

Analysis of the IHME COVID 19 Forecasting Model – May 19th Update

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Introduction

- The COVID 19 virus is having a major effect on the economy with the unemployment rate closing in on 20%
- Since the middle of March, more than 36 million U.S. workers filed for unemployment due to the shut down a significant share of the economy
- The Institute for Health Metrics and Evaluation (IHME) at the University of Washington is playing a large role in the formation of policy
 - The data used in this analysis is sourced from <http://www.healthdata.org/covid>
- It is important to document and understand the ex-post performance of the forecasting model and the periodic revisions that are made to the model
- This is an update of the May 12th discussion.
- A major change in the modeling approach occurred with the May 4th model release



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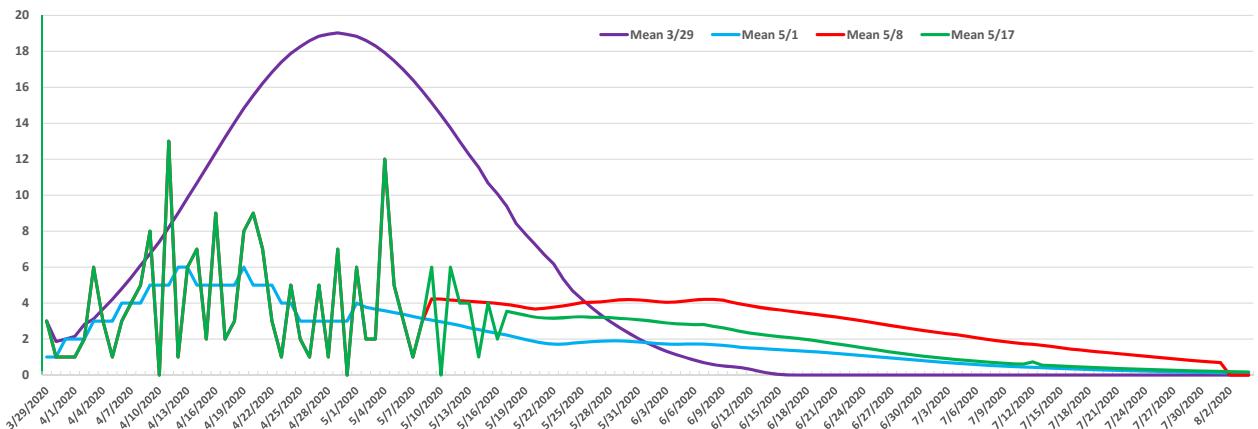
Outline

- ❖ IHME revisions since May 12th
- ❖ Stability of the IHME model since inception
- ❖ A look at Kansas mortality statistics
- ❖ Distribution of daily deaths compared to the March 26th model
- ❖ Cumulative deaths compared to:
 - ❖ The March 26th model
 - ❖ The May 4th model
- ❖ Two weeks of evidence from those states that have relaxed stay at home orders



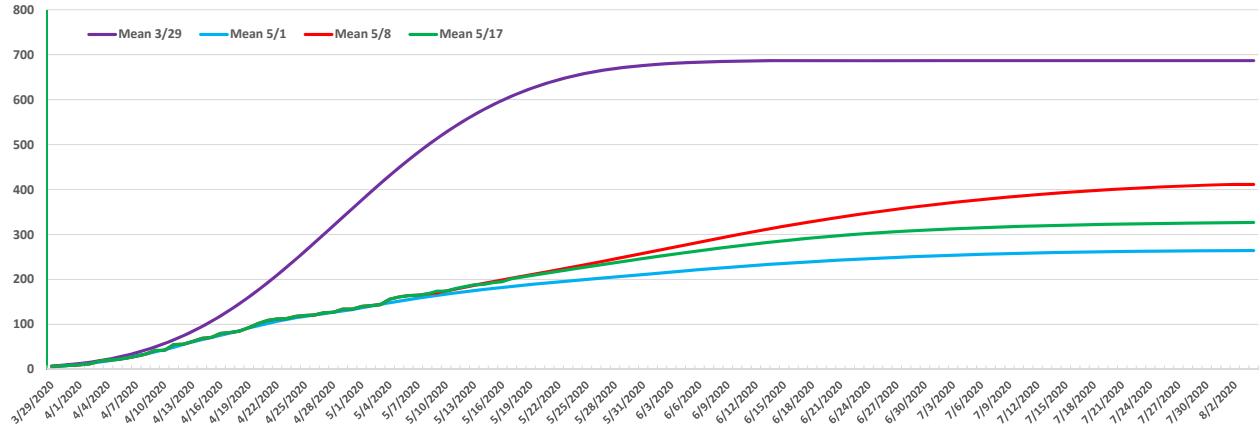
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Kansas COVID 19 Cumulative Death Projections Revised Forecasts



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Cumulative Death Change from the Original Model to the May 4, May 11 and the May 18 Release

	% Change 5/4	% Change 5/11	% Change 5/18		% Change 5/4	% Change 5/11	% Change 5/18
Alabama	33.3%	-10.3%	-30.2%	Hawaii	-93.8%	-95.1%	-95.1%
Alaska	-96.1%	-96.1%	-97.7%	Idaho	-0.7%	-10.2%	-3.2%
Arizona	-35.4%	85.2%	282.7%	Illinois	169.2%	213.3%	272.0%
Arkansas	-77.5%	-72.0%	-84.9%	Indiana	564.9%	335.4%	155.1%
California	8.4%	41.3%	58.9%	Iowa	998.6%	564.2%	657.1%
Colorado	-37.9%	-22.1%	6.0%	Kansas	-61.5%	-41.1%	-52.4%
Connecticut	970.6%	1,110.2%	1,185.6%	Kentucky	-11.2%	16.3%	-16.1%
Delaware	-34.5%	-50.1%	-34.7%	Louisiana	48.7%	70.4%	65.5%
Florida	-41.3%	-19.6%	-30.2%	Maine	-97.2%	-97.0%	-97.4%
Georgia	76.9%	29.5%	-14.3%	Maryland	87.0%	122.6%	272.6%



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Cumulative Death Change from the Original Model to the May 4, May 11 and the May 18 Release

	% Change 5/4	% Change 5/11	% Change 5/18		% Change 5/4	% Change 5/11	% Change 5/18
Massachusetts	331.9%	323.3%	402.1%	New Mexico	-16.3%	-25.8%	1.1%
Michigan	147.4%	117.2%	111.2%	New York	106.7%	103.4%	106.7%
Minnesota	1.7%	-3.4%	-15.5%	North Carolina	-32.1%	-30.8%	46.7%
Mississippi	-78.9%	-46.1%	-57.0%	North Dakota	-77.9%	-52.6%	-22.7%
Missouri	17.9%	88.1%	42.8%	Ohio	112.1%	146.0%	146.3%
Montana	-95.3%	-95.0%	-95.7%	Oklahoma	-57.0%	-59.1%	-68.0%
Nebraska	-10.4%	-48.5%	-42.7%	Oregon	-58.9%	-56.6%	-50.7%
Nevada	-15.4%	-10.0%	7.3%	Pennsylvania	445.2%	580.5%	509.6%
New Hampshire	-52.1%	-35.1%	-10.2%	Rhode Island	58.6%	120.6%	153.5%
New Jersey	665.3%	603.7%	571.2%	South Carolina	6.6%	-28.7%	-53.5%



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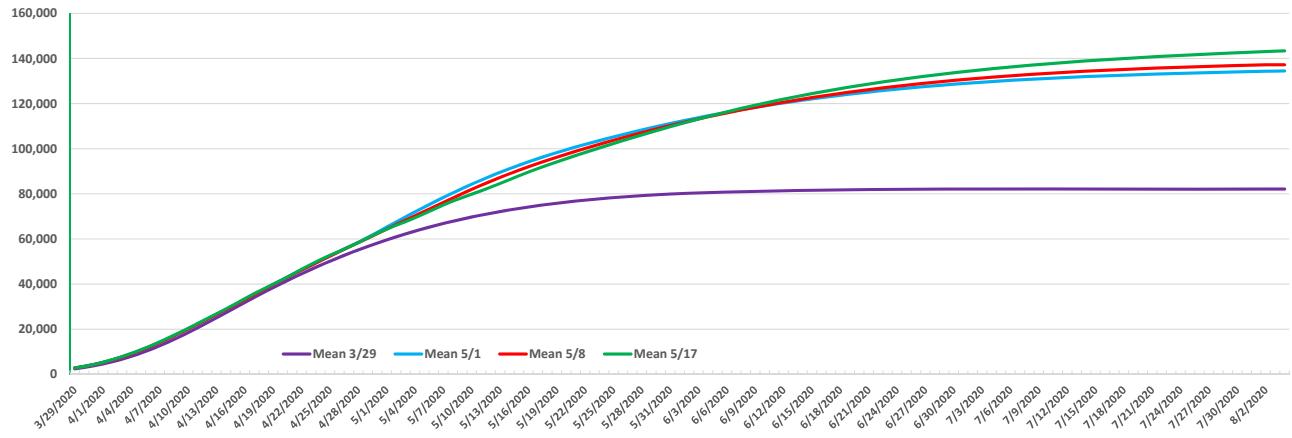
Cumulative Death Change from the Original Model to the May 4, May 11 and the May 18 Release

