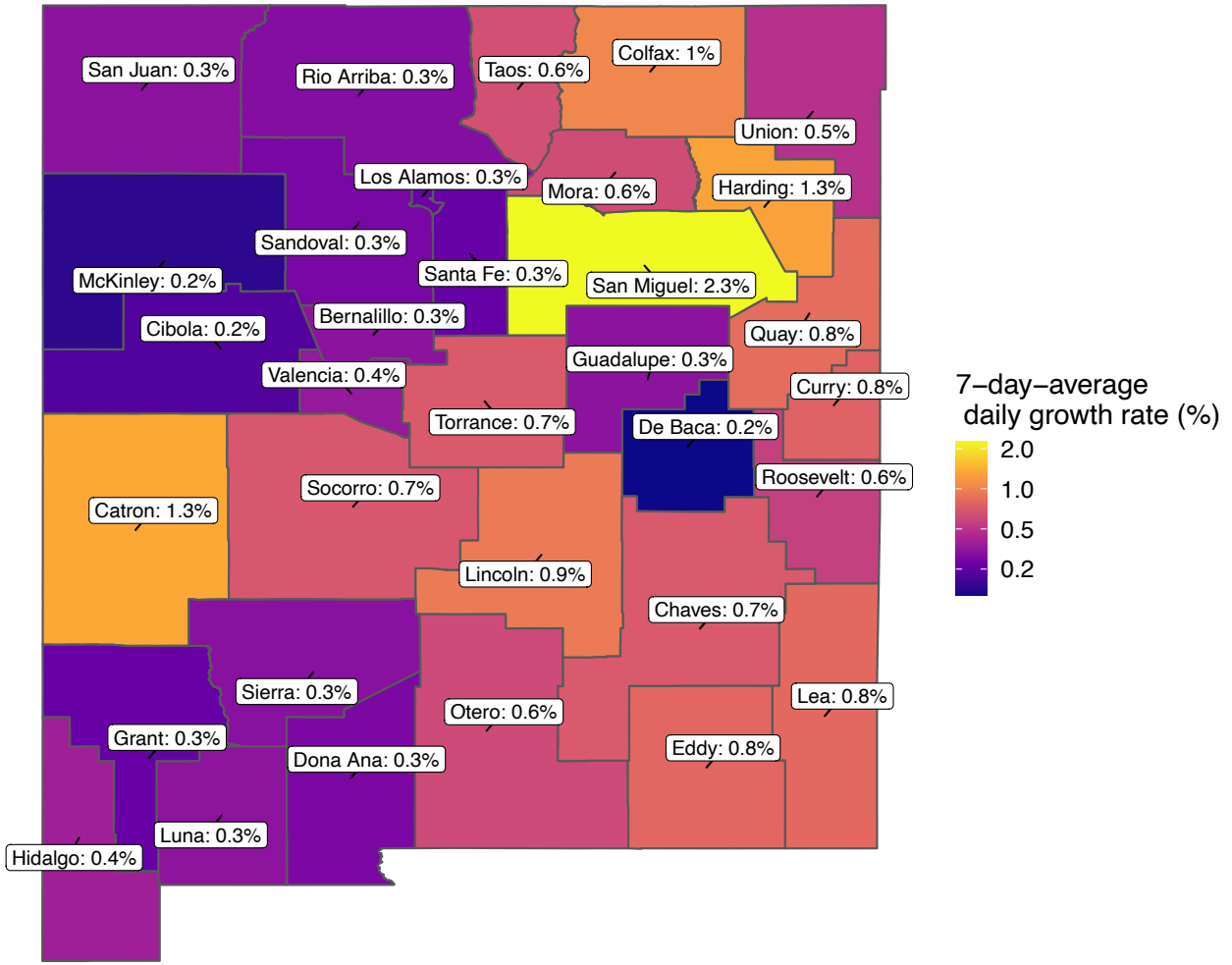
^Closest-matching scenario

So what?

As of September 7th, the average growth rate in NM is at 0.22% (down from 0.36%)

Cumulative Cases & Daily Growth Rate for NM: Sept 6

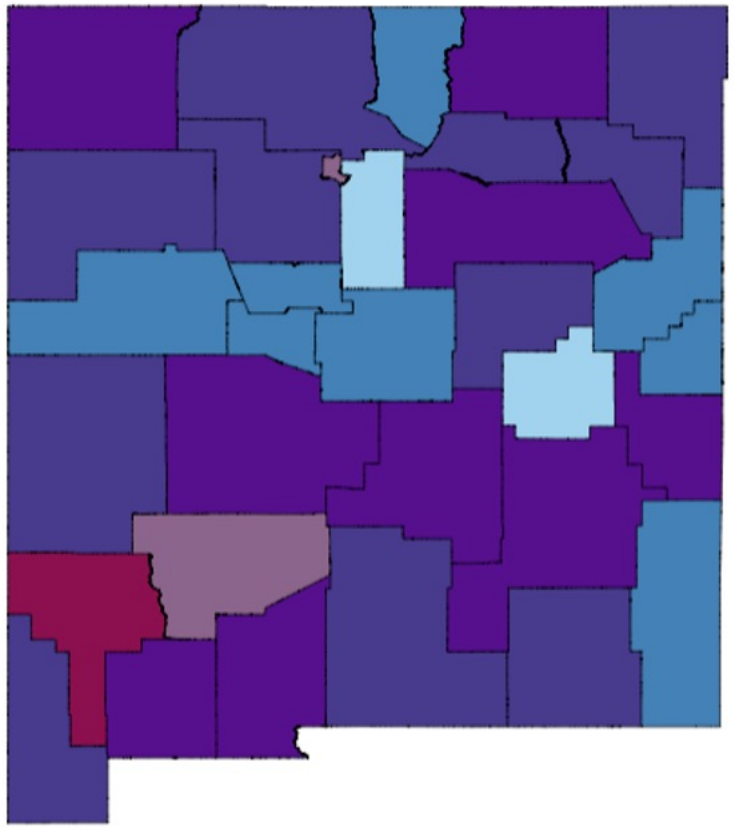




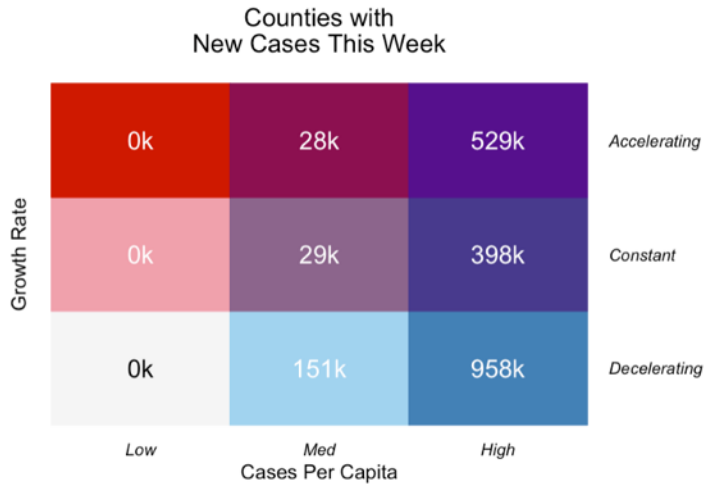
Cumulative growth rates are rising in middle NM

*Growth rate is in cumulative cases

Weekly Growth Rate for NM: Another View (Sept 6)



Impacted Nev Mexicans



So what?

- Most people in New Mexico are living in a county that is high per-capita case counts with mixed accelerating and accelerating
- Dona Ana, Chaves, San Juan, San Miguel, Lincoln, Colfax, Luna, Socorro are accelerating with high per-capita cases (

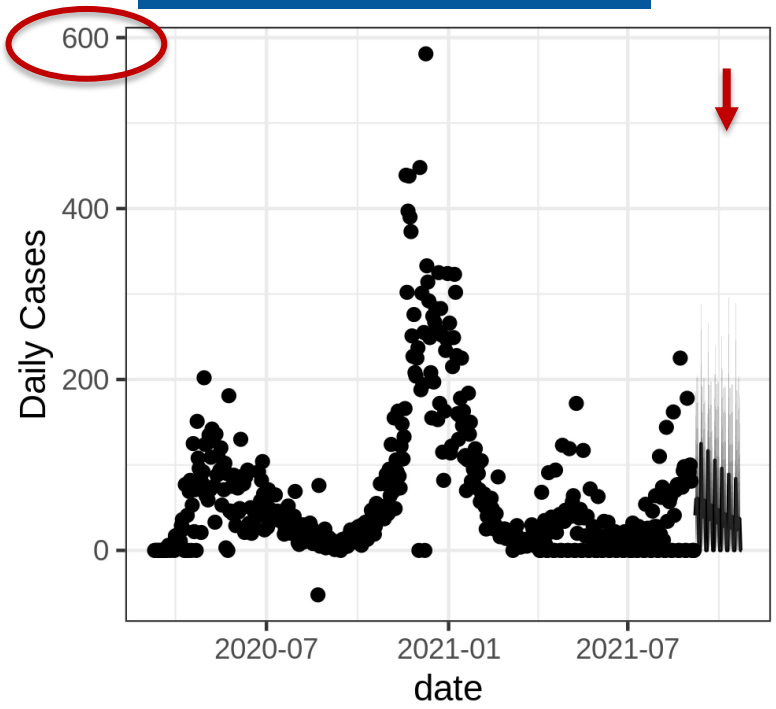
Number of New Mexicans living in regions with particular combinations of per capita case counts and 7-day growth rates

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

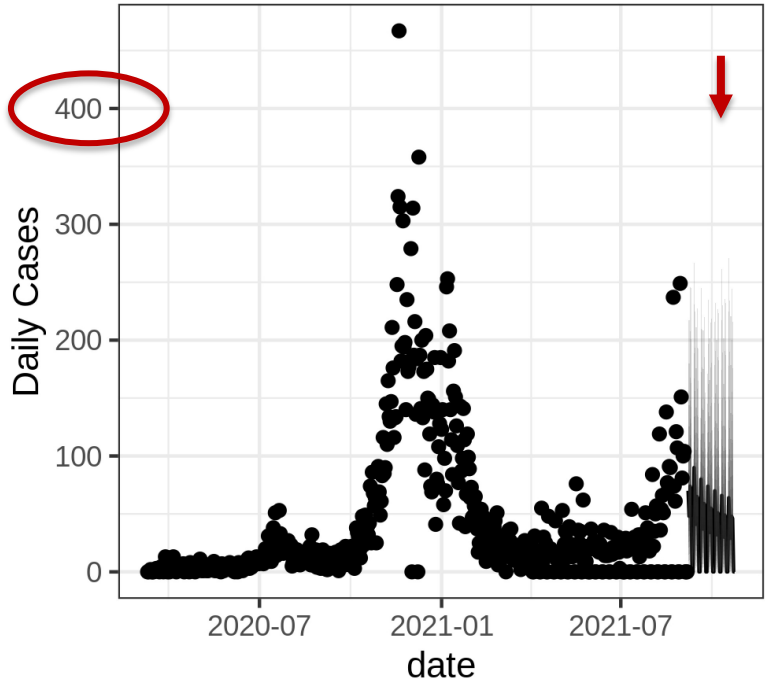
> Additional Regional Forecasts

Central & North Regions Daily Cases Forecast

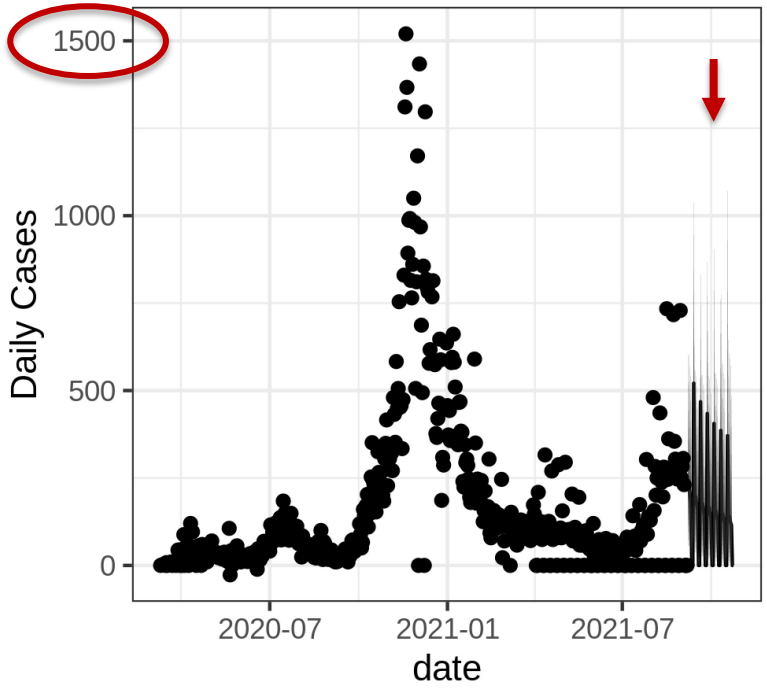
Northwest



Northeast



Central



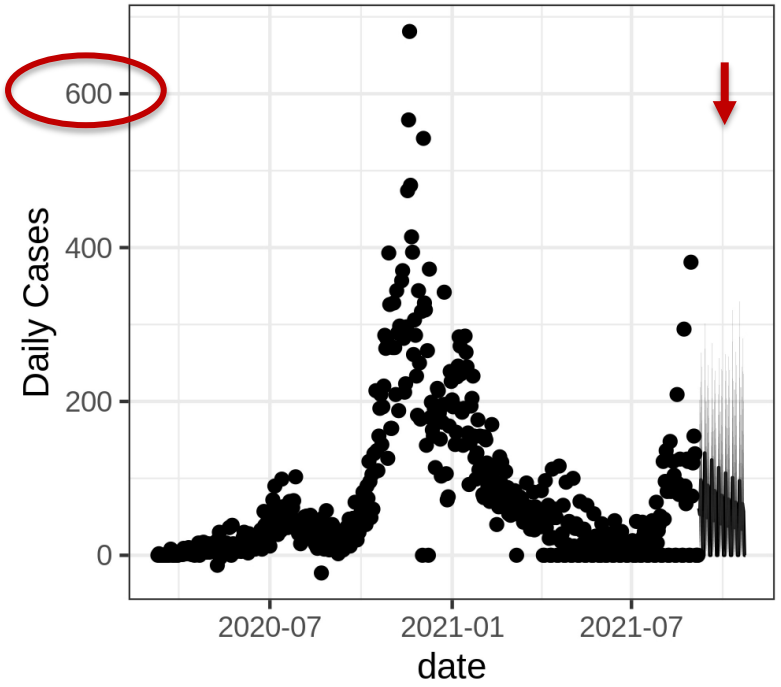
So what?

All regions are expected to see a decline in the number of cases

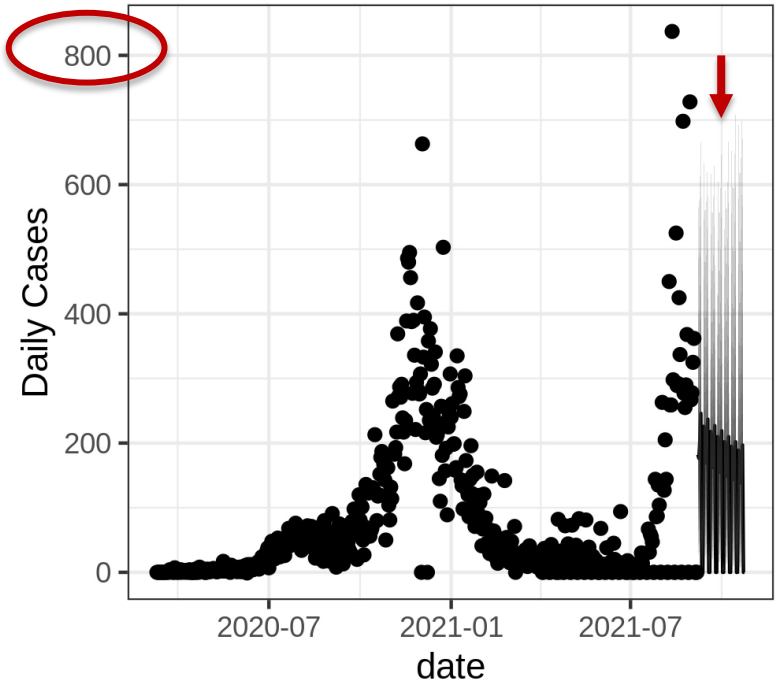
***These forecasts may change due to Labor Day travel & activities**

South Regions Daily Cases Forecast

Southwest



Southeast



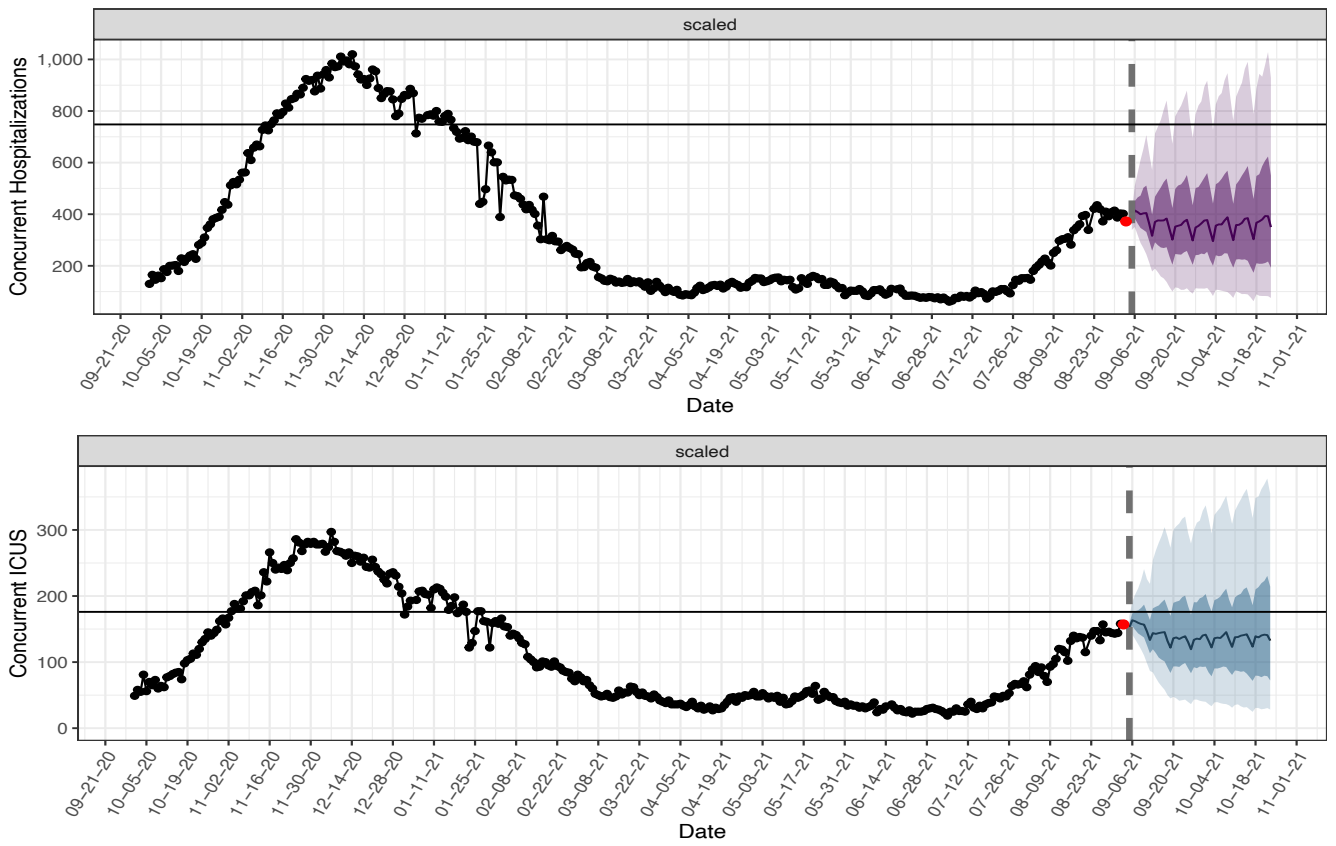
So what?

All regions are expected to see a decline in the number of cases

***These forecasts may change due to Labor Day travel & activities**

> Hospitalization Forecast

Concurrent Hosp & ICU Beds Based on Forecasts – Average Stay of 8 Hosp, 15 Days for ICU/vent & 25% ICU rate



Concurrent COVID-19 ICU beds

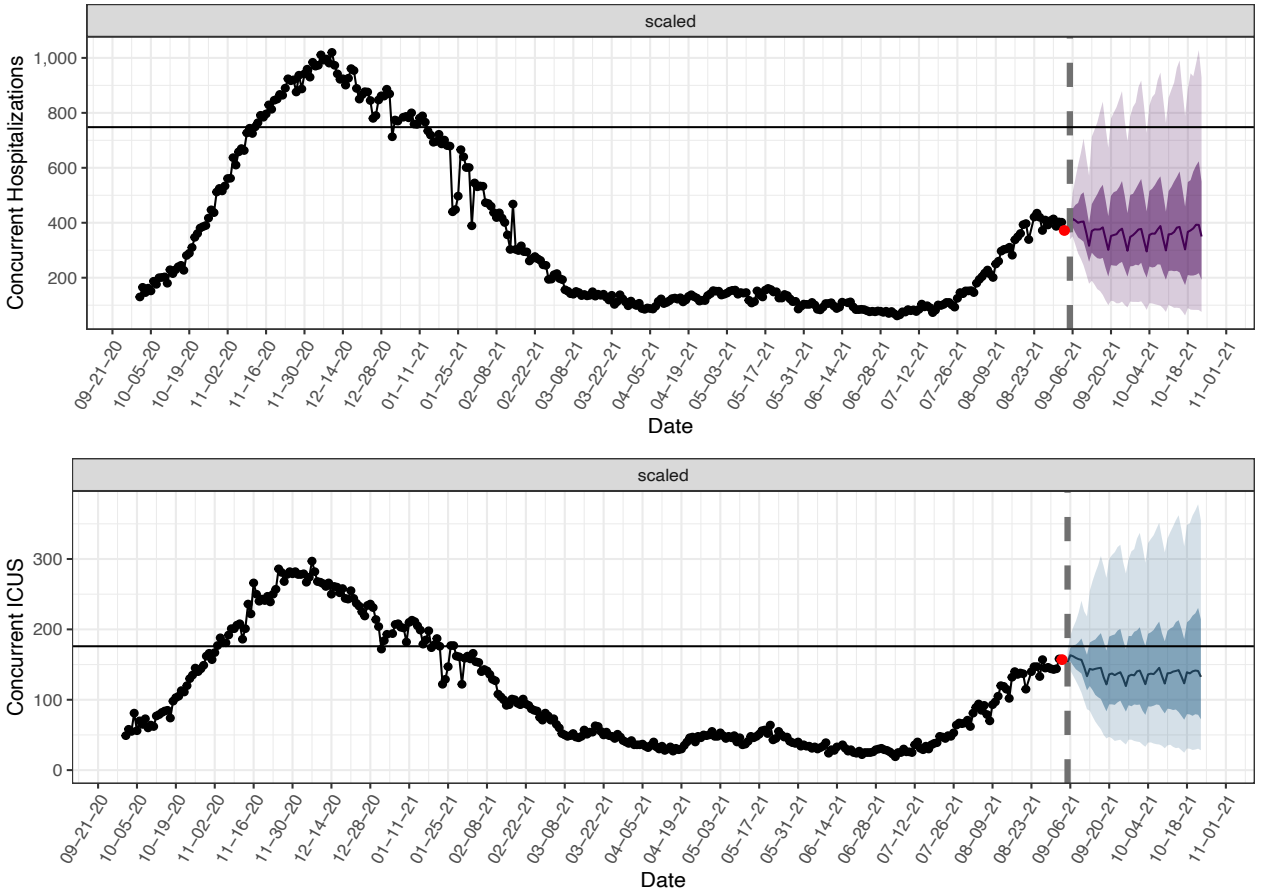
Week	Qu. 5% (best case)	Qu. 50% (median)	Qu. 95% (worst case)
9/12	87	133	218
9/19	45	122	273
9/26	36	119	280
10/3	33	122	295
10/10	31	123	309
10/17	25	123	318

"Scaled" Scenario

So what?

Model is predicting a slow decrease in COVID-19 ICU beds needed over the next 3 weeks

Concurrent Hosp & ICU Beds Based on Forecasts – Average Stay of 8 Hosp, 15 Days for ICU/vent & 25% ICU rate



Concurrent COVID-19 non-ICU "med-surge" beds

Week	Qu. 5% (best case)	Qu. 50% (median)	Qu. 95% (worst case)
9/12	91	183	353
9/19	55	180	400
9/26	56	179	417
10/3	50	173	432
10/10	45	176	454
10/17	38	180	471

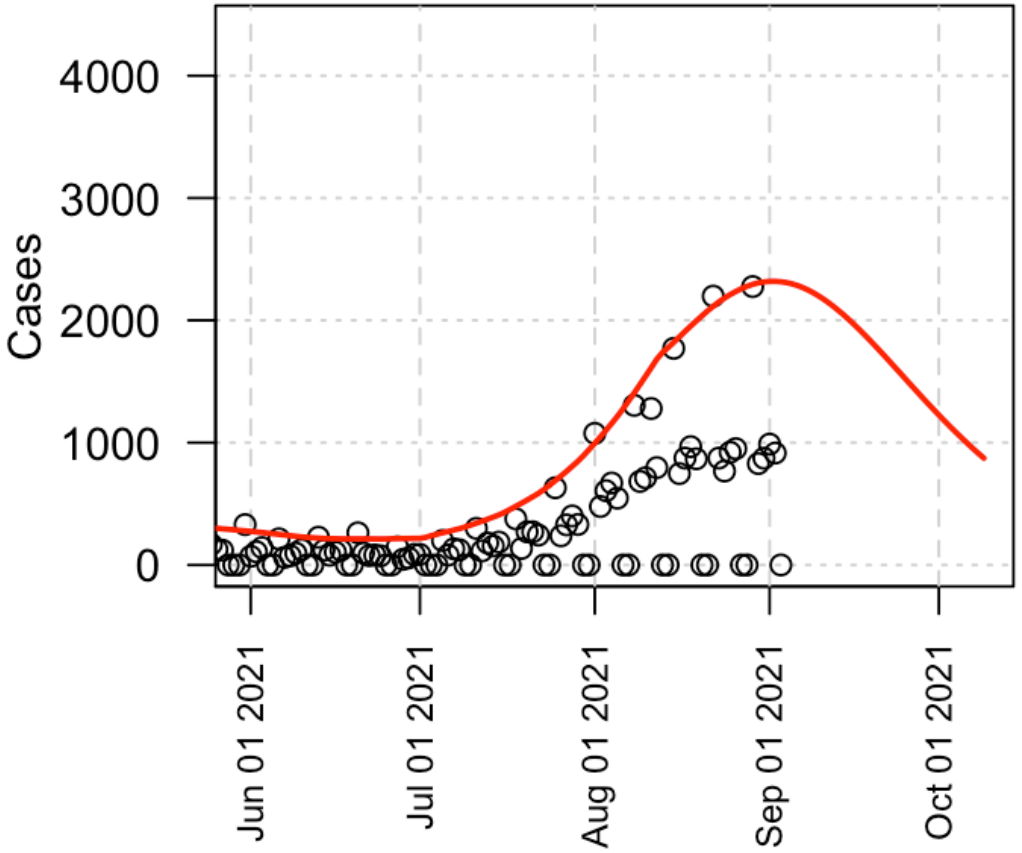
"Scaled" Scenario

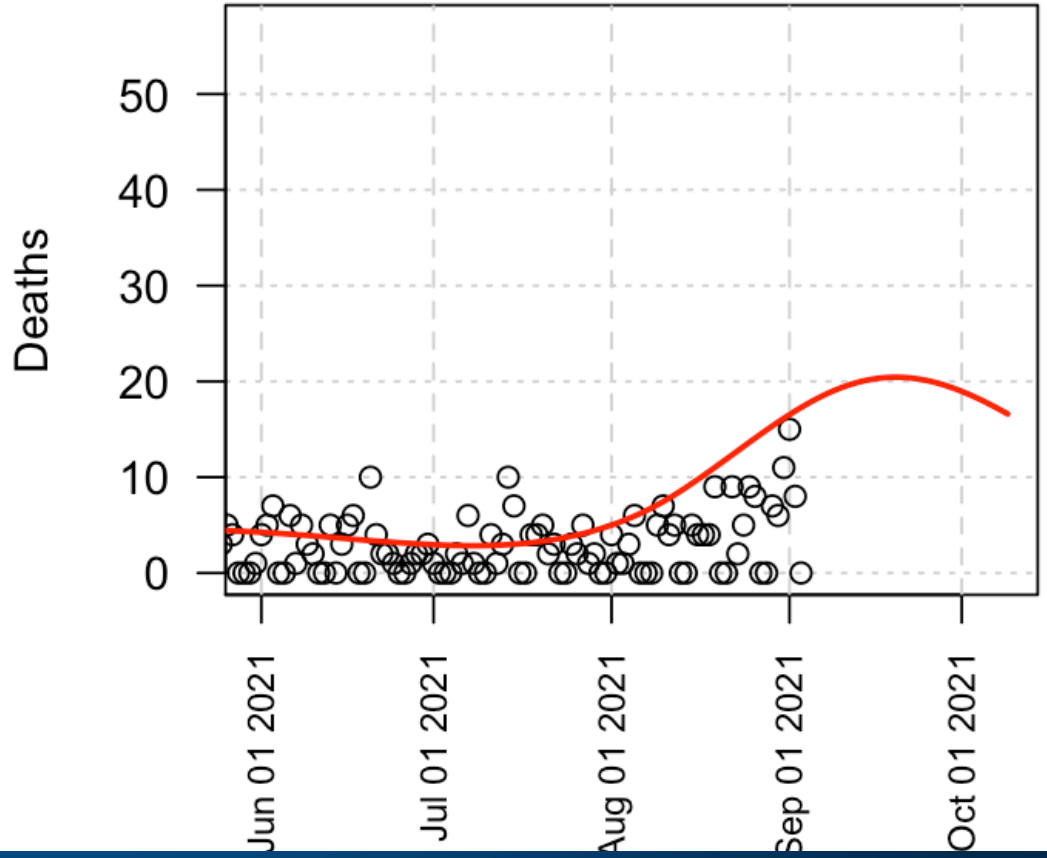
So what?

Med-surge general bed needs are predicted to gradually decrease during the next 3 weeks

7 Sept 2021: EpiGrid modeling

- Statewide NM daily incidence is plateauing. By-county and regional heterogeneity are determining outcomes. *Some counties improving, others are not.* The red curve likely rolls over too fast.
- High daily incidence likely impairing some mitigations (i.e. tracing, followed by quarantine or isolation).
- Testing positivity rates in some counties may also be compromising mitigations.
- NM daily deaths will likely peak in September or early October, contingent on continued improvement.



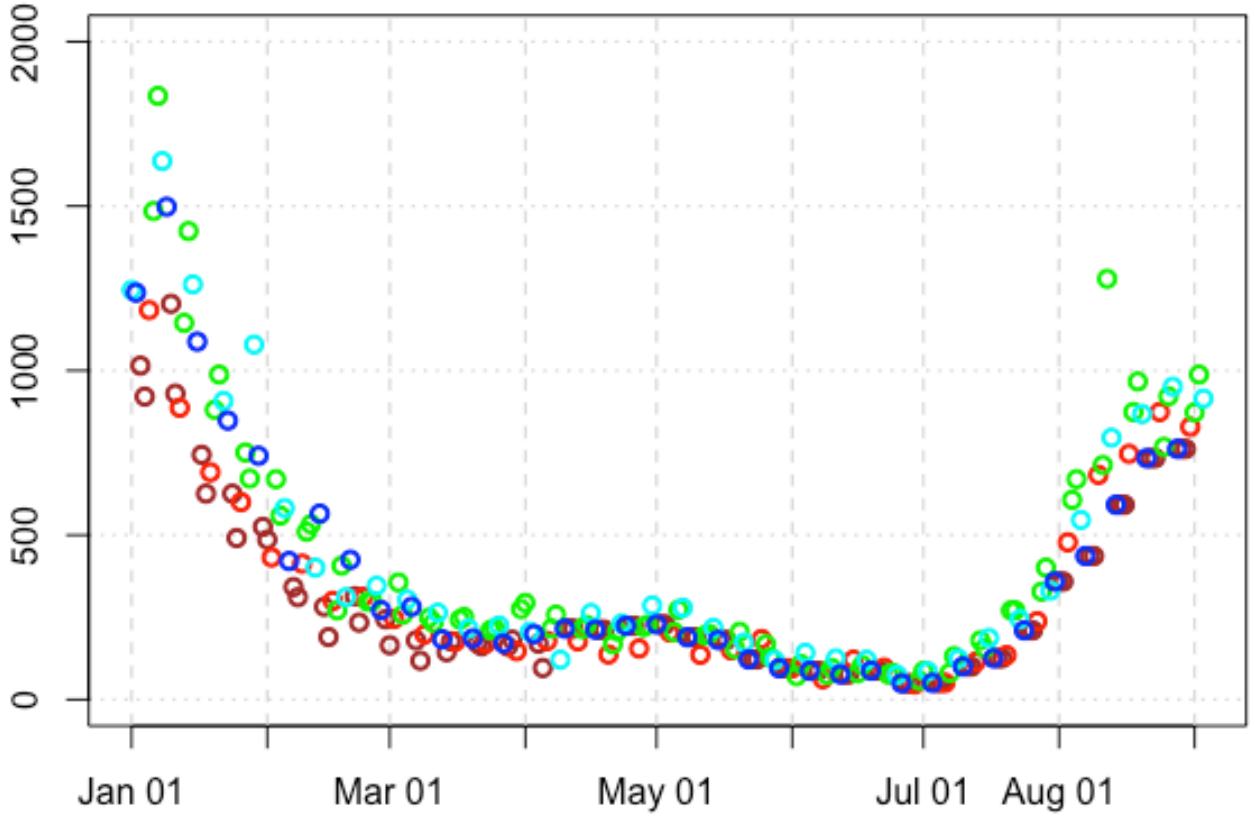


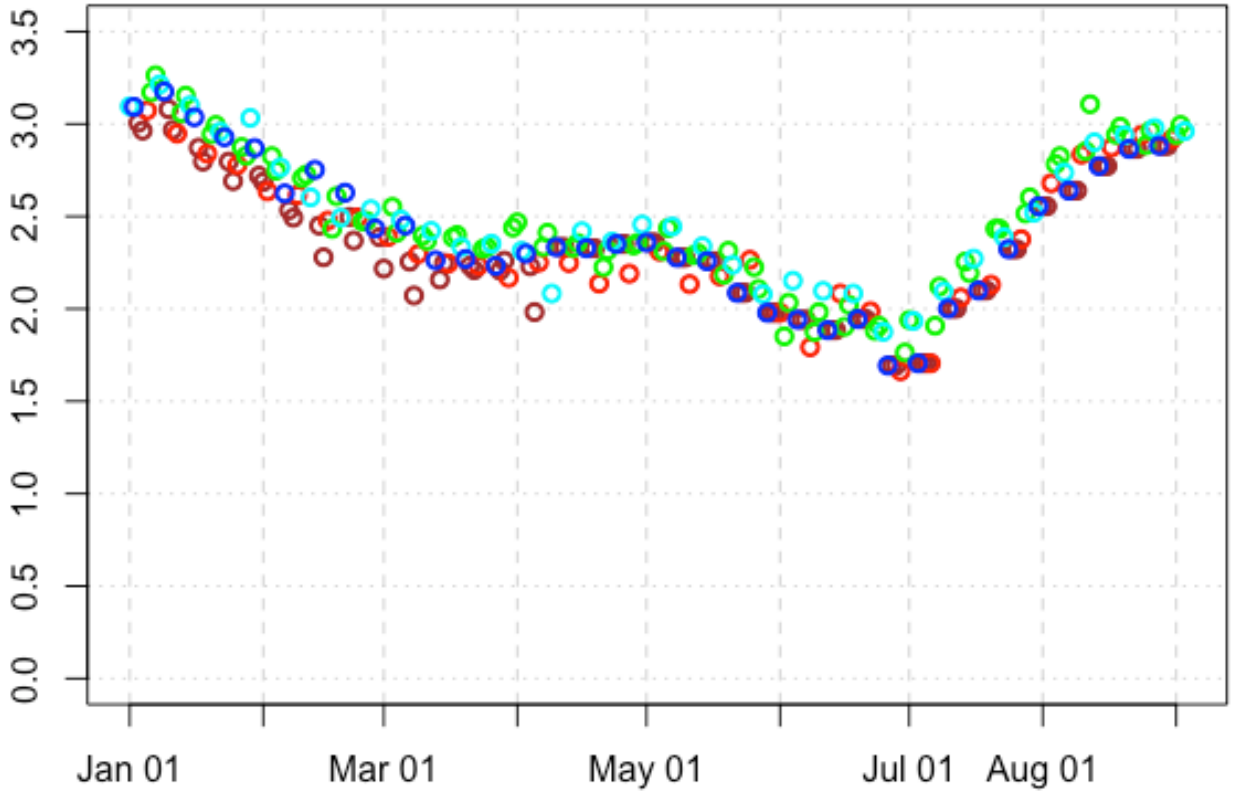
A look at the raw incidence data

- Sunday, Monday
- Tuesday
- Wednesday/Thursday
- Friday
- Saturday

Cases rates are moderating due to mitigations.

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.





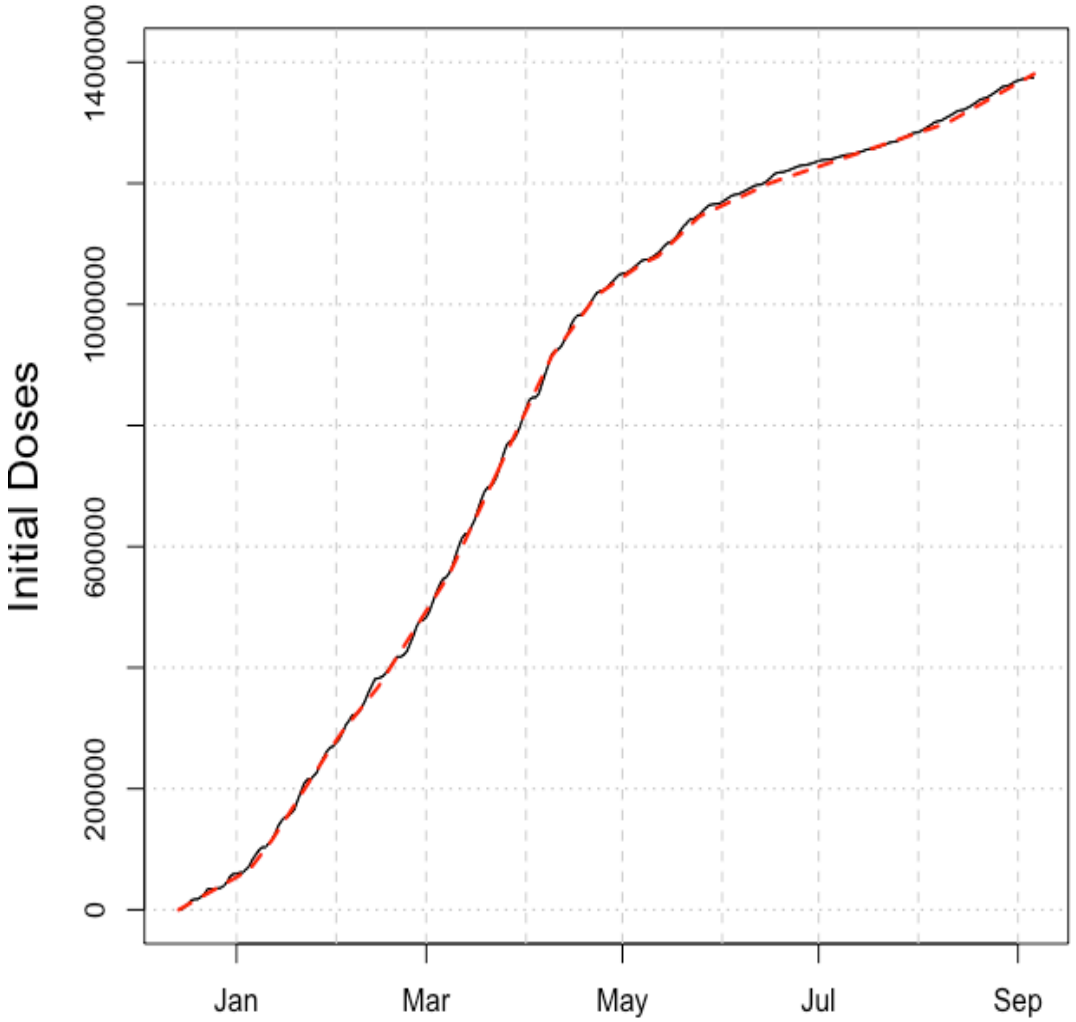
7 September 2021 Vaccine Analysis and Summary

- **~1374k first doses have been administered in NM.**
- **~1193k completed vaccine series in NM.**
- **Epigrid is modeling this as 1381k first doses.**
- **~65.5% of all persons in New Mexico are vaccinated.**

- **Implications of NM reporting for vaccinated vs. unvaccinated outcomes with Delta variant:**
  - 5.4 x *raw* protection ratio against infection (this likely contains biases due to high prevalence in areas with low vaccination)
  - 10. x *raw* protection ratio again hospitalization.
  - 18. x *raw* protection against mortality.
- **"Raw" does not mean un-normalized.**
- **The scale of incidence, hospitalization, and mortality are being driven by:**
  - Delta variant, and
  - Unvaccinated, and: partially or unprotected individuals.

Black – vaccination for all New Mexicans

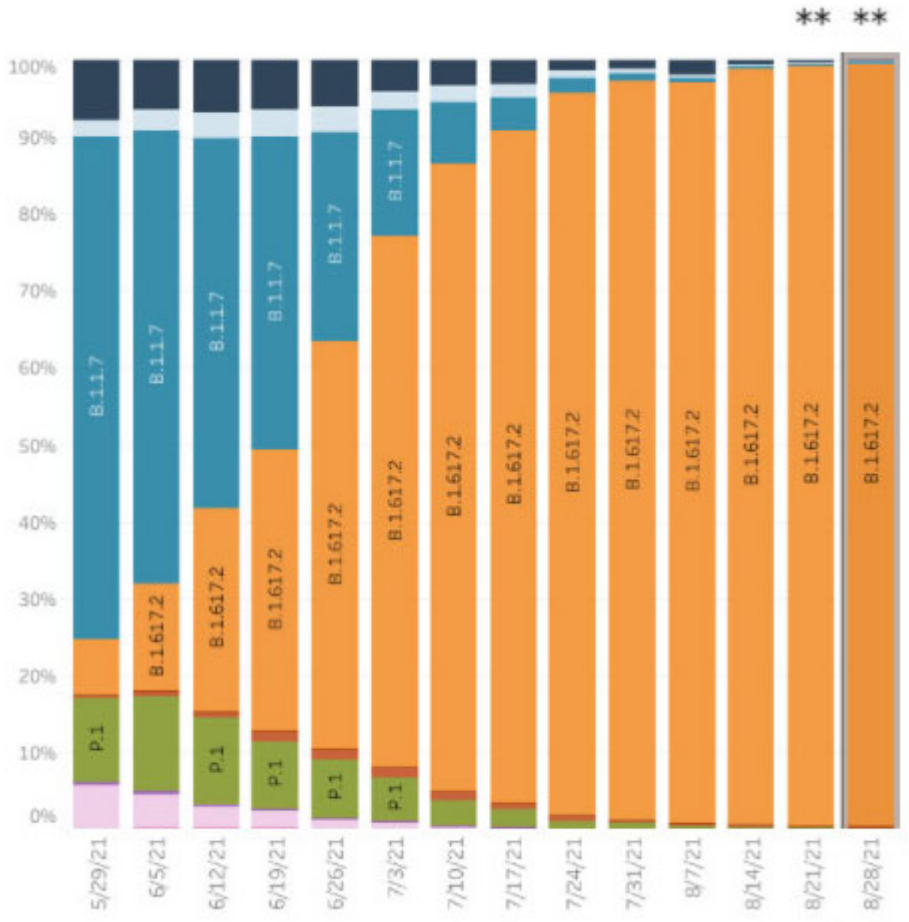
Red – First dose data used in EpiGrid.



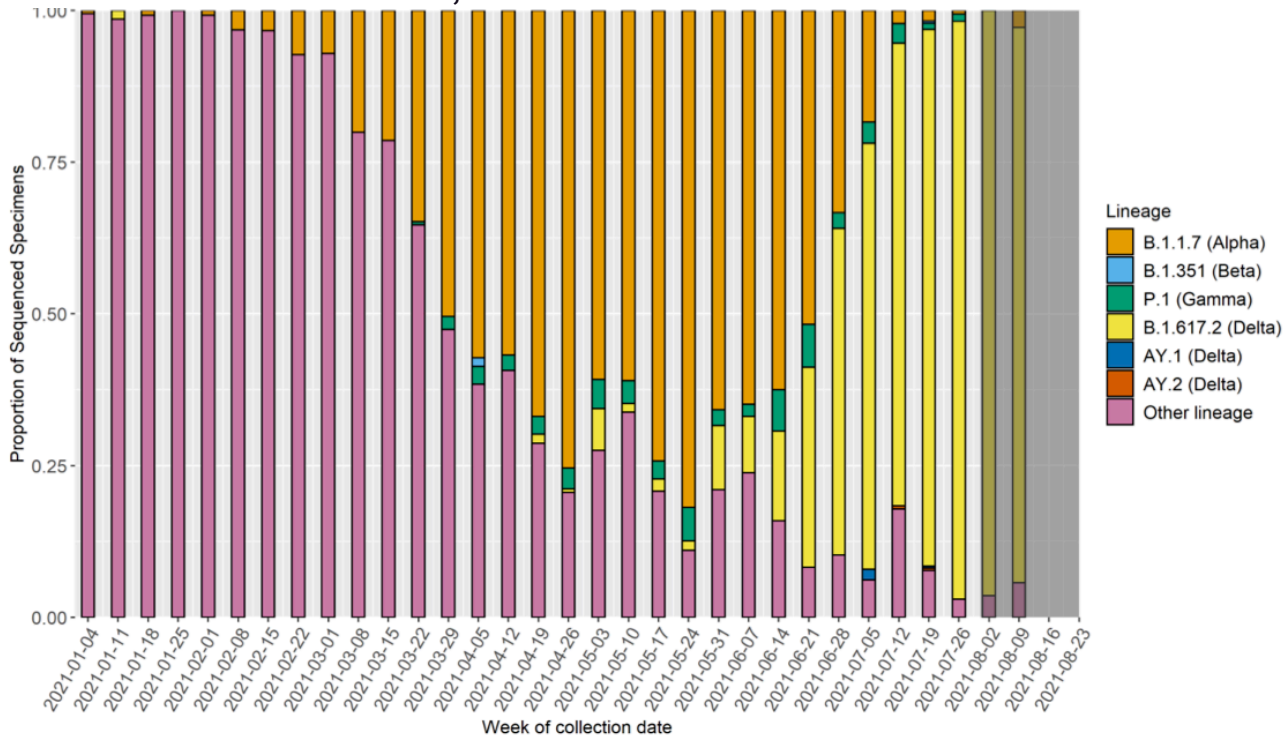
Variants: Still Delta (for now, keep watching …)

https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html

B.1.617.2, "Δ" is "Indian variant"
B.1.1.7, "α" is "UK variant"
Other variants are being reported in multiple countries.



New Mexico data, Delta is still dominant



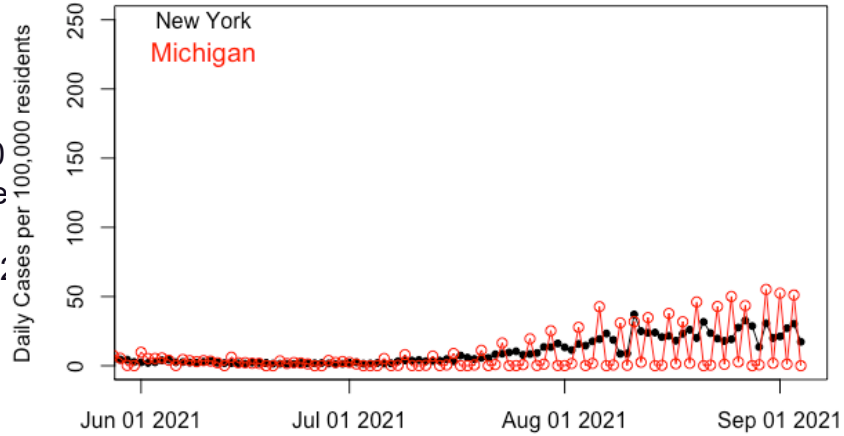
https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/09032021/images/variants1_09032021.jpg?_=15485?noicon

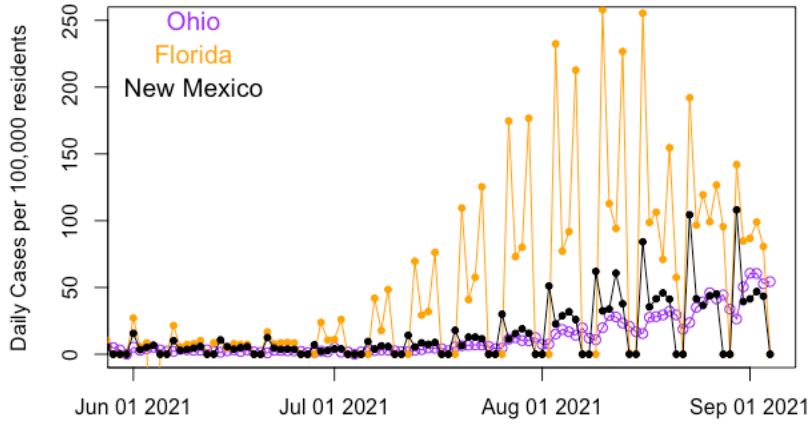
What is happening in the rest of the U.S.? The 10 most populous states and New Mexico

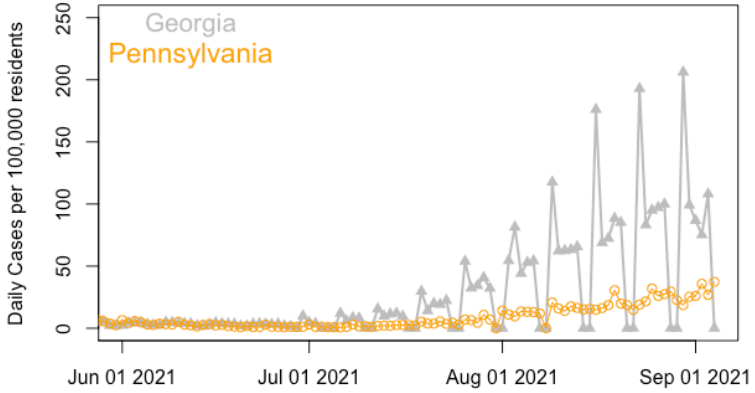
Trends over the last 3 weeks: Increasing: Ohio. Steady: California, Georgia, Illinois, Michigan, New Mexico, New York, North Carolina, Pennsylvania, Texas. Modest Declines: Florida (from a high baseline).

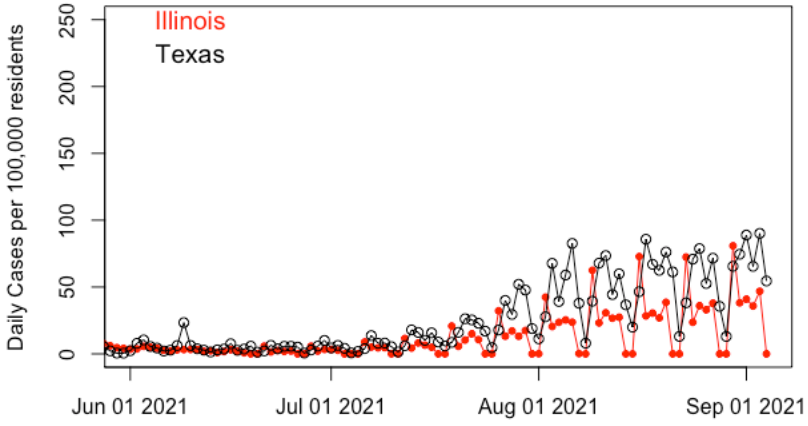
	Cases	Deaths
New York	22.87	0.144
Michigan	23.18	0.212
Ohio	48.42	0.18
Florida	70.46	1.527
New Mexico	39.91	0.319
Illinois	34.65	0.22
Texas	64.58	0.808
California	35.1	0.256
North Carolina	63.86	0.523
Georgia	82.22	0.722
Pennsylvania	27.53	0.192

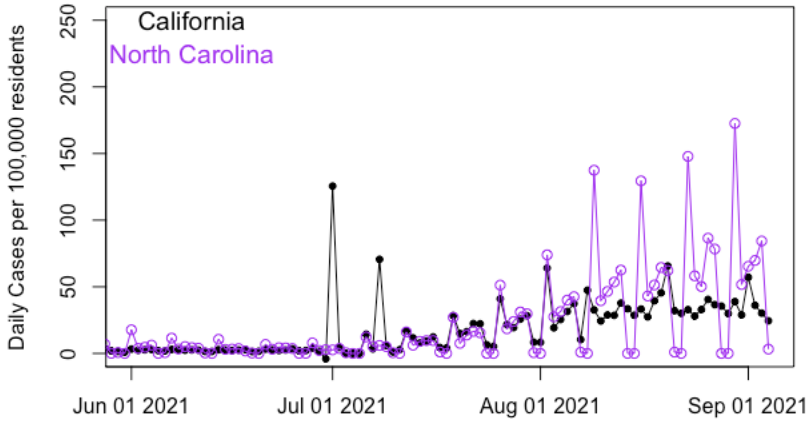
Daily rates per 10 residents average August 30rd thru September 6th 20





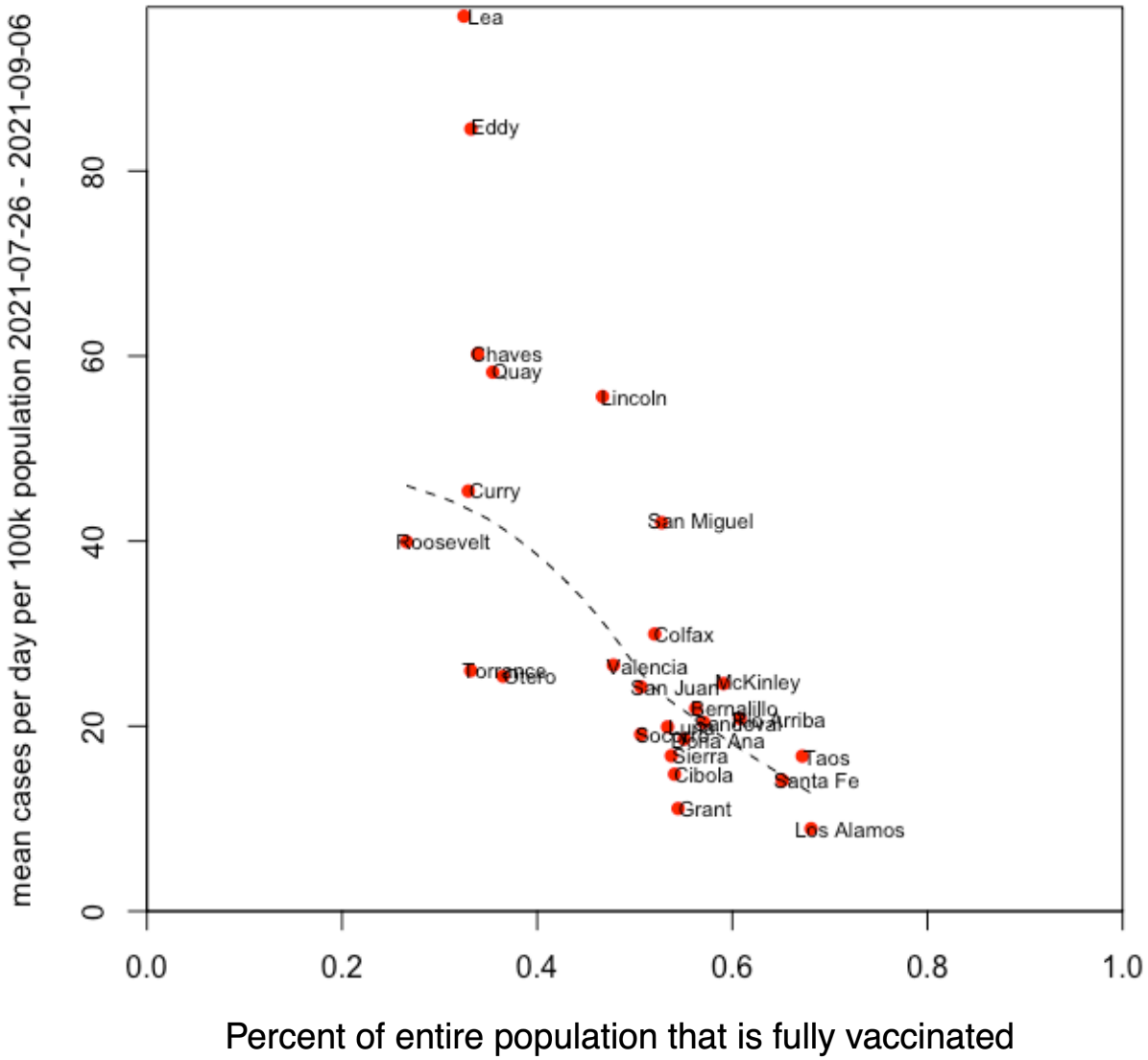






Any anticipated roll-over in cases is slow coming in this wave

Cases plotted versus vaccination by county



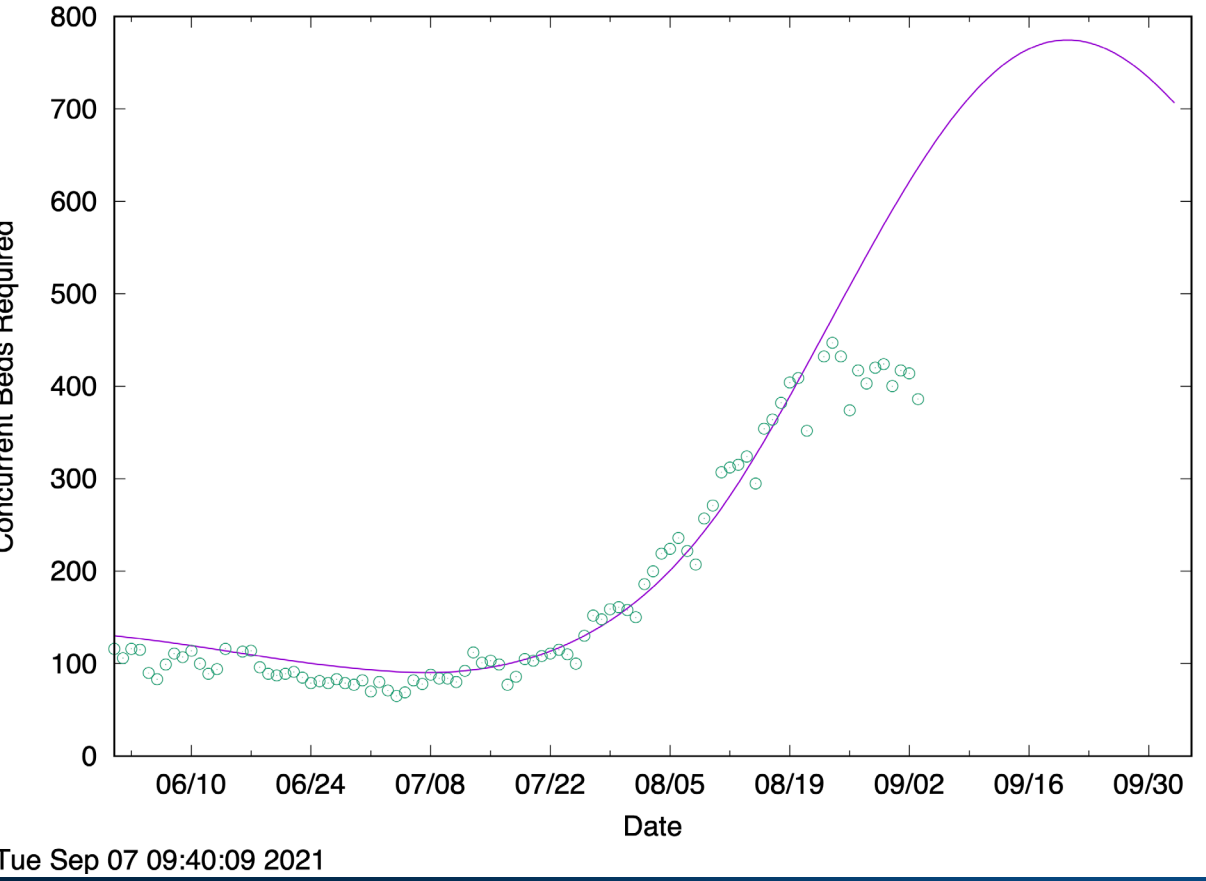
The relationship between vaccination and cases is strong and highly protective on a by-county basis.

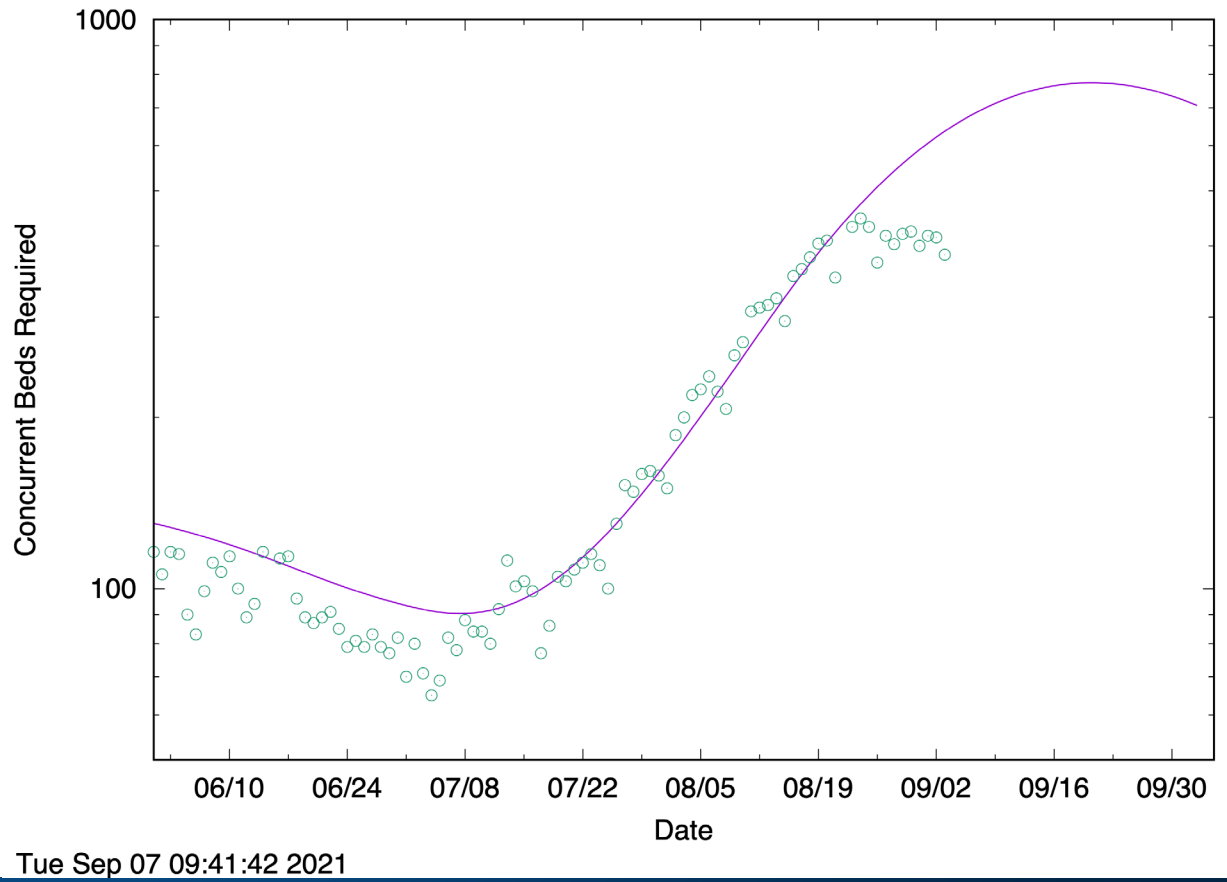
- Lea and Eddy Counties continue to have high incidence, even when accounting for low vaccine adoption.
- Adoption of masking in these counties would rapidly improve this situation (~2 weeks).
- Seven counties are not on this plot due to relative isolation and small populations: Catron, De Baca, Guadalupe, Harding, Hidalgo, Mora and Union.

- If every county was as well vaccinated as McKinley County, simple extrapolation says statewide daily reported cases would now be <500/day (i.e. at or near the peak)
- In reality, because people travel, high-incidence counties raise incidence everywhere. Uniform vaccination at the rates in McKinley would lead to even better control than stated above
- This translates to multiple deaths per day over the next 1-2 months that are avoidable.

Hospital bed concurrent usage by COVID-19 patients (Statewide)

- Left panel: linear vs. time (y-scale = 0:800)
- Right panel: log vs. time (y-scale = 50:1000, 20x)
- Deviation of data below the model is evident in late August.
- Flattening of the hospital load data is either due to improved disease progression or other factors.





By-county situational awareness for notable counties (incidence, recent change)

- **High but possibly declining: Eddy, Lea**
- **Still rising, but possibly plateauing soon: San Juan, Valencia,**
- **Plateaued: Bernalillo, Sandoval (within county heterogeneity possible), McKinley, Santa Fe, Roosevelt**
- **Likely still rising: San Miguel, Socorro, Chavez**
- **Discernable improvement in some counties with high incidence, but:**
  - Many areas are plateauing, not immediately declining
  - Strongest declines are in counties with the poorest infection control
  - Declines are more modest in counties with higher levels of baseline mitigation