# Modeling & Forecasting COVID-19 in NM

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May 18, 2021

NNSA
National Nuclear Security Administration

# 18 May 2021: EpiGrid modeling

- NM daily incidence is declining
  - Model predicts a slow rise.
  - Are schools contributing to contact tracing? Not accounted here.
- NM deaths are closer to the model.
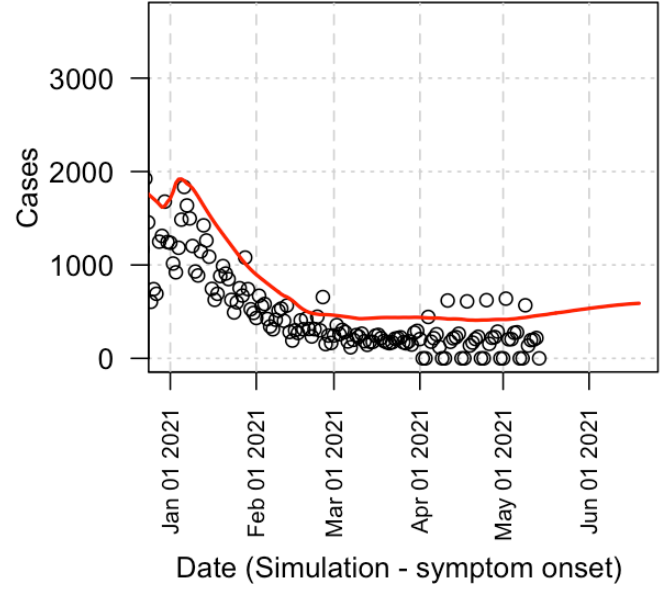


log10 Incidence, wk 69, 2021-06-20



United States__New Mexico



United States__New Mexico
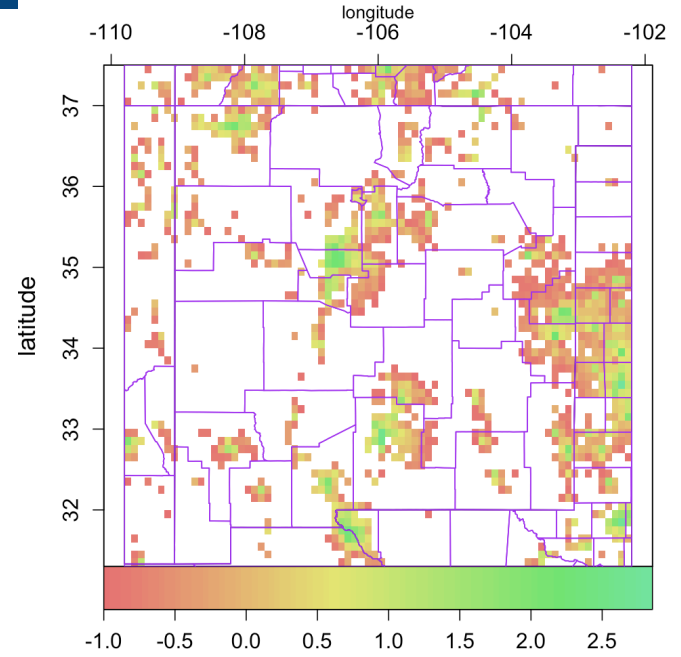


log10 Cumulative cases, wk 69, 2021-06-20
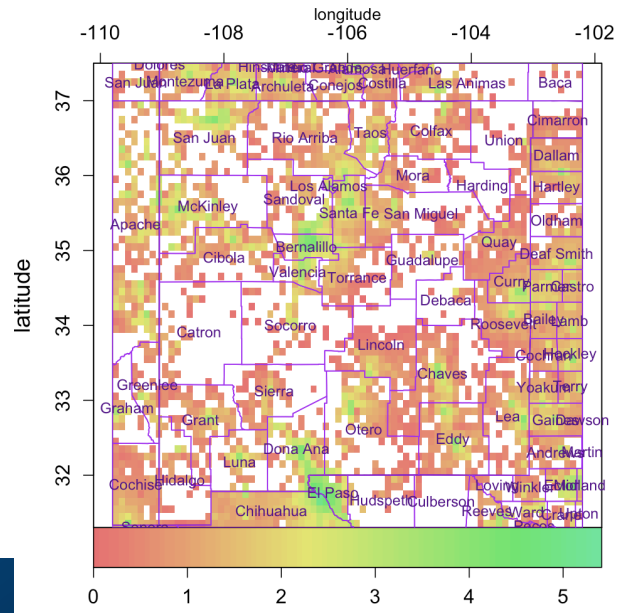
# A look at the raw incidence data

- Sunday, Monday
- Tuesday
- Wednesday/Thursday
- Friday
- Saturday
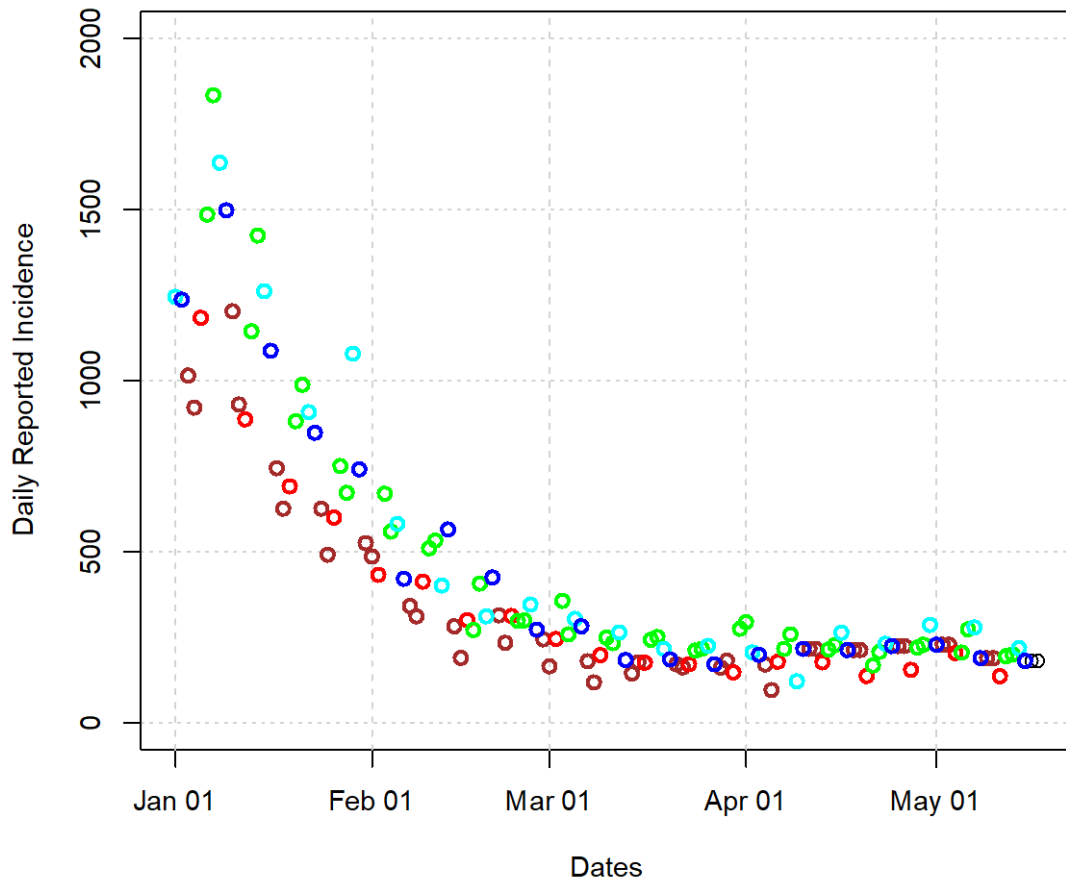
## Cases appear to be declining.

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.
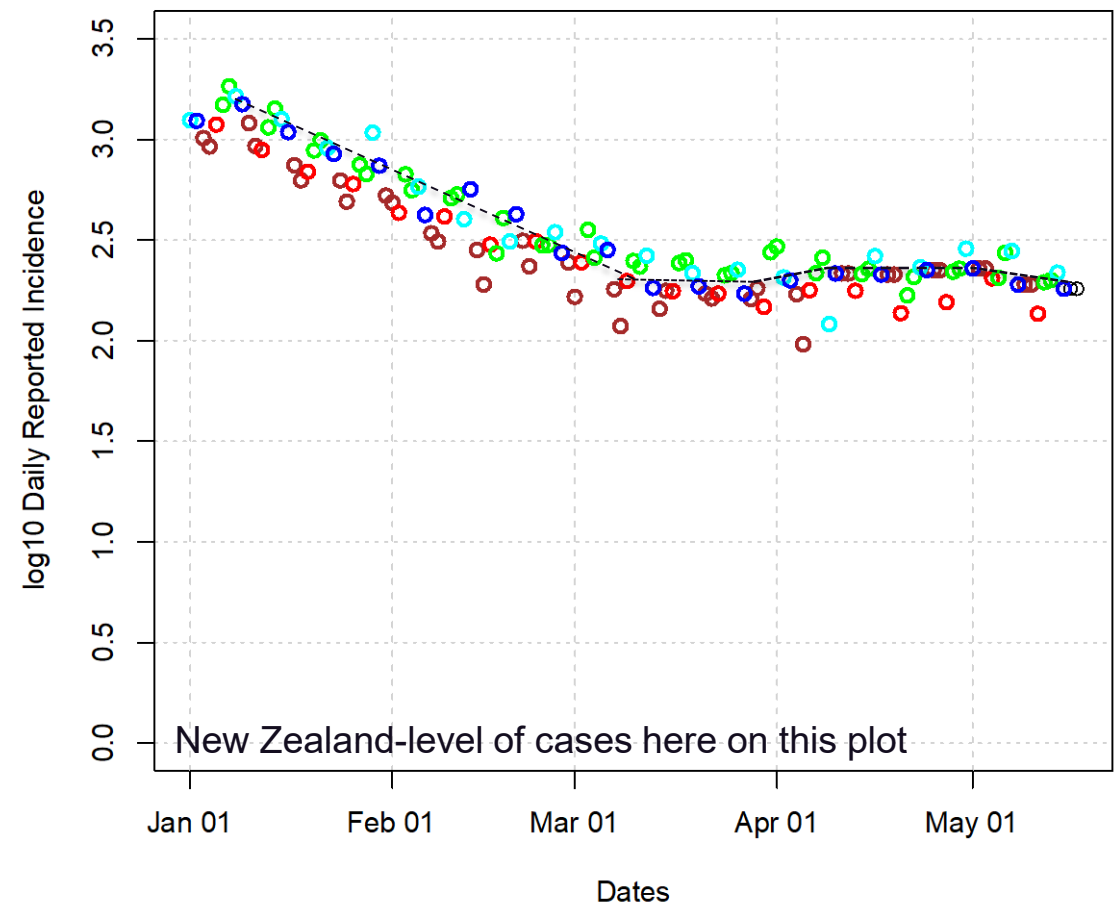
- **~1,052,000 first doses have been administered in NM (Federal and State).**
  - Federal and state doses attributed to counties per data provided by the State of NM
- **Transmission is based on mobility with modifications due to PHO's and the red/yellow/green/turquoise (RYGT) framework.**
  - Public health orders (PHO) and public behavior similar to previous models.
  - There are no extrapolations to RYGT assignments.
  - Currently modeling turquoise counties as a progressively increasing force-of-infection.
- **Daily reported cases in El Paso are declining.**

Vaccination rate is slowing

Top line is state plus federal first doses.

Circles are initial doses as reported by the state of NM.

B.1.1.7 is the primary variant in US at this time.
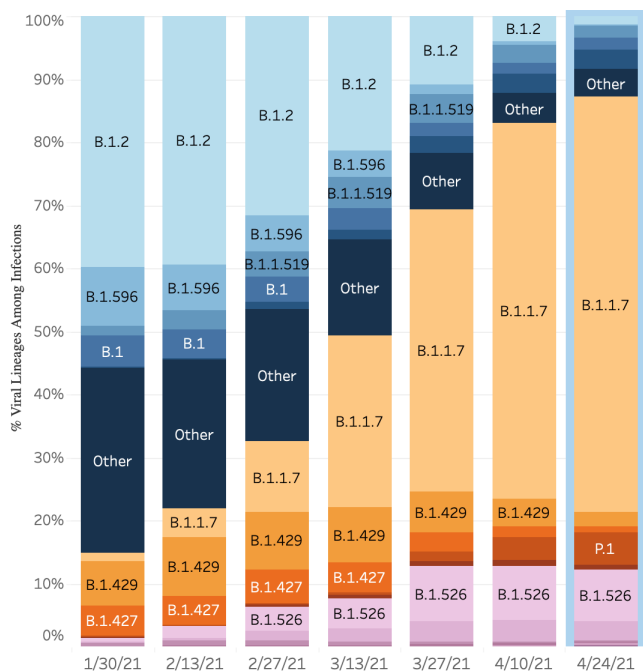https://covid.cdc.gov/covid-data-tracker/#variant-proportions

- **Baseline results reflect SARS-CoV-2 Variants of Concern (VOC).**
  - Assumes a 50% increase in contagion/force of infection.
  - CDC shows the NM, TX, OK, AR, LA region as being 74% B.1.1.7 & >80% VOC.
  - EG incorporates variant replacement and continues to match the fraction of variants of concern since approximately late January.
  - New Mexico never had a significant load of pre-Milan viral variants.
  - Variant P.1 *might* be more infectious than B.1.1.7 (Faria *et al*. Science 14Apr2021)

# T-80 Mobility – northern counties (data only)

Possibly increased: Bernalillo, San Juan, Valencia
Stable:, Los Alamos, McKinley, Rio Arriba, Sandoval, Santa Fe, Taos
Mobility is *near* pre-pandemic levels Statewide.

- Weekends not shown
- Monday
- Wednesday/Thursday
- Friday (usually higher)
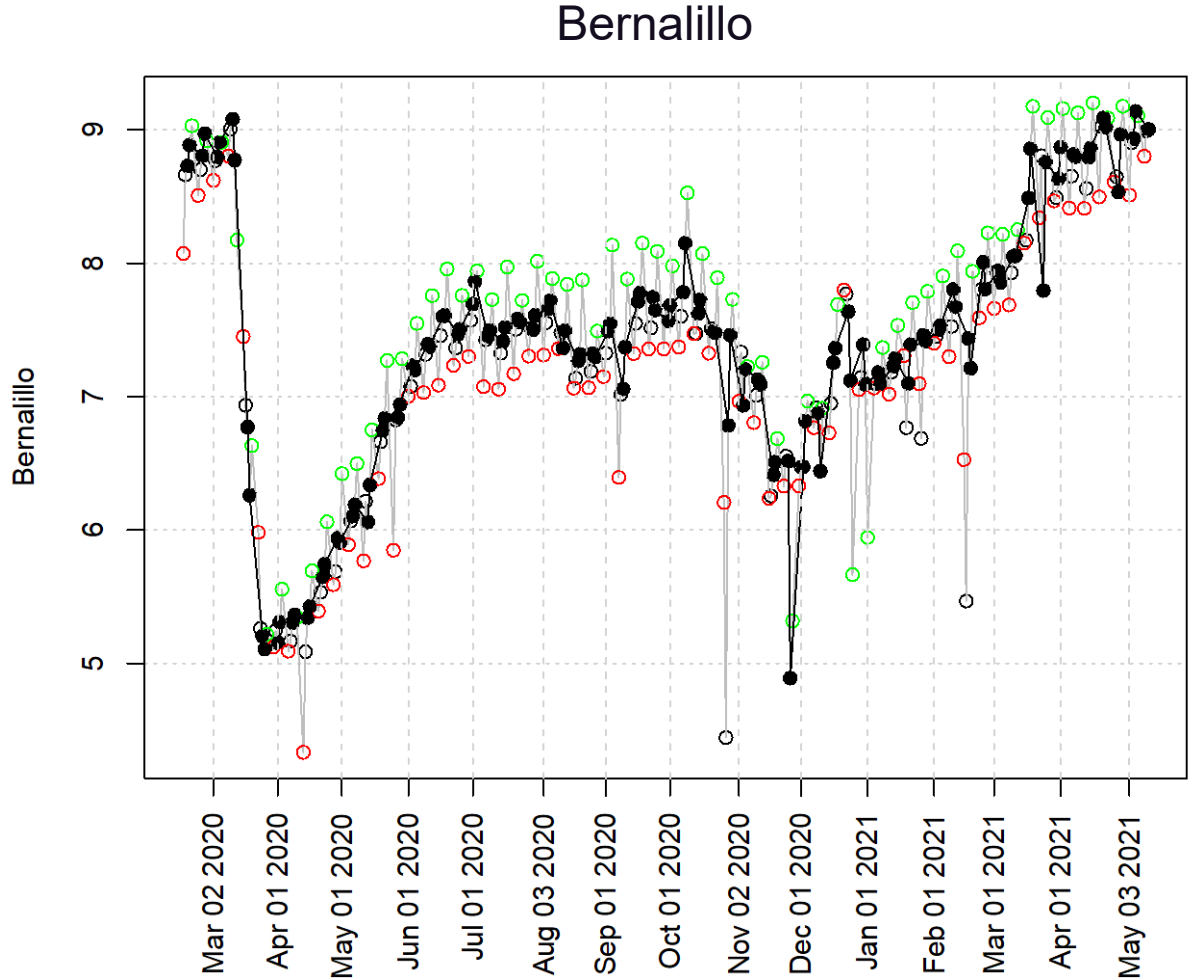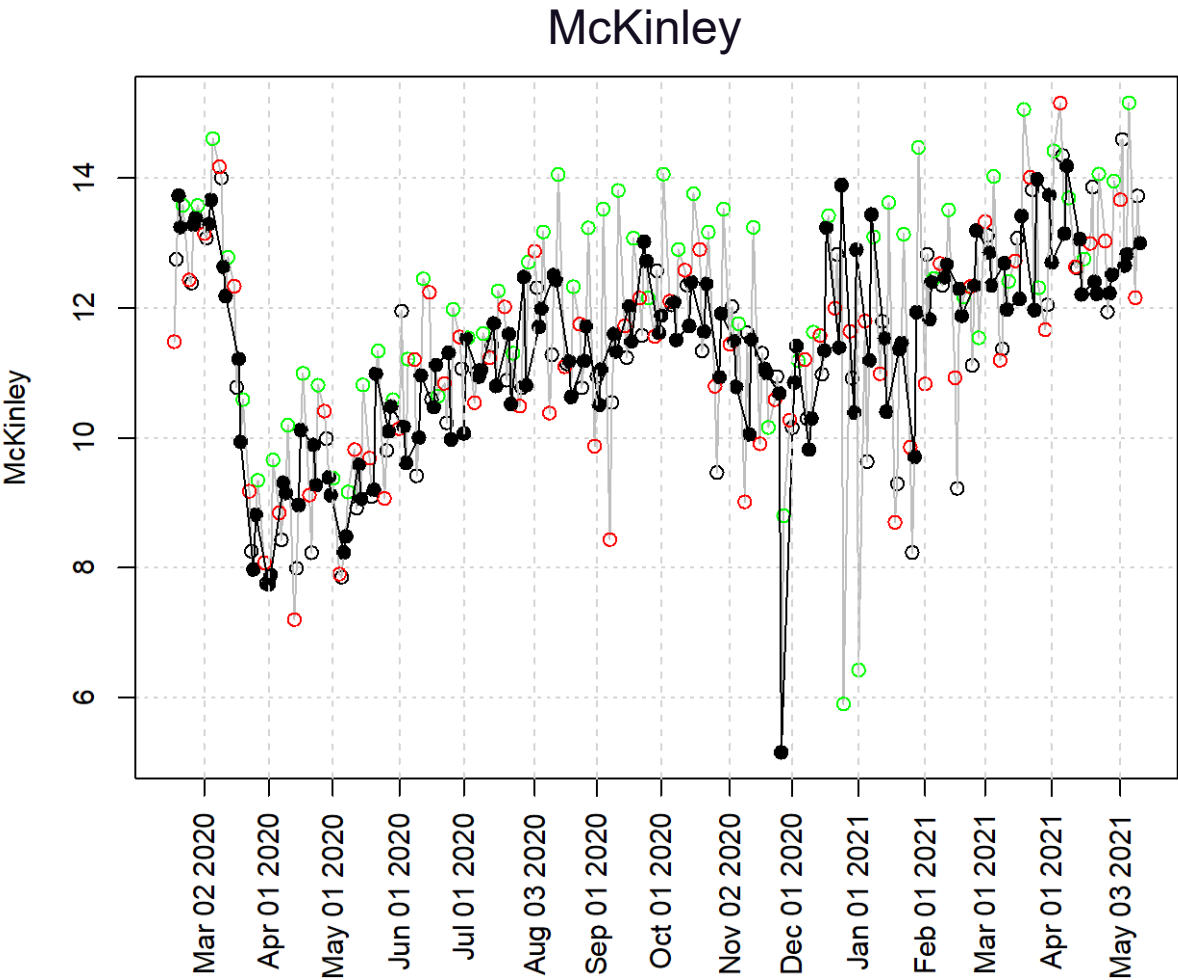
# T-80 Mobility – southern counties and Curry (data only)

- No significant changes
- Mobility is *near* pre-pandemic levels Statewide.


Eddy


Dona Ana


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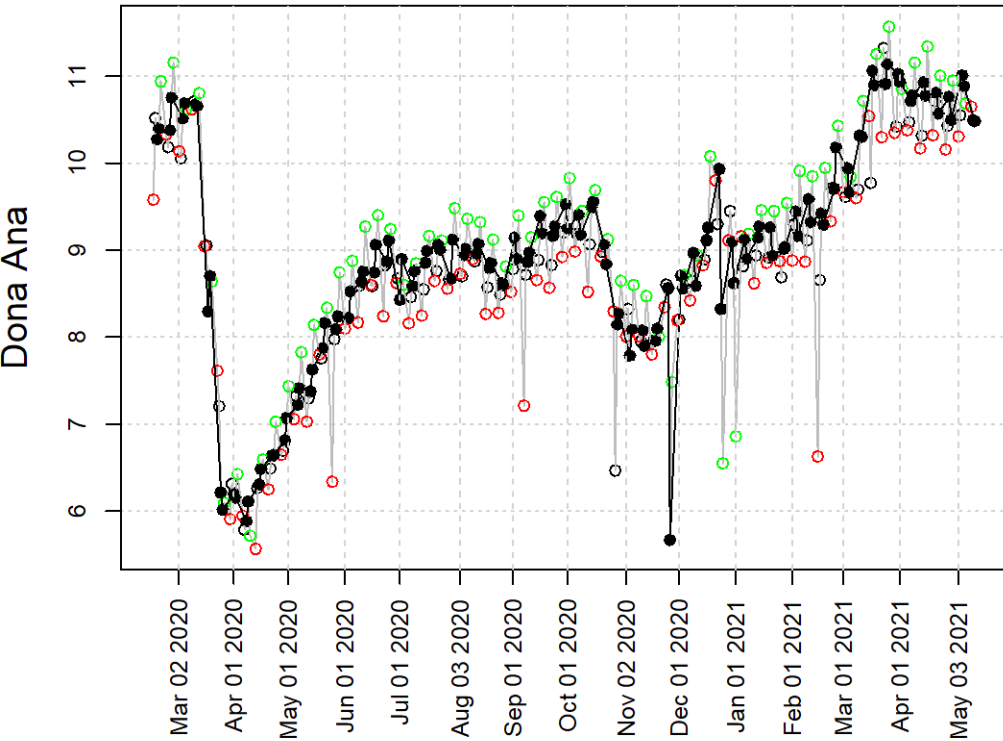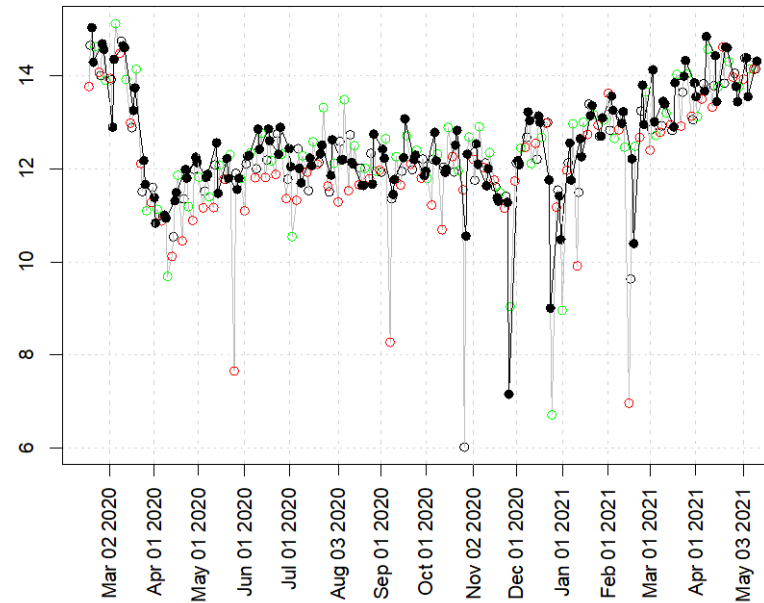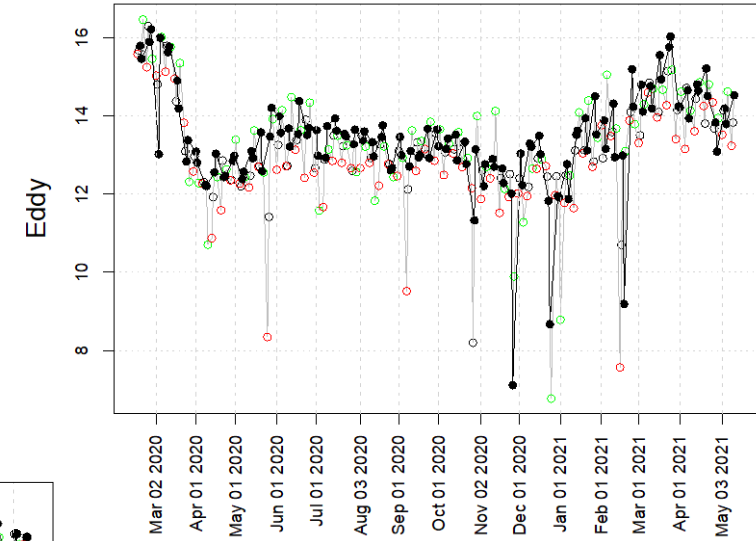
- ⬤ Weekends NOT shown
- ⬤ Monday
- ⬤ Wednesday/Thursday
- ⬤ Friday (usually higher)

# Counties to Watch

- **San Juan –** there was a significant (transient?) uptick in cases.   Cases may now be decreasing. Is contact tracing in the schools contributing significantly to control?

- **Several other counties could be seeing the start of an increase in cases: Curry, De Baca, Guadalupe, Lincoln, Quay, Roosevelt, Santa Fe, Torrance Counties.**

- **Over the past few months, case data from several counties is consistent with small outbreaks, that are subsequently stopped without changes in mobility or RYGT status. Is contact tracing playing a major rapid-response role beyond facility closure?**

# What is happening in the rest of the U.S.?

The 10 most populous states

Steady or slight decreases: California, Ohio, Texas

Decreasing: Florida, Georgia, Illinois, Michigan, New York, North Carolina, Pennsylvania
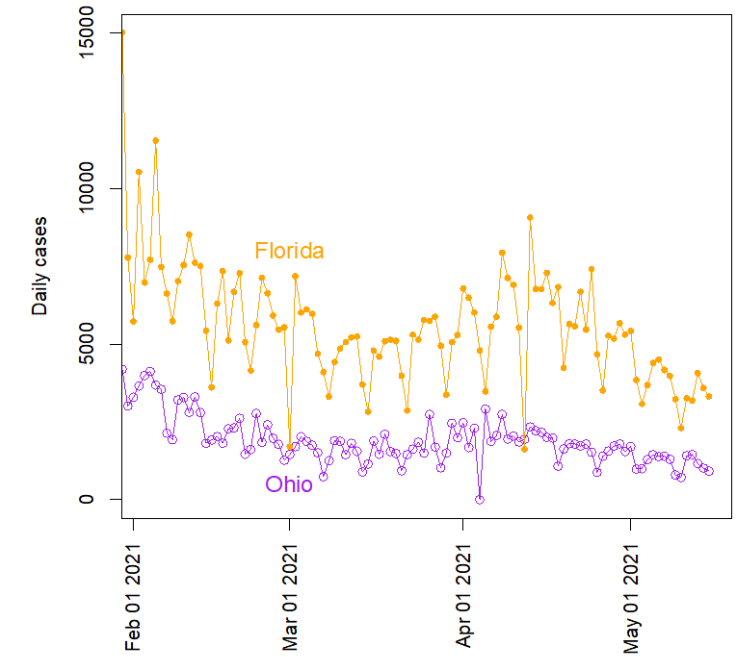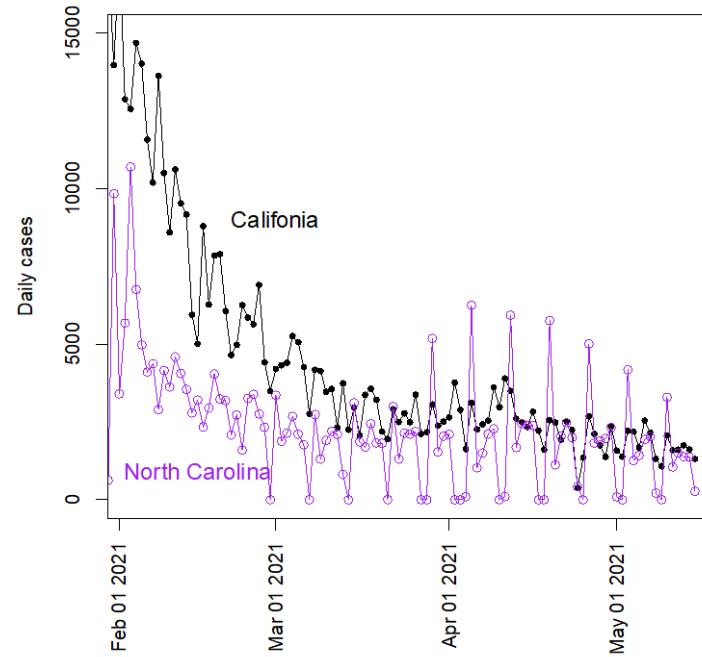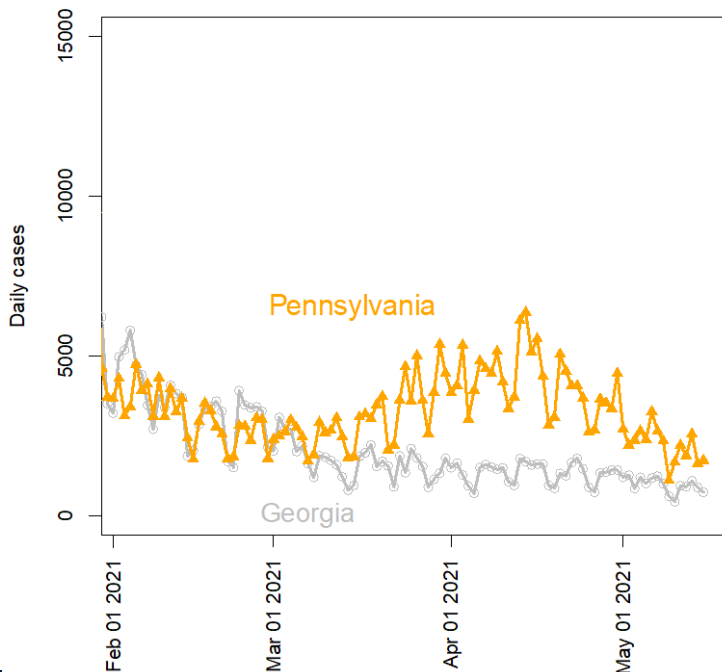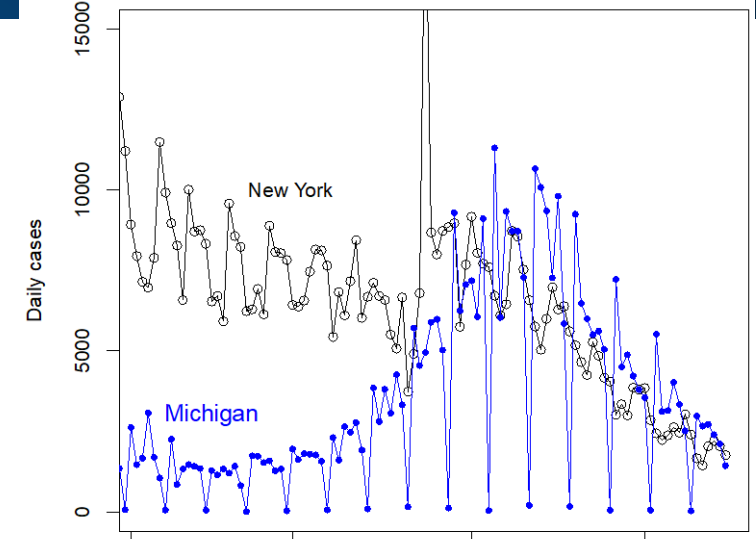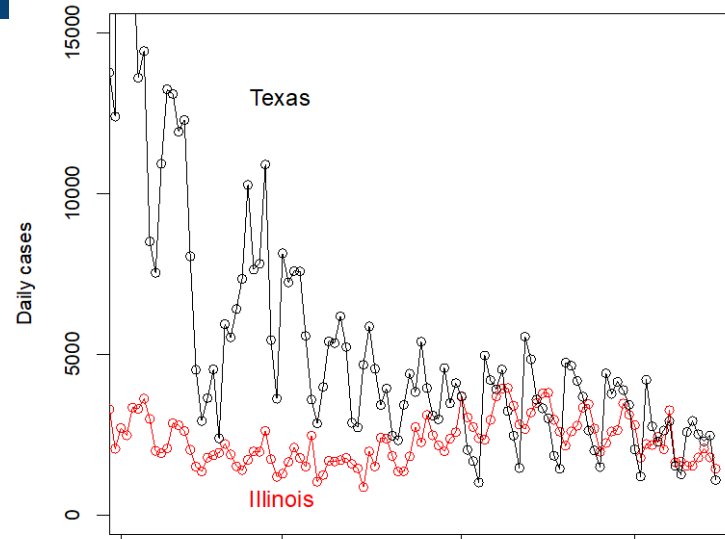
# Outlook with Vaccination, Variants

- ~1052k people partially vaccinated (1 or 2 doses).
- ~877k people fully vaccinated.
- New vaccination rate has slowed dramatically in New Mexico.
- Uncertainties in vaccination may still be relevant. Variant replacement may be important too.
- Quarantine important and possibly improving.
- Currently modeling 92% vaccine effectiveness. Weighted sum.
- Matching all counties' reported vaccination data.
- Vaccinating both naïve and recovered individuals.
- Unchanged quarantine effectiveness assumed in all cases. Maybe under-estimating the role of schools.
- End-state vaccine hesitancy is not being predicted.
- Variant replacement is a major determinant of the epidemic course.
- An improved vaccination rate would also be highly beneficial.



New Mexico Model and Data (Incidence)

Red curve is New Mexico's baseline model
Blue curve is New Mexico with no variant replacement
Green curve is New Mexico with 10.5k/day vaccinations
Vaccinations match county-by-county and state
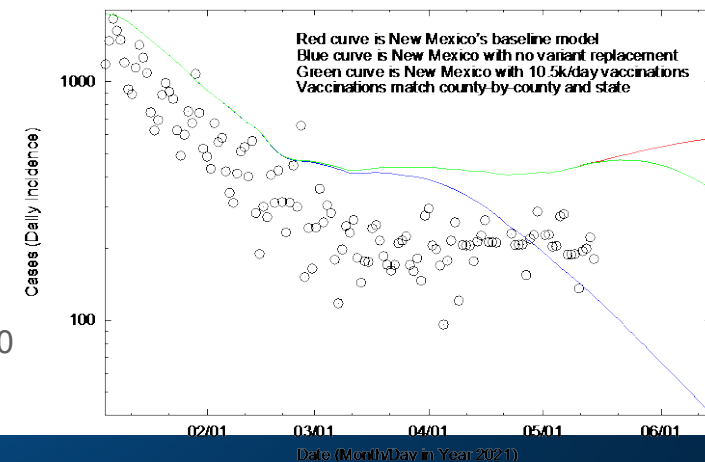
y-axis: 40:2000

# Short- & Long-Term Forecast for NM: Cases



7–day Incidence Confirmed Cases Forecast for New Mexico Based on Data as of 2021–05–17

**6–Week Forecast of Confirmed Cases for New Mexico Based on Data as of 2021–05–17**

| Week | Best Case (5th Percentile) | Middle Case (50th Percentile)^ | Worst Case (95th Percentile) |
|---|---|---|---|
| 2021–05–17 | | 201,186* | |
| 2021–05–24 | 201,419 | 202,134 | 203,875 |
| 2021–05–31 | 201,613 | 203,012 | 206,457 |
| 2021–06–07 | 201,773 | 203,818 | 208,924 |
| 2021–06–14 | 201,904 | 204,563 | 211,328 |
| 2021–06–21 | 202,019 | 205,283 | 213,766 |
| 2021–06–28 | 202,109 | 205,946 | 216,098 |

*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 2021–05–17**

| Week | Best Case (5th Percentile) | Middle Case (50th Percentile)^ | Worst Case (95th Percentile) |
|---|---|---|---|
| 2021–05–17 | | 184* | |
| 2021–05–24 | 33 | 135 | 384 |
| 2021–05–31 | 28 | 126 | 369 |
| 2021–06–07 | 23 | 115 | 352 |
| 2021–06–14 | 19 | 106 | 344 |
| 2021–06–21 | 16 | 103 | 348 |
| 2021–06–28 | 13 | 95 | 333 |

*Last reported confirmed cases count
^Closest–matching scenario

**So what?**
**The _daily_ number of cases are expected to range between 115 and 135 in the next few weeks**

# Short- & Long-Term Forecast for NM: Deaths



7–day Deaths Forecast for New Mexico Based on Data as of 2021–05–17

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

**6–Week Forecast of Deaths for New Mexico Based on Data as of 2021–05–17**

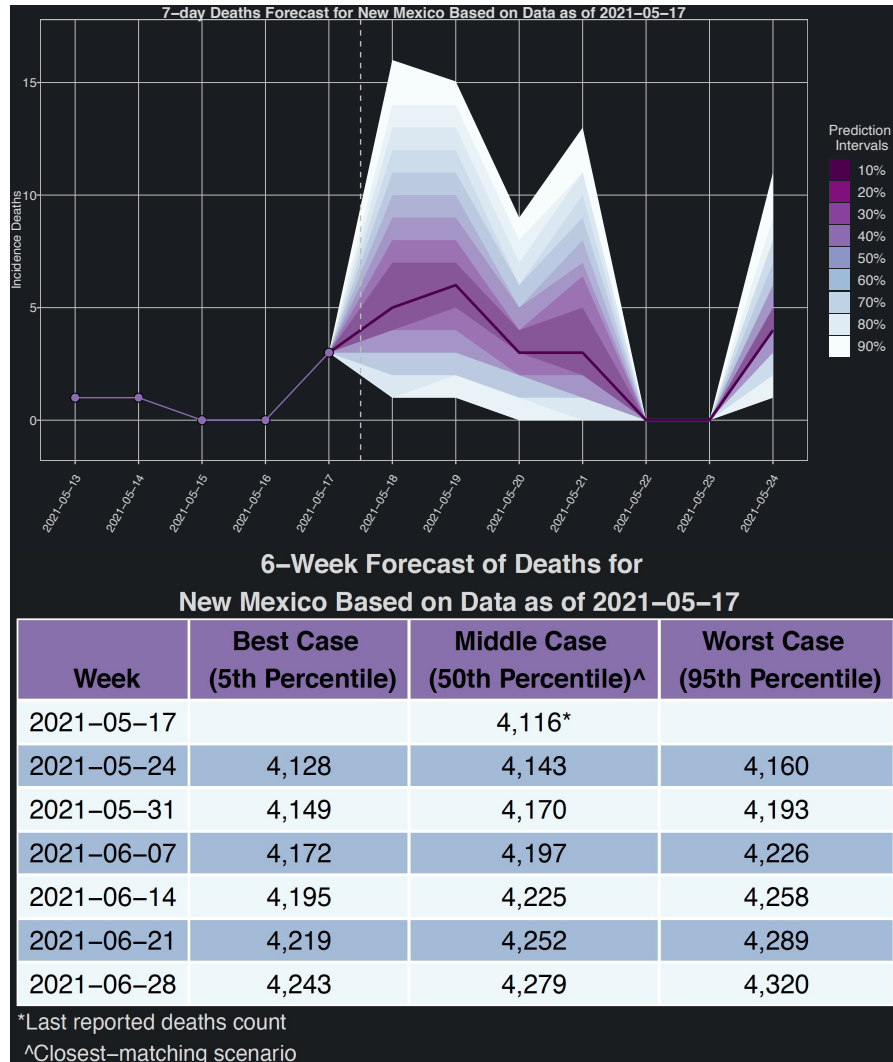| Week | Best Case (5th Percentile) | Middle Case (50th Percentile)^ | Worst Case (95th Percentile) |
|---|---|---|---|
| 2021–05–17 | | 4,116* | |
| 2021–05–24 | 4,128 | 4,143 | 4,160 |
| 2021–05–31 | 4,149 | 4,170 | 4,193 |
| 2021–06–07 | 4,172 | 4,197 | 4,226 |
| 2021–06–14 | 4,195 | 4,225 | 4,258 |
| 2021–06–21 | 4,219 | 4,252 | 4,289 |
| 2021–06–28 | 4,243 | 4,279 | 4,320 |

*Last reported deaths count
^Closest–matching scenario

**6–Week Forecast of Daily Average of Deaths for New Mexico Based on Data as of 2021–05–17**

| Week | Best Case (5th Percentile) | Middle Case (50th Percentile)^ | Worst Case (95th Percentile) |
|---|---|---|---|
| 2021–05–17 | | 1* | |
| 2021–05–24 | 2 | 4 | 6 |
| 2021–05–31 | 3 | 4 | 5 |
| 2021–06–07 | 3 | 4 | 5 |
| 2021–06–14 | 3 | 4 | 5 |
| 2021–06–21 | 3 | 4 | 4 |
| 2021–06–28 | 3 | 4 | 4 |

*Last reported confirmed deaths
^Closest–matching scenario

**So what?**
**The <u>daily</u> number of deaths are expected to range between 2 and 6 in the next few weeks**

# Growth Rate for NM



**Daily Growth Rate for the Past Six Weeks in New Mexico as of 2021-05-17**
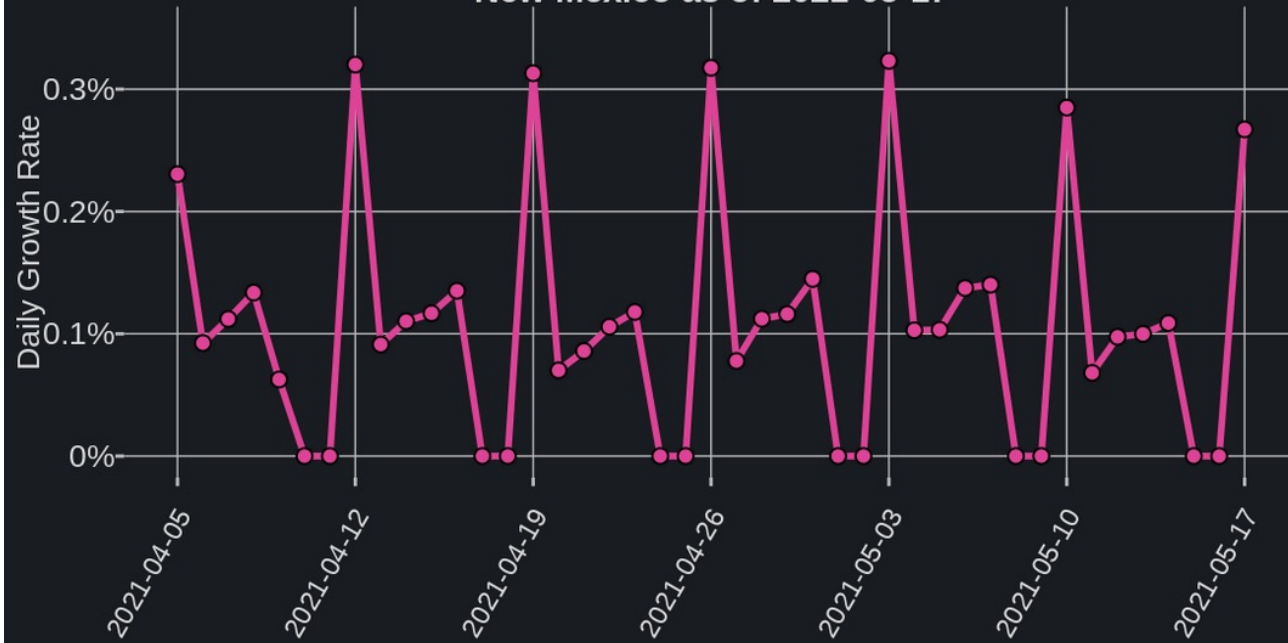
**6-Week Forecast of the Average Weekly Growth Rate for New Mexico Based on Data as of 2021-05-17**

| Week | Best Case (5th Percentile) | Middle Case (50th Percentile)^ | Worst Case (95th Percentile) |
|---|---|---|---|
| 2021-05-17 | | 0.092%* | |
| 2021-05-24 | 0.017% | 0.067% | 0.19% |
| 2021-05-31 | 0.014% | 0.062% | 0.18% |
| 2021-06-07 | 0.011% | 0.057% | 0.17% |
| 2021-06-14 | 0.0093% | 0.052% | 0.16% |
| 2021-06-21 | 0.0081% | 0.050% | 0.16% |
| 2021-06-28 | 0.0064% | 0.046% | 0.16% |

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

## So what?
### As of May 17th, the average growth rate in NM is at 0.092% (down from two weeks ago)

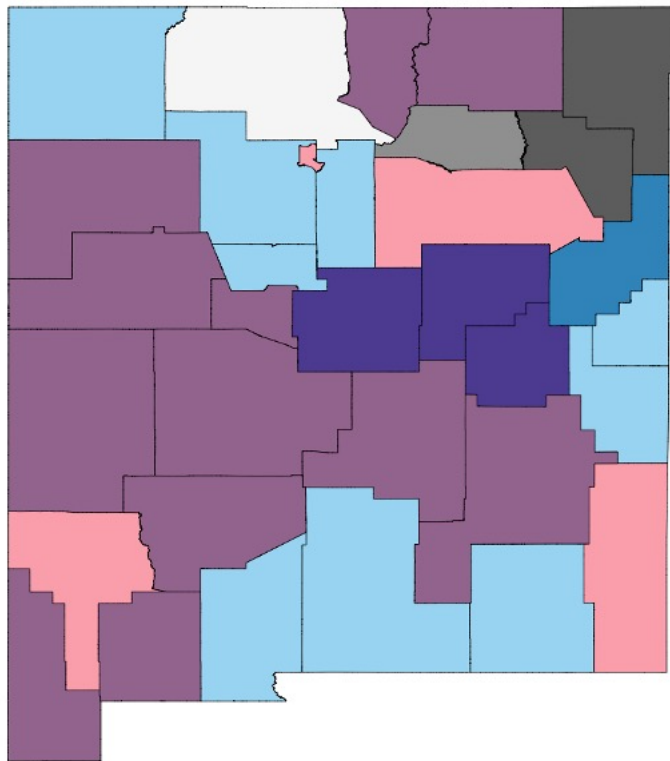# Cumulative Cases & Daily Growth Rate for NM: May 17
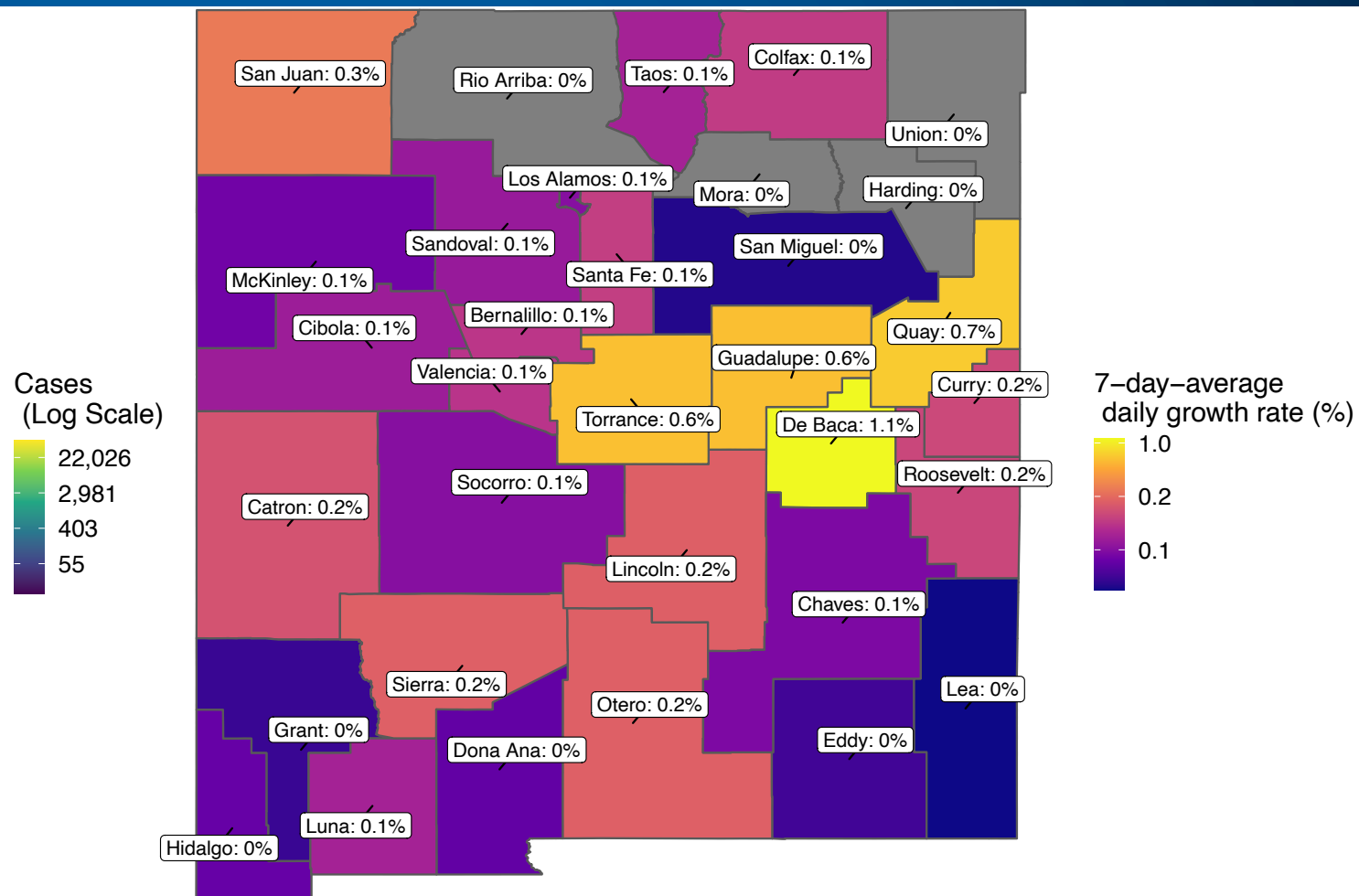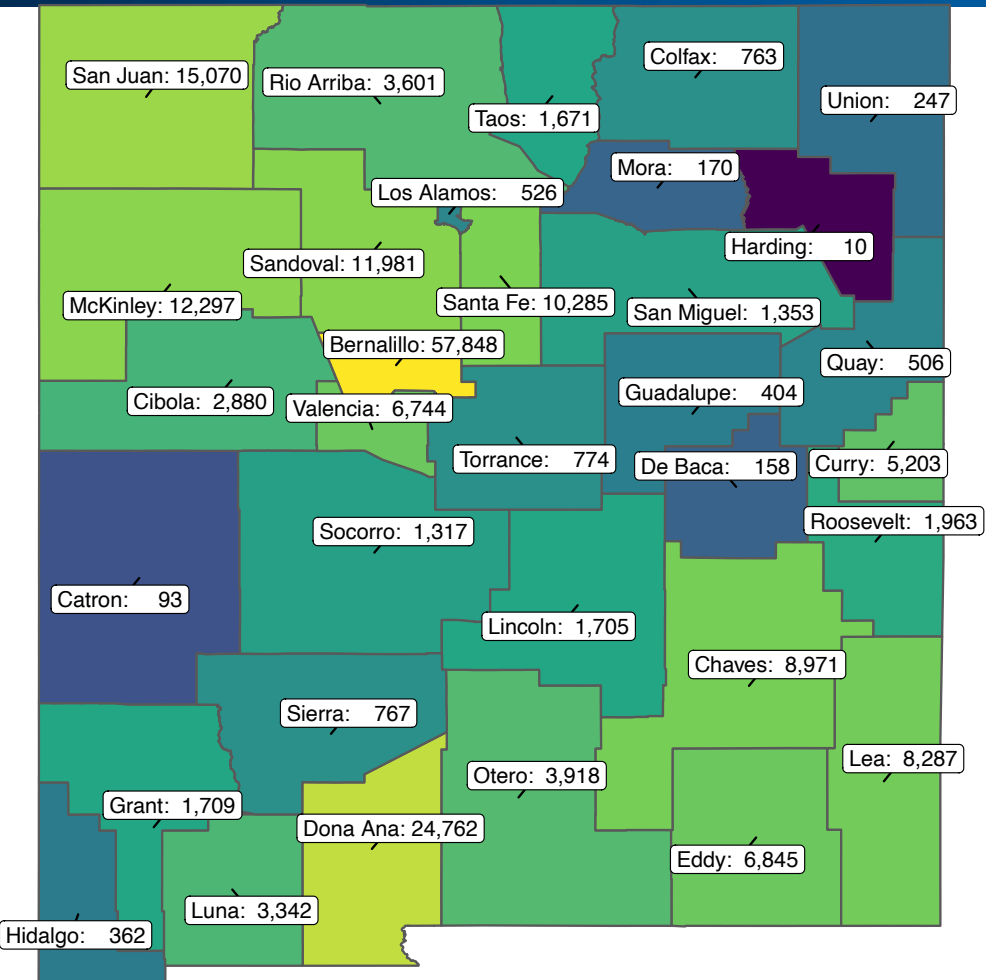


**So what?**

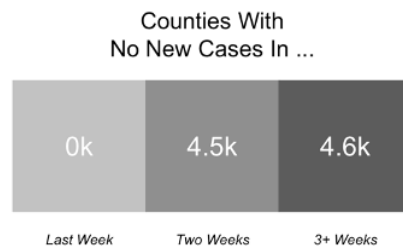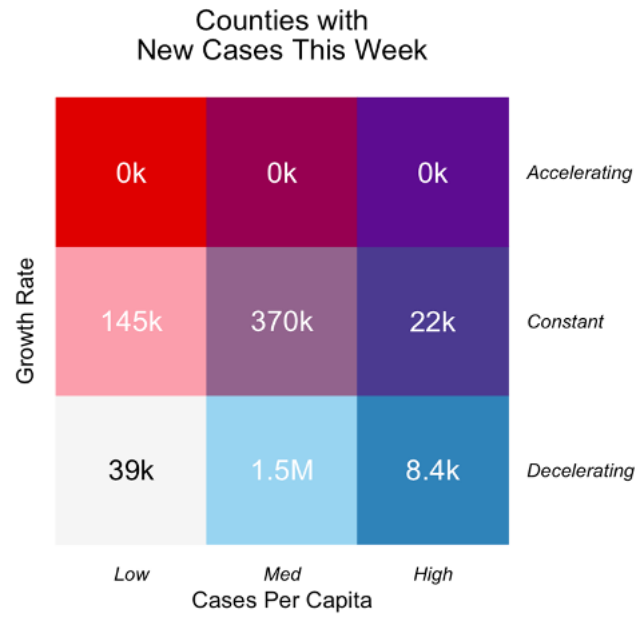- **Most counties have very low cumulative growth rates**

*Growth rate is in cumulative cases

**COVID-19 across New Mexico**
*A 7-day moving window comparison*
*May 17, 2021*

Impacted New Mexicans

**Counties with New Cases This Week**

Growth Rate

|  | | | |
|---|---|---|---|
| 0k | 0k | 0k | Accelerating |
| 145k | 370k | 22k | Constant |
| 39k | 1.5M | 8.4k | Decelerating |
| Low | Med | High | |

Cases Per Capita

**Counties With No New Cases In ...**

| 0k | 4.5k | 4.6k |
|---|---|---|
| Last Week | Two Weeks | 3+ Weeks |

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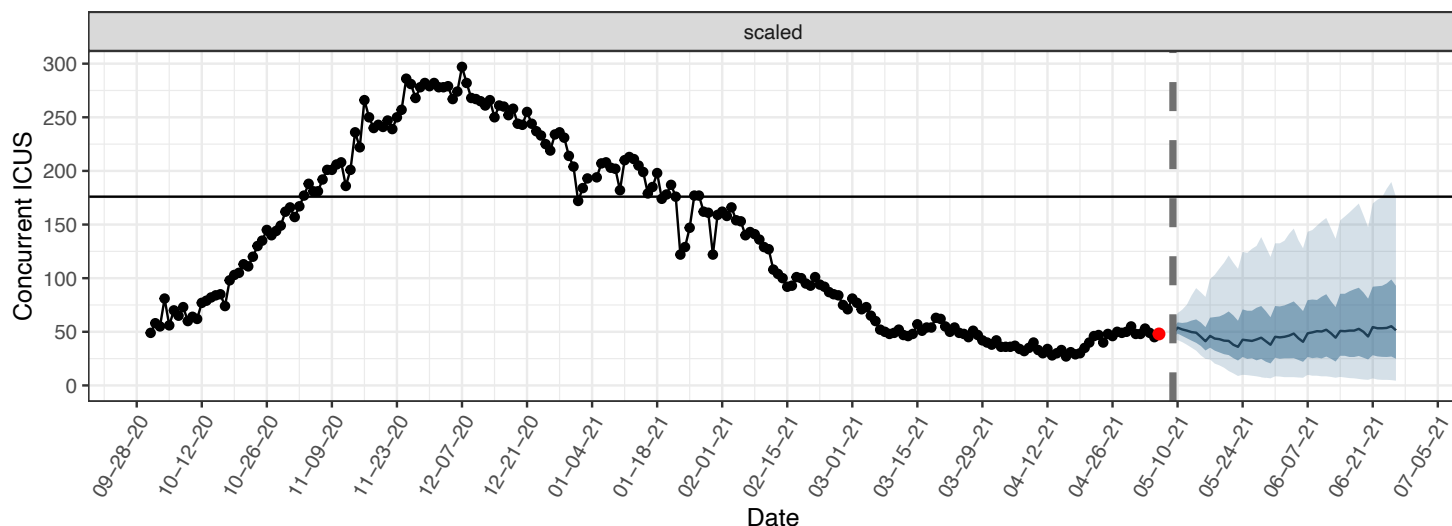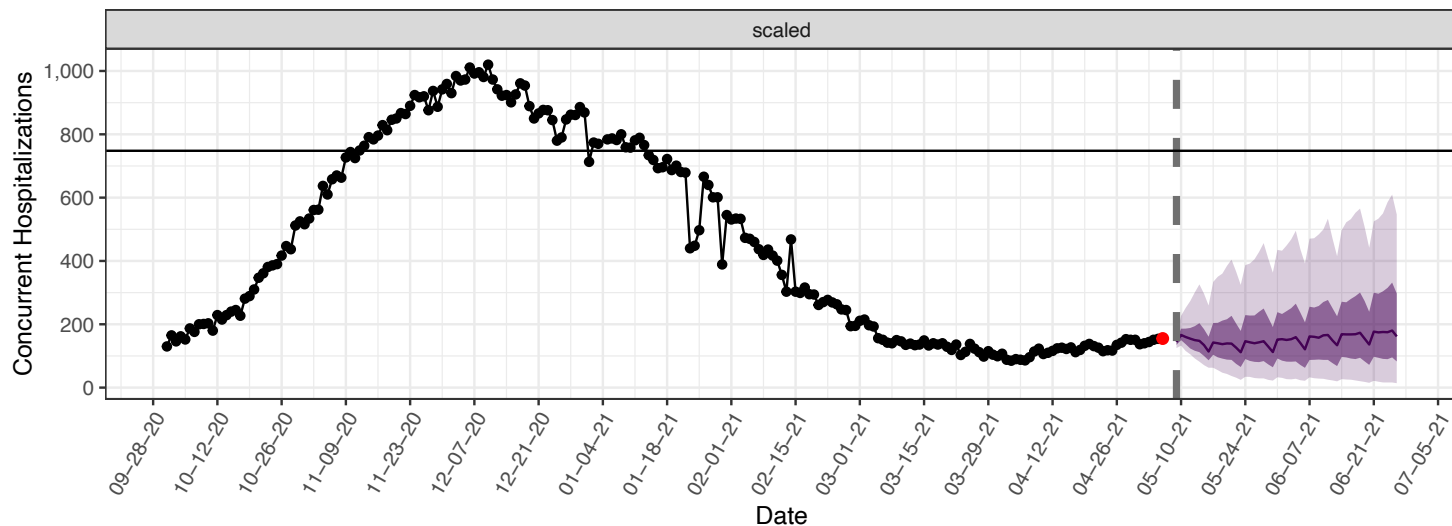
**So what?**

- **Most people in New Mexico are living in a county that is medium per-capita case counts with a decelerating growth**
- **No counties are accelerating**

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

# Concurrent Hosp & ICU Beds Based on Forecasts – Average Stay of 8 Hosp, 15 Days for ICU/vent & 25% ICU rate (May 9)



**So what?**

Model is predicting total beds and ICU beds to remain steady or slightly decrease over the next 3 weeks. We are tracking between best case and median scenarios.