	% Change 5/4	% Change 5/11	% Change 5/18		% Change 5/4	% Change 5/11	% Change 5/18
South Dakota	36.8%	-18.3%	-38.3%	Virginia	-41.7%	-32.0%	-3.6%
Tennessee	-47.3%	-52.5%	-54.1%	Washington	-30.6%	-32.9%	-24.4%
Texas	-12.5%	-38.1%	-10.6%	West Virginia	-77.8%	-85.5%	-80.4%
Utah	-82.9%	-70.2%	-70.1%	Wisconsin	-45.2%	-48.6%	-43.9%
Vermont	-43.4%	-44.7%	-48.2%	Wyoming	-95.4%	-95.4%	-97.0%
United States	63.7%	67.0%	74.5%				



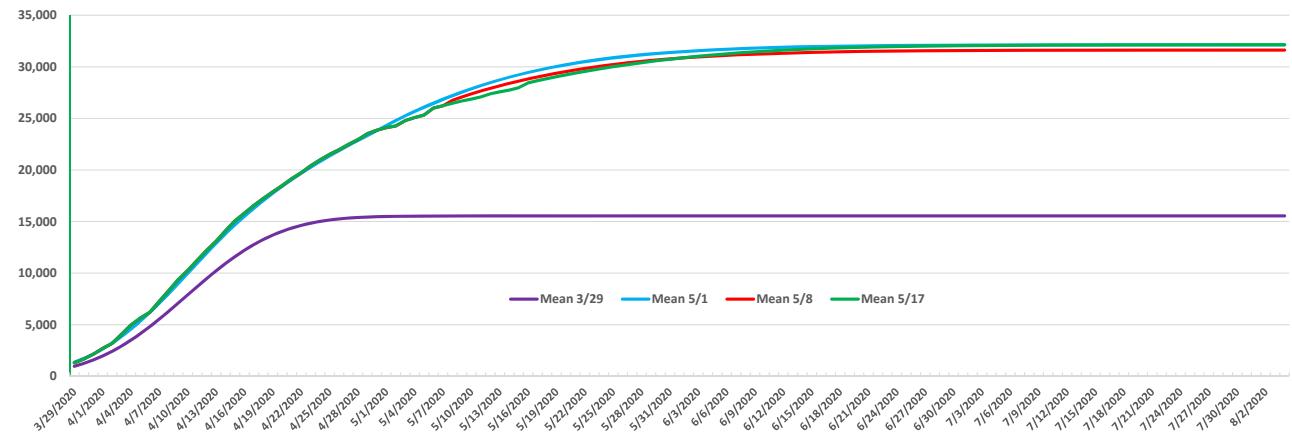
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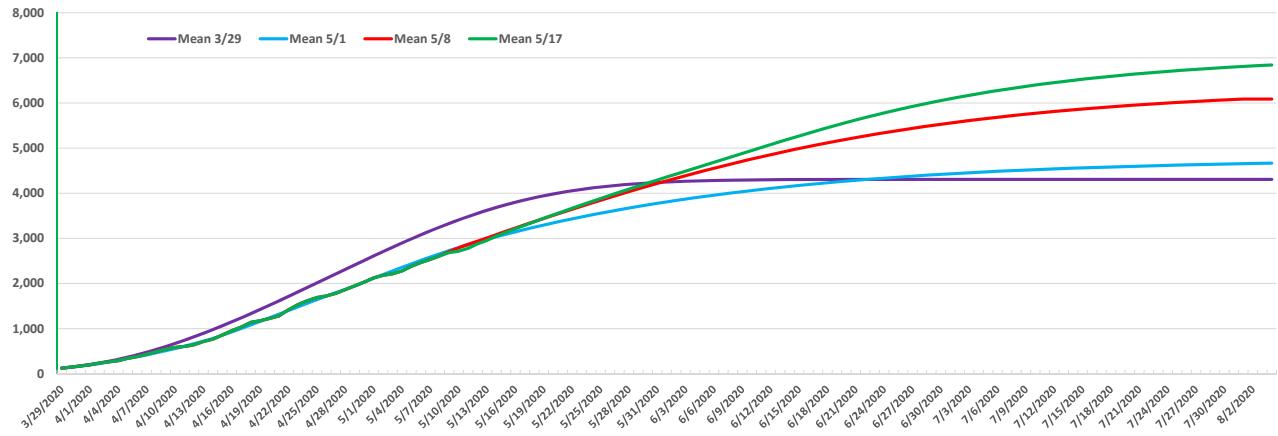
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New York COVID 19 Cumulative Death Projections Revised Forecasts



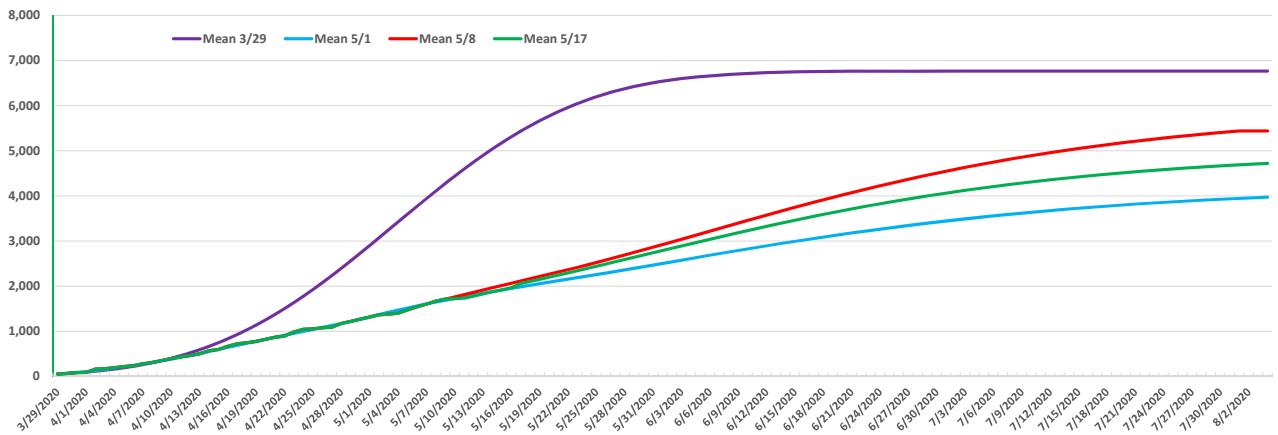
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California COVID 19 Cumulative Death Projections Revised Forecasts



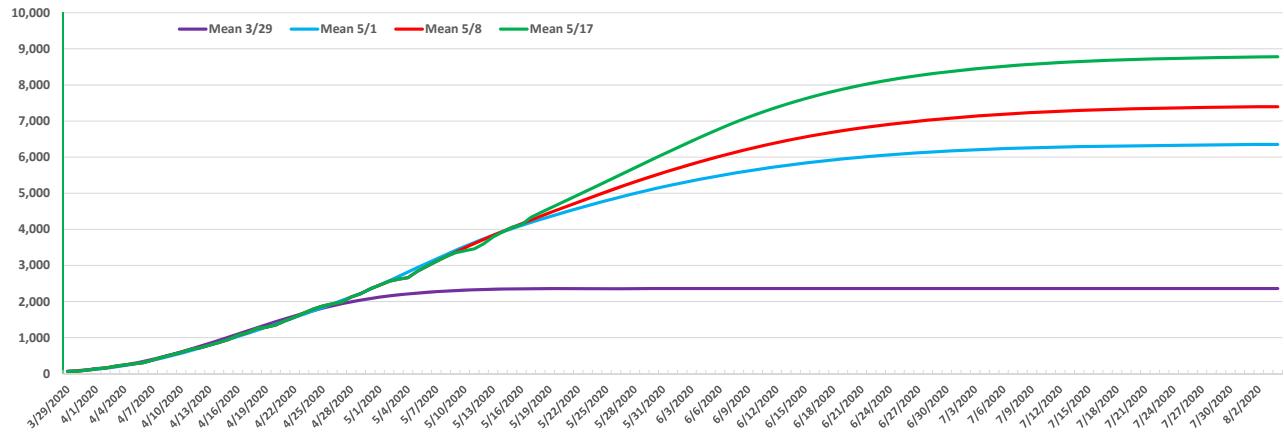
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Florida COVID 19 Cumulative Death Projections Revised Forecasts



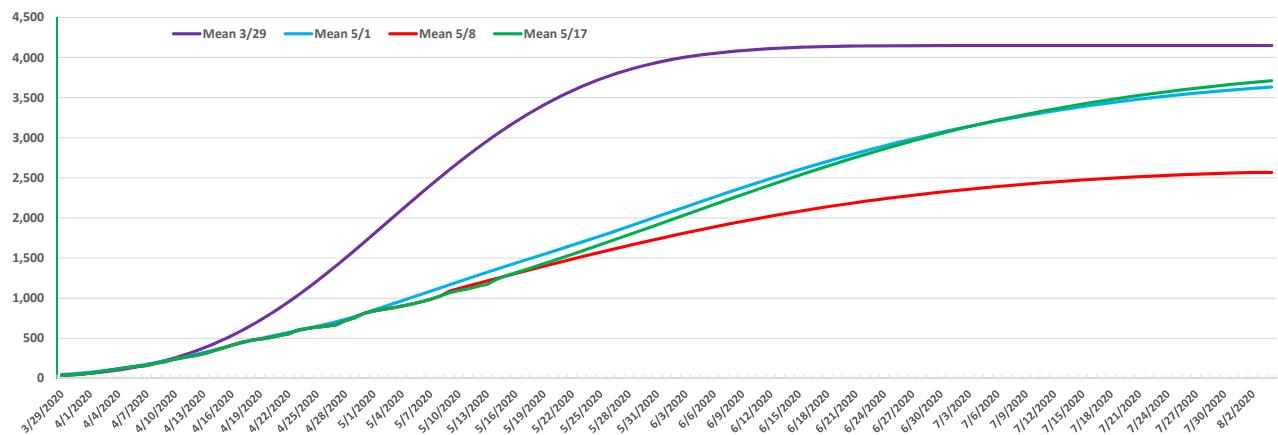
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Illinois COVID 19 Cumulative Death Projections Revised Forecasts



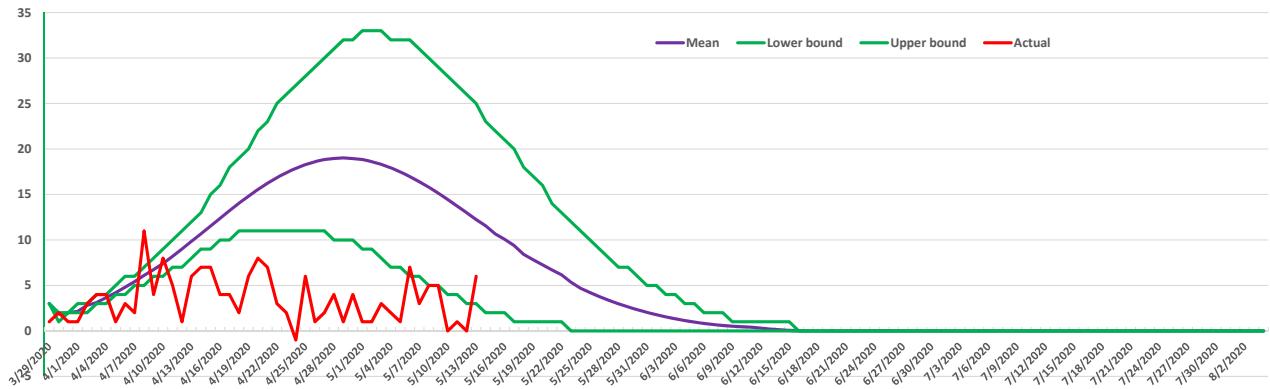
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Texas COVID 19 Cumulative Death Projections Revised Forecasts



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Kansas COVID Deaths by Age Group

Age Group	Number of Deaths	Percent of COVID Deaths	2018 Mortality Rates
35-44 years	4	2.3%	2.5%
45-54 years	5	4.0%	4.8%
55-64 years	20	14.5%	12.8%
65-74 years	29	17.3%	18.2%
75-84 years	35	22.5%	23.4%
85+ years	65	39.3%	34.2%
Total	158	100%	95.8%

<https://www.coronavirus.kdheks.gov/160/COVID-19-in-Kansas>, May 19, 2020

https://www.kdheks.gov/phi/AS_Tables/AS_2018_Tables_and_Figures/general_mortality/Table_E4.pdf, May 19, 2020



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Kansas COVID and General Mortality by Age Group

Age Group	COVID Deaths	COVID Deaths per 1000	2018 Mortality Rate per 1000
Under 1 year	0	0.00	6.3
1-24 years	0	0.00	1.2
25-34 years	0	0.00	1.3
35-44 years	4	0.01	1.9
45-54 years	5	0.02	3.9
55-64 years	20	0.07	9.3
65-74 years	29	0.11	18.9
75-84 years	35	0.29	47.5
85+ years	65	1.04	142.1

<https://www.coronavirus.kdheks.gov/160/COVID-19-in-Kansas>, May 19, 2020

https://www.kdheks.gov/phi/AS_Tables/AS_2018_Tables_and_Figures/general_mortality/, May 19, 2020

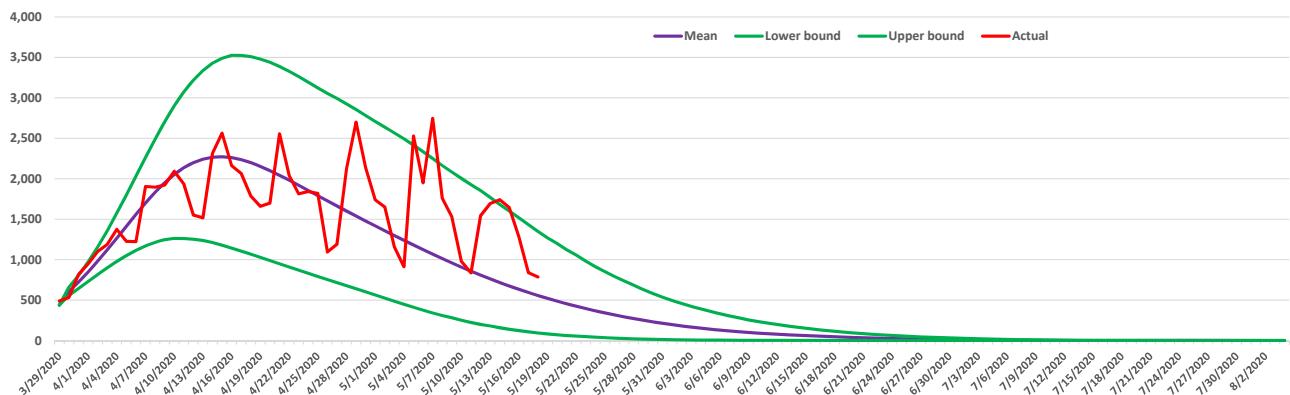


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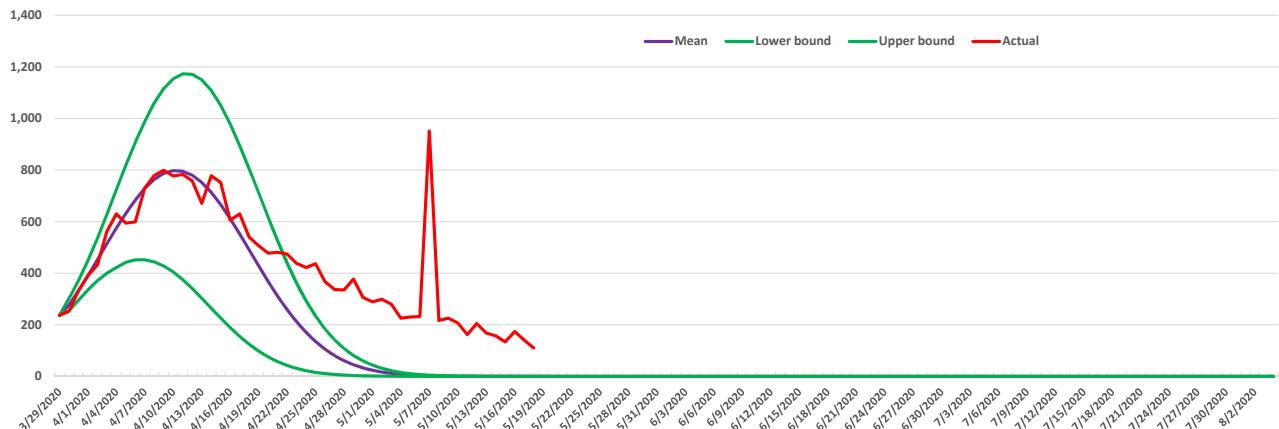


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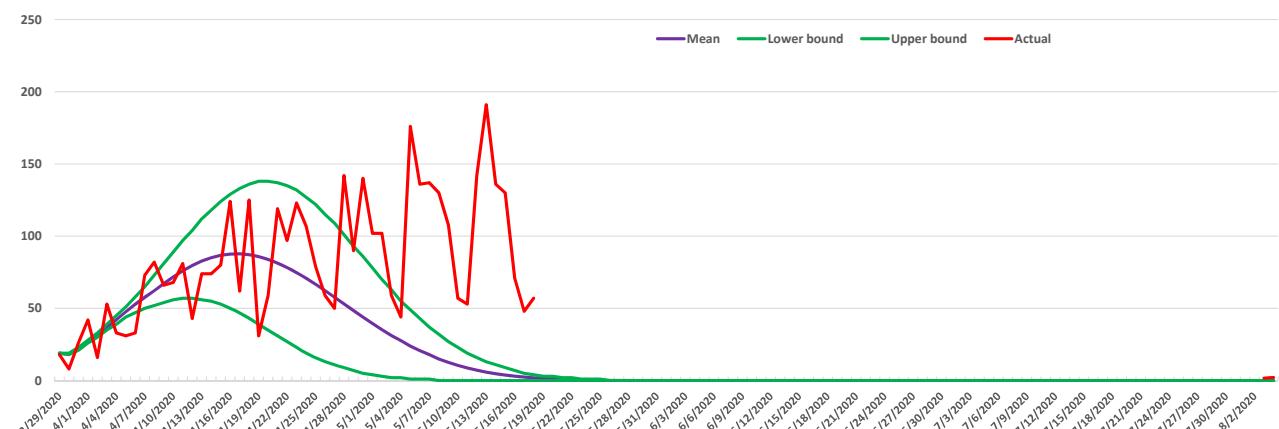
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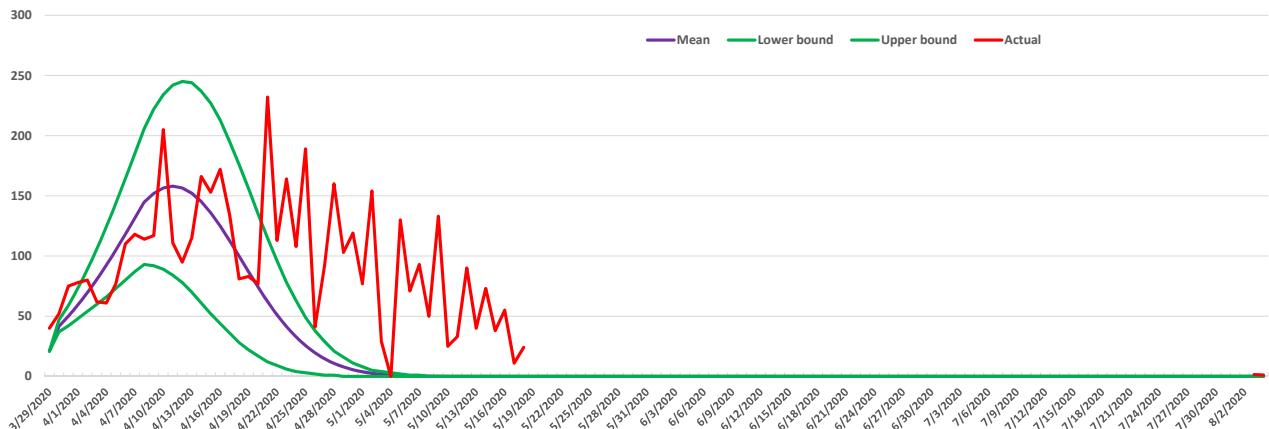
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Illinois COVID 19 Daily Death Projections March 26



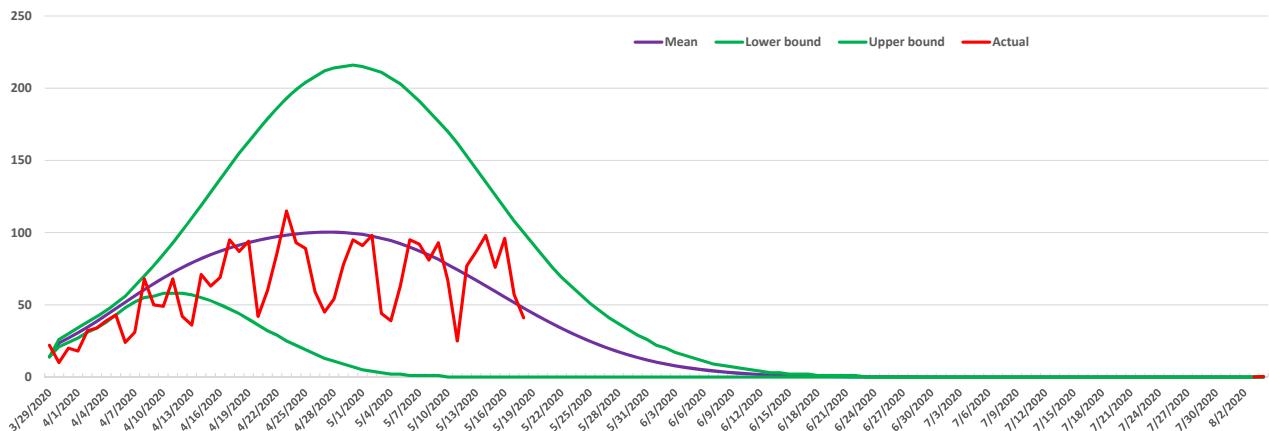
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Michigan COVID 19 Daily Death Projections March 26



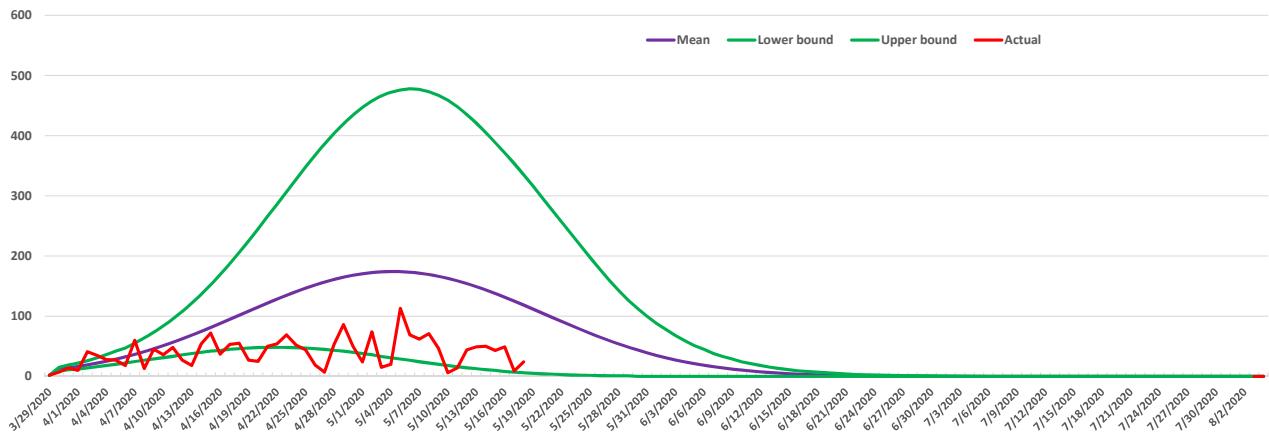
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California COVID 19 Daily Death Projections March 26



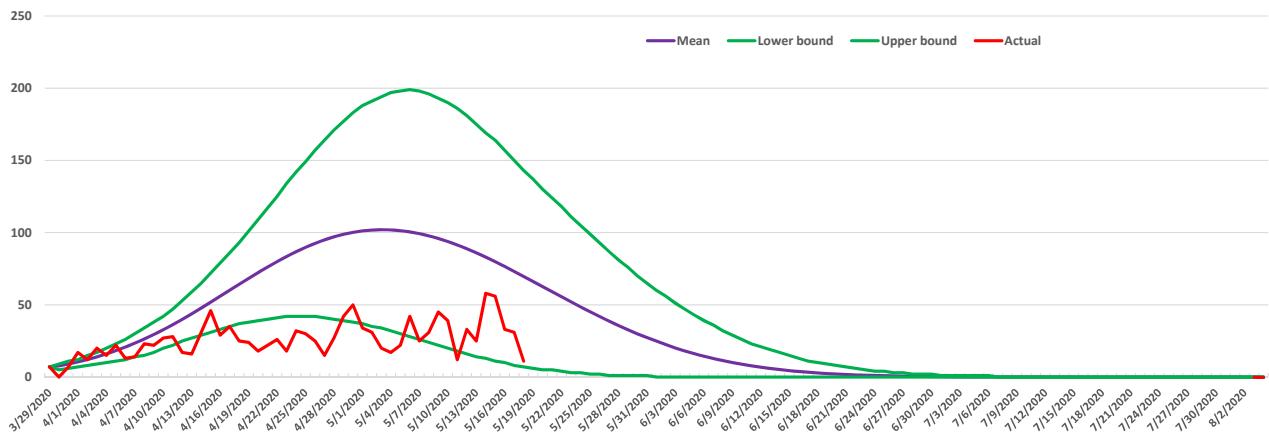
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Florida COVID 19 Daily Death Projections March 26



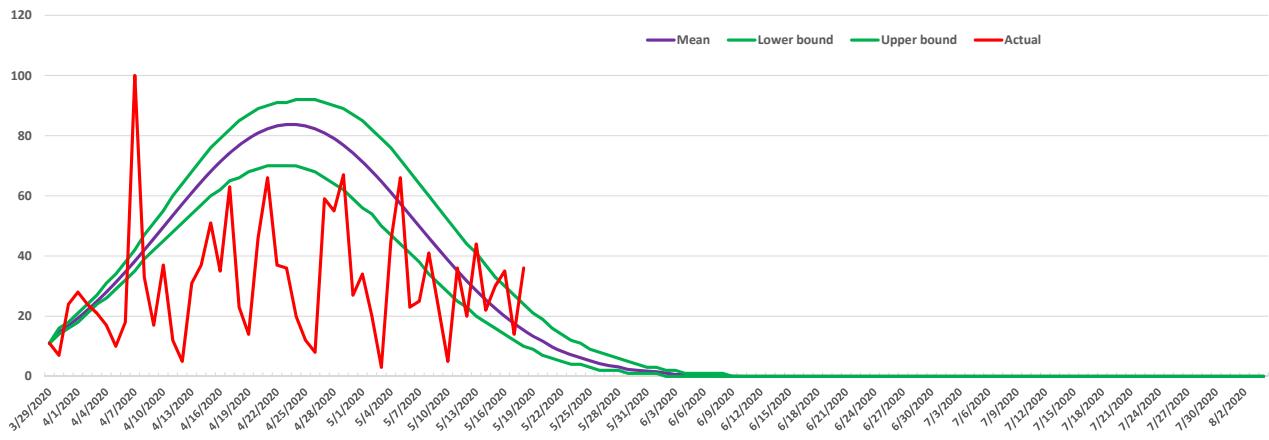
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Texas COVID 19 Daily Death Projections March 26



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Georgia COVID 19 Daily Death Projections March 26



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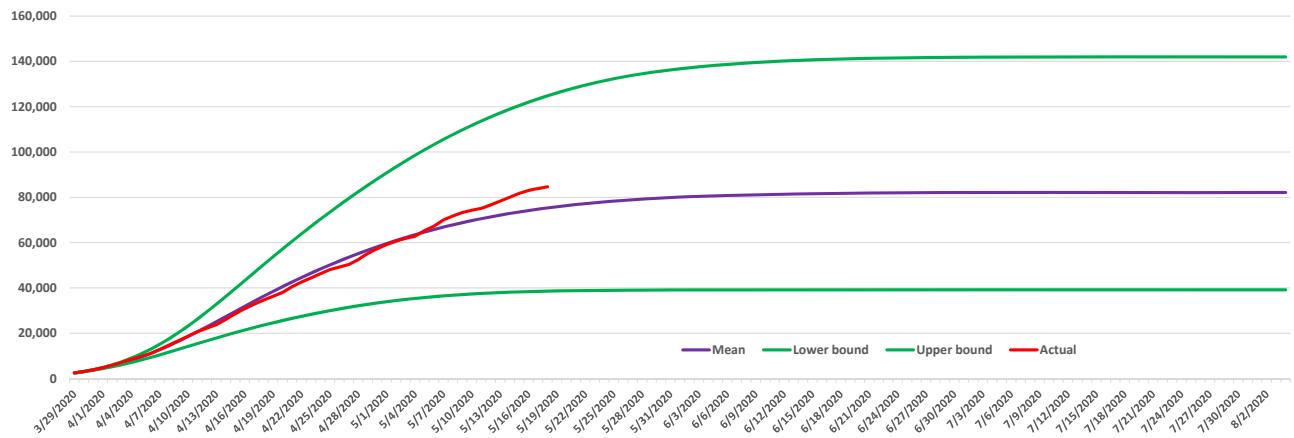
Cumulative Death Information

- ❖ The original model since March 29th
- ❖ The original model and the May 4th Model since May 1



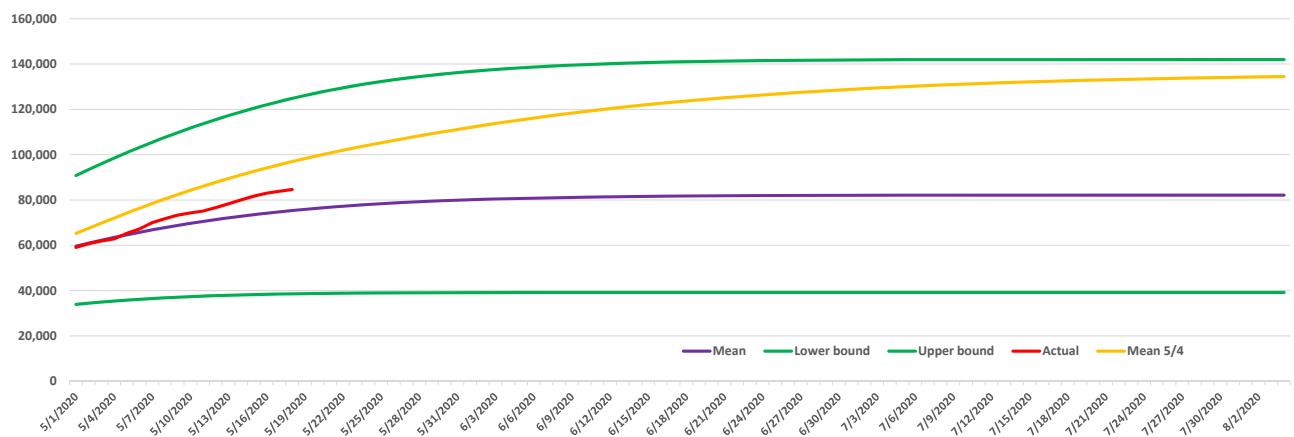
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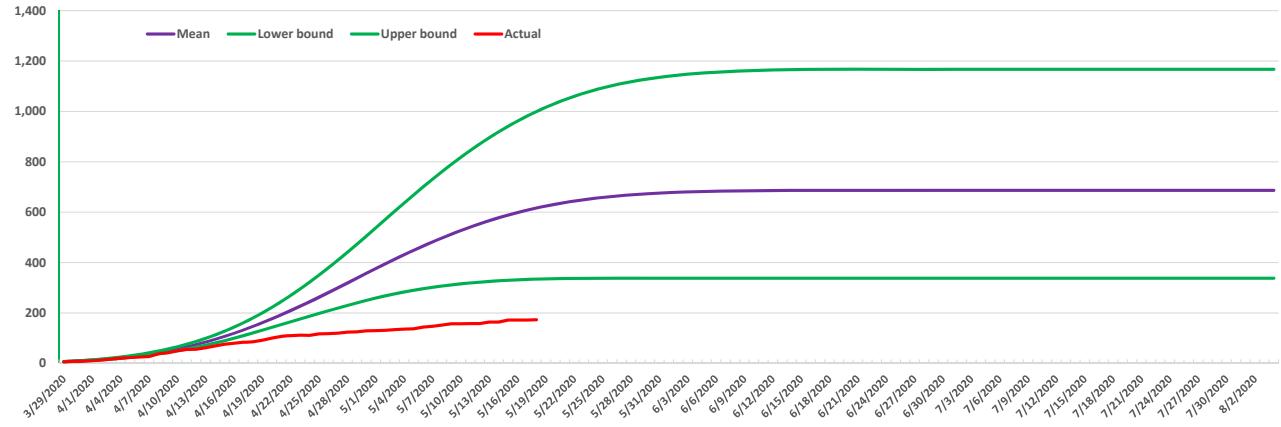
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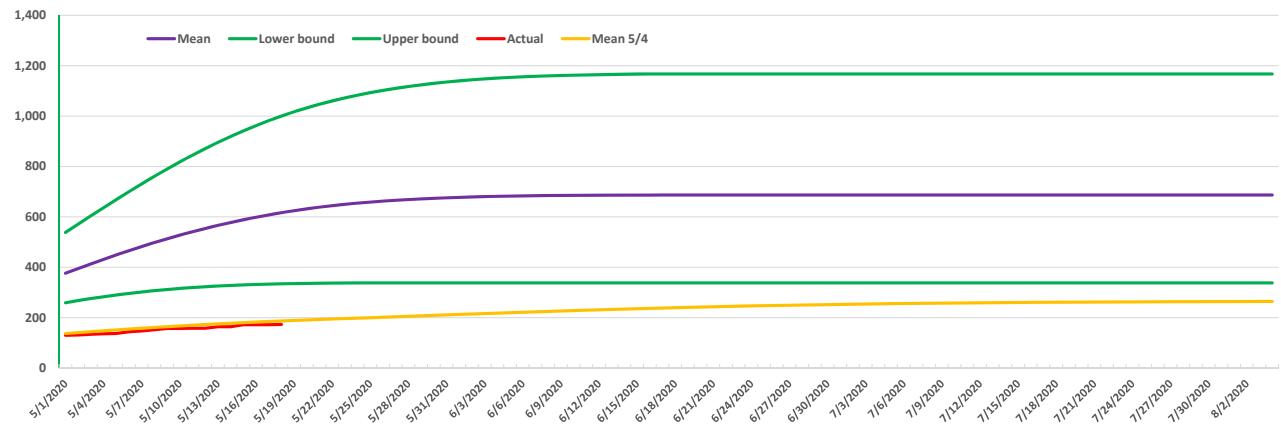
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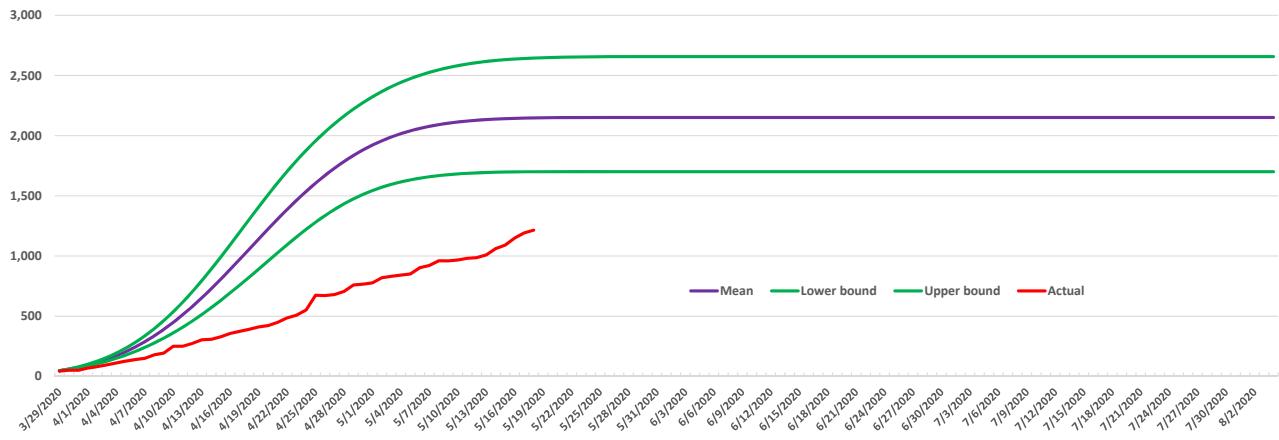
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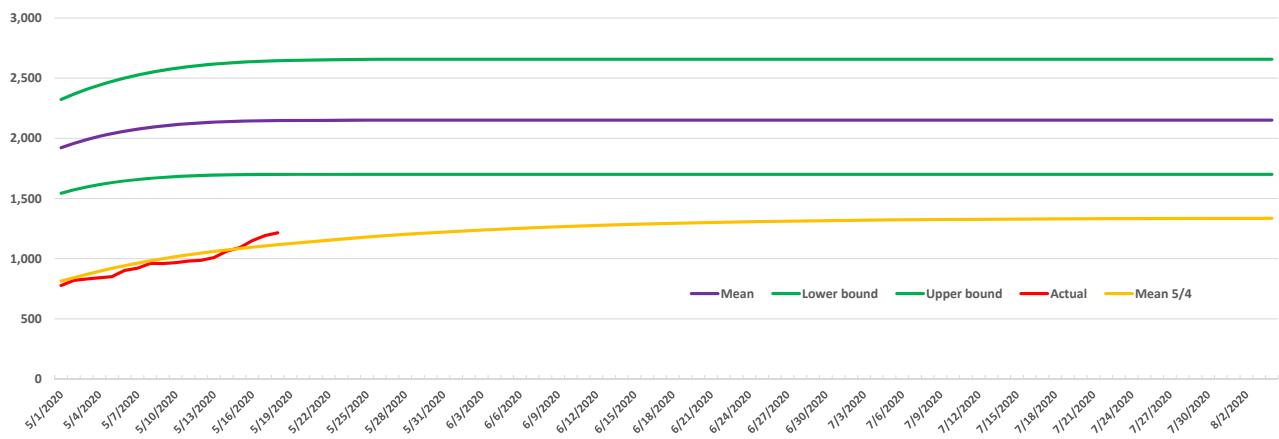
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Colorado COVID 19 Cumulative Death Projections March 26



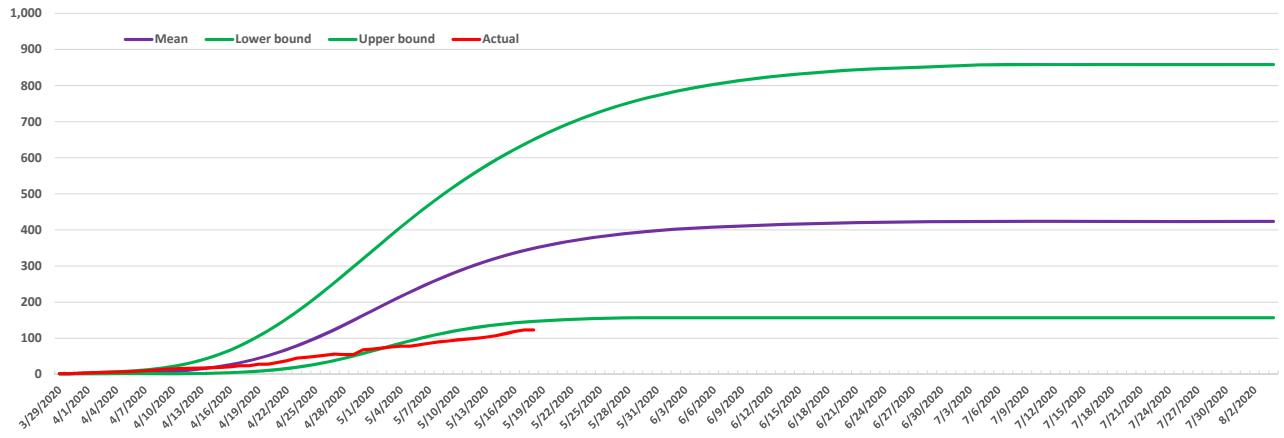
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Colorado COVID 19 Cumulative Death Projections March 26



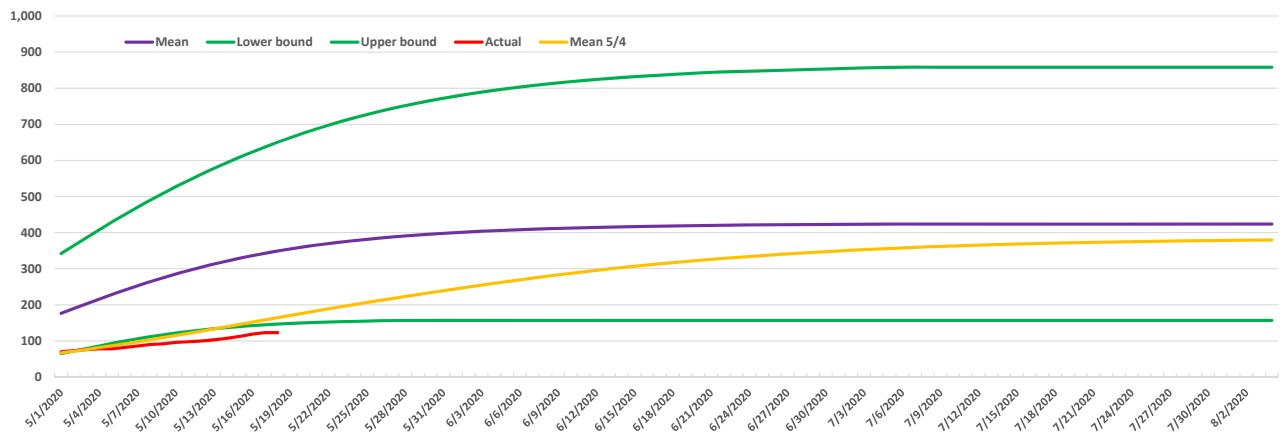
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Nebraska COVID 19 Daily Death Projections March 26



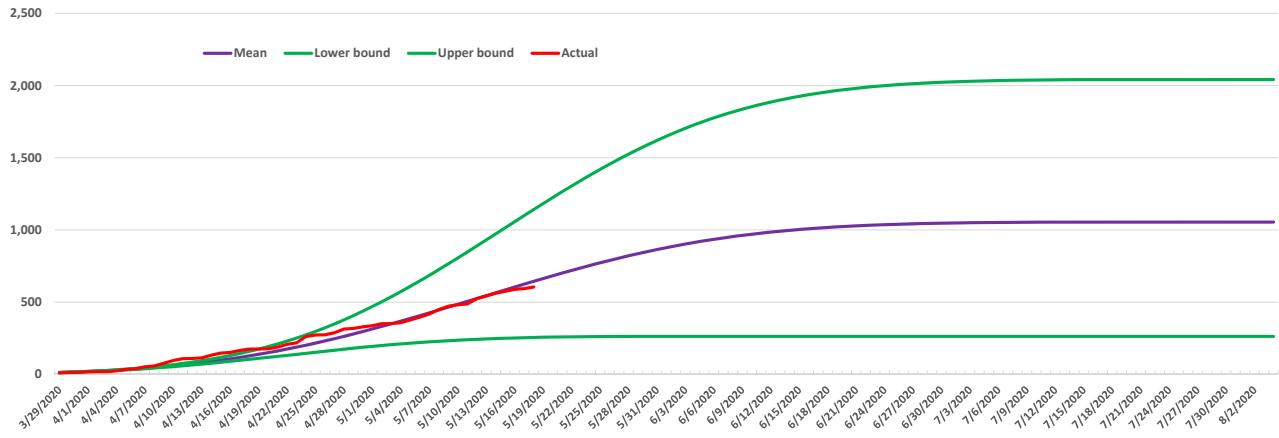
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Nebraska COVID 19 Daily Death Projections March 26



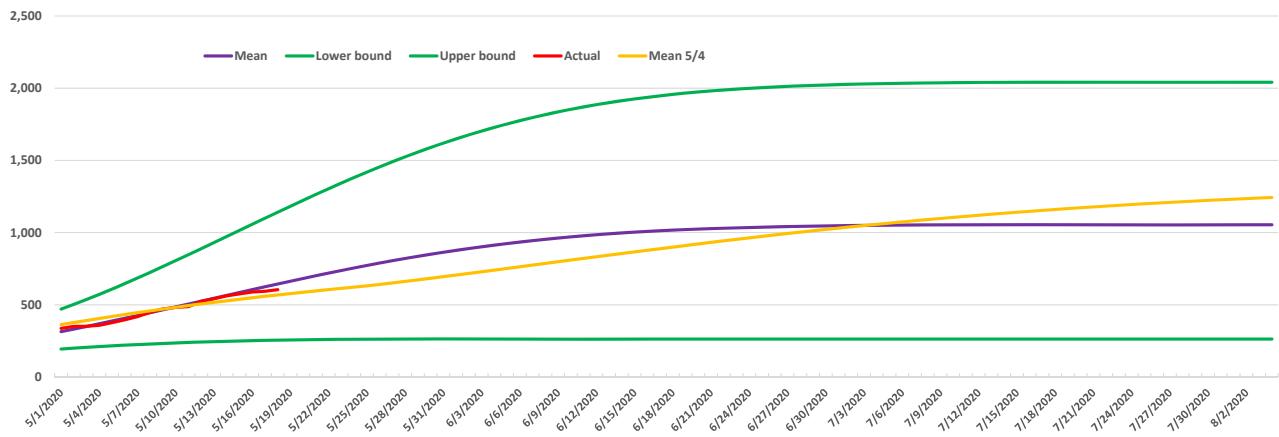
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Missouri COVID 19 Cumulative Death Projections March 26



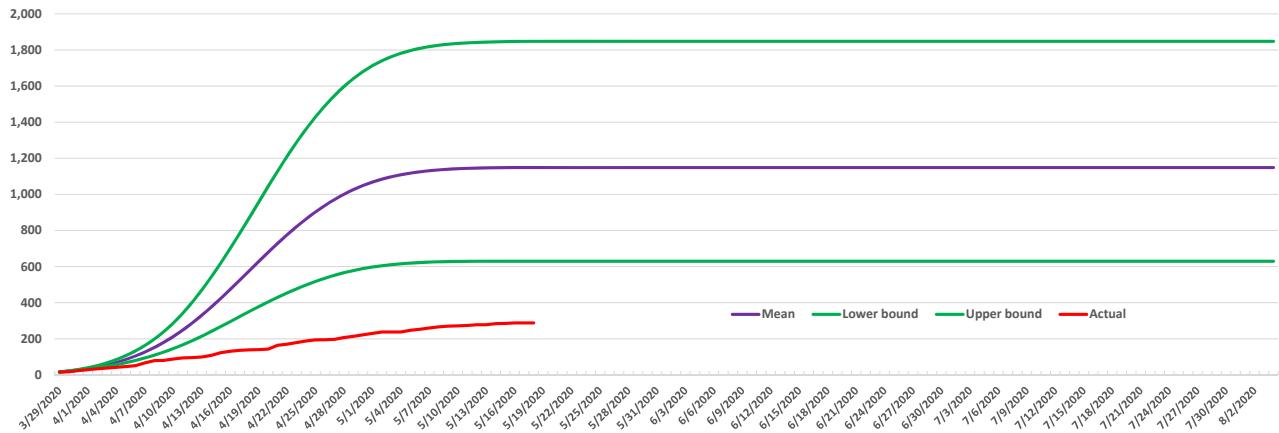
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Missouri COVID 19 Cumulative Death Projections March 26



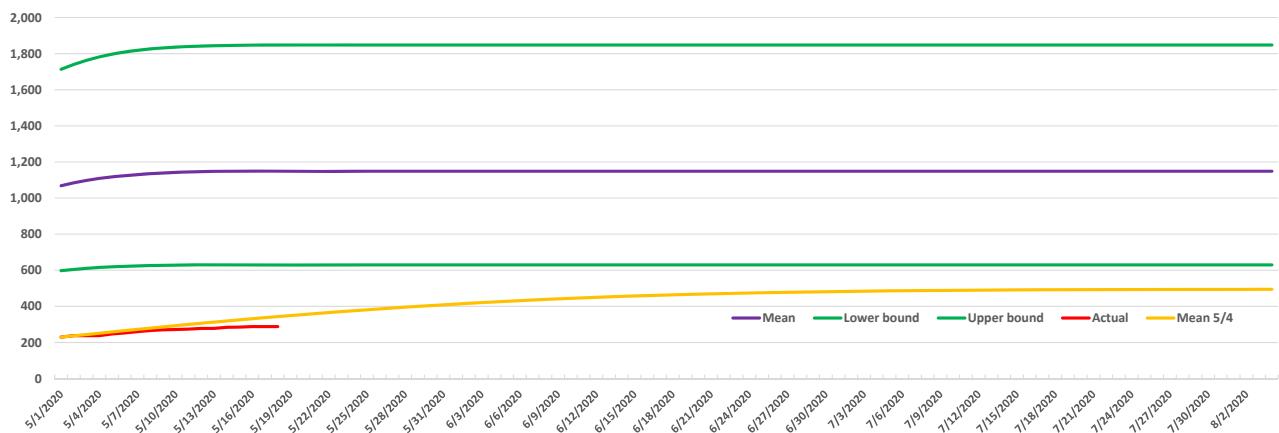
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Oklahoma COVID 19 Daily Death Projections March 26



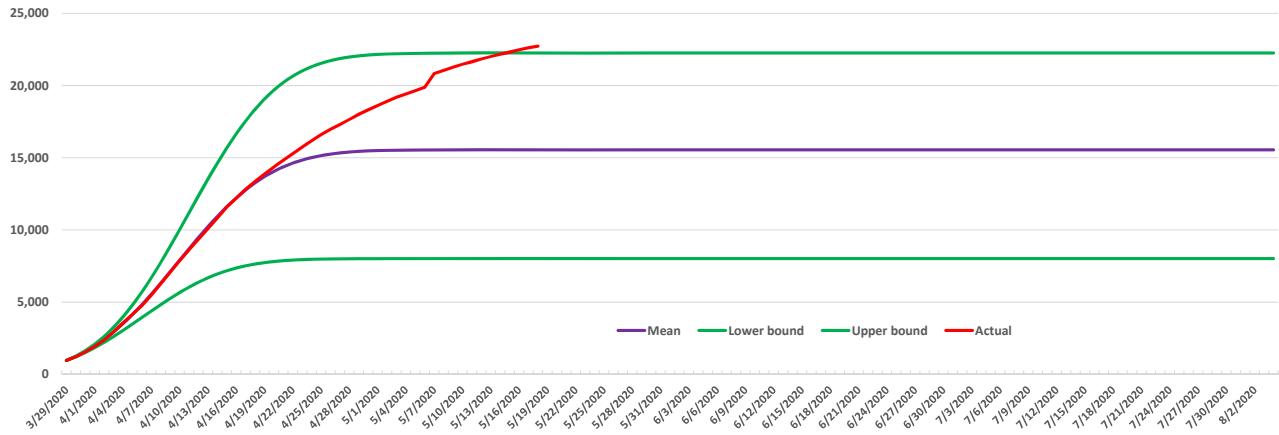
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Oklahoma COVID 19 Daily Death Projections March 26



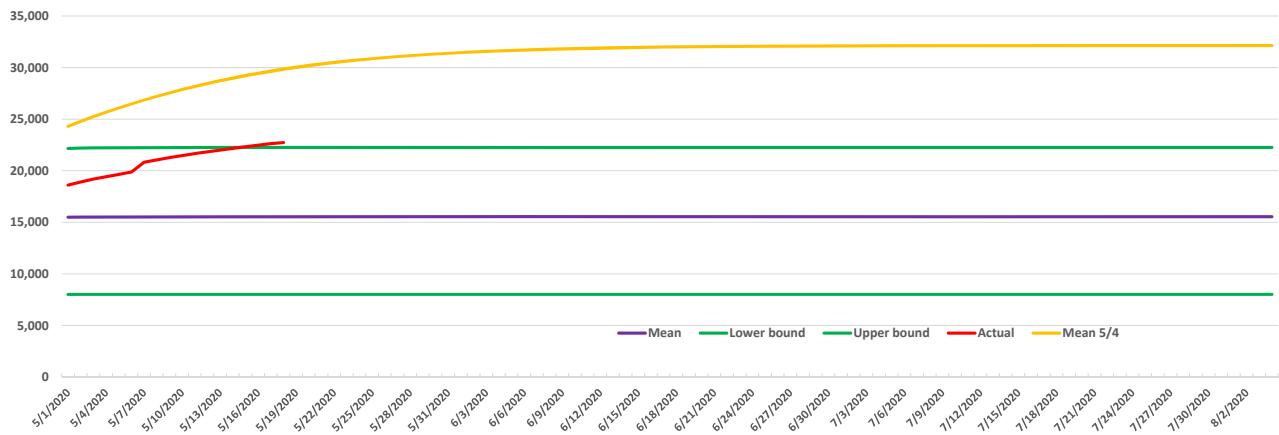
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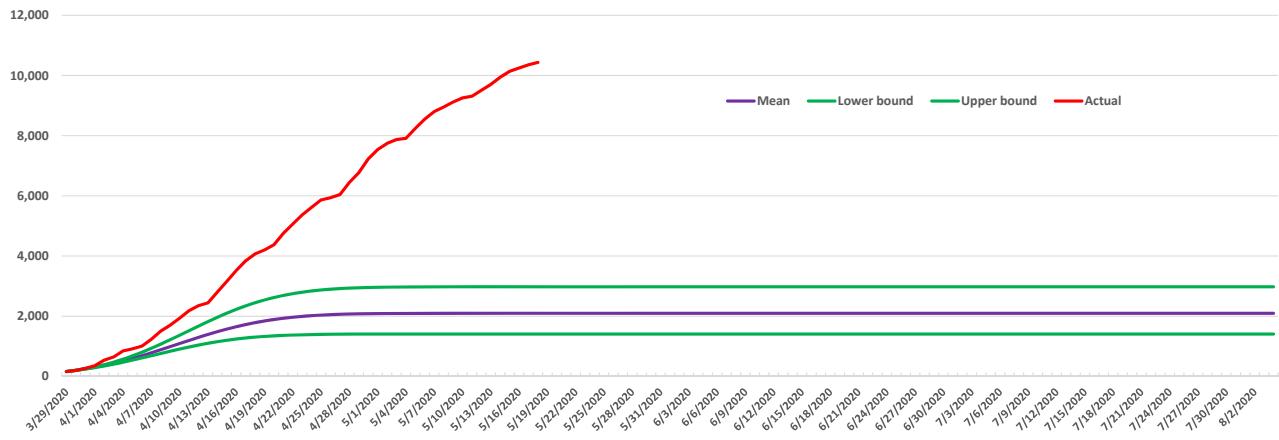
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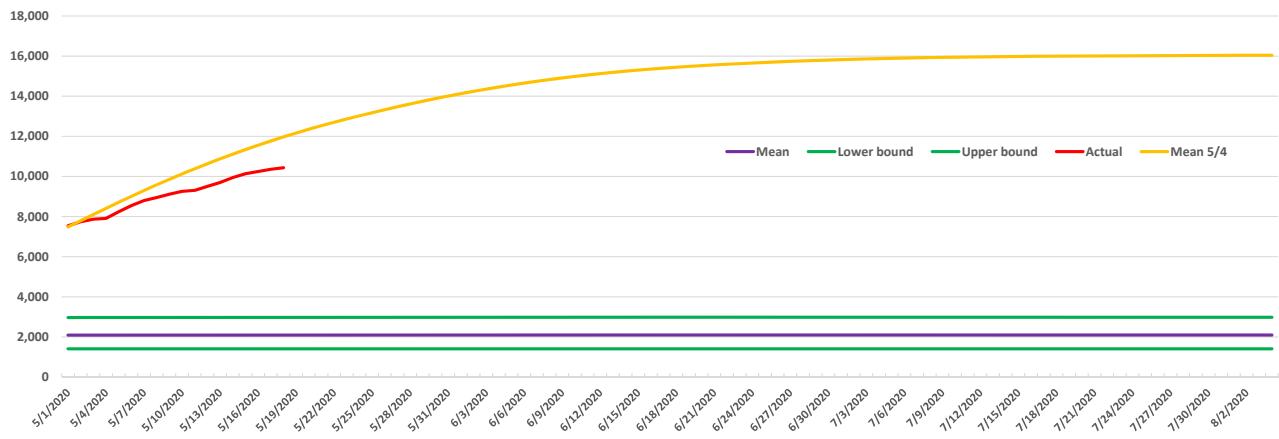
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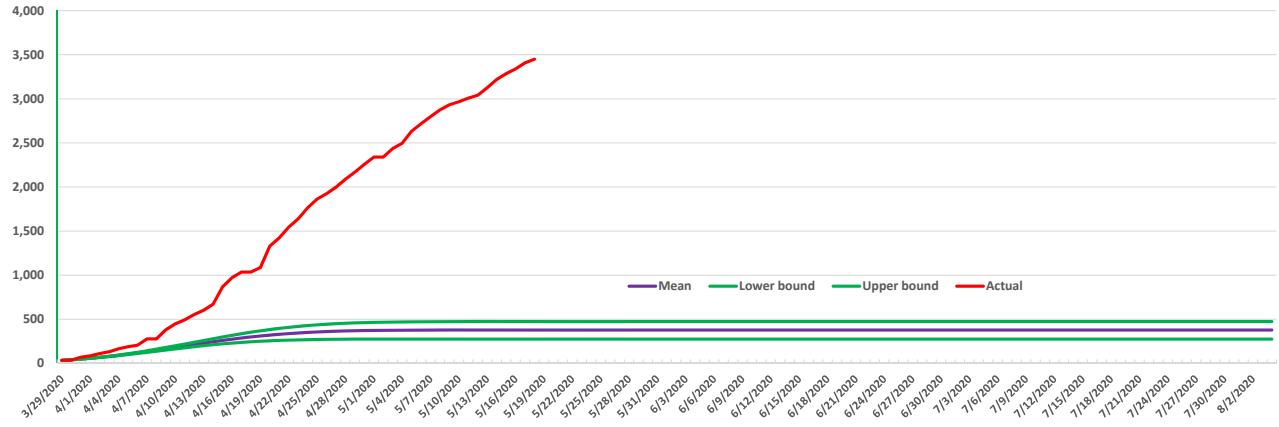
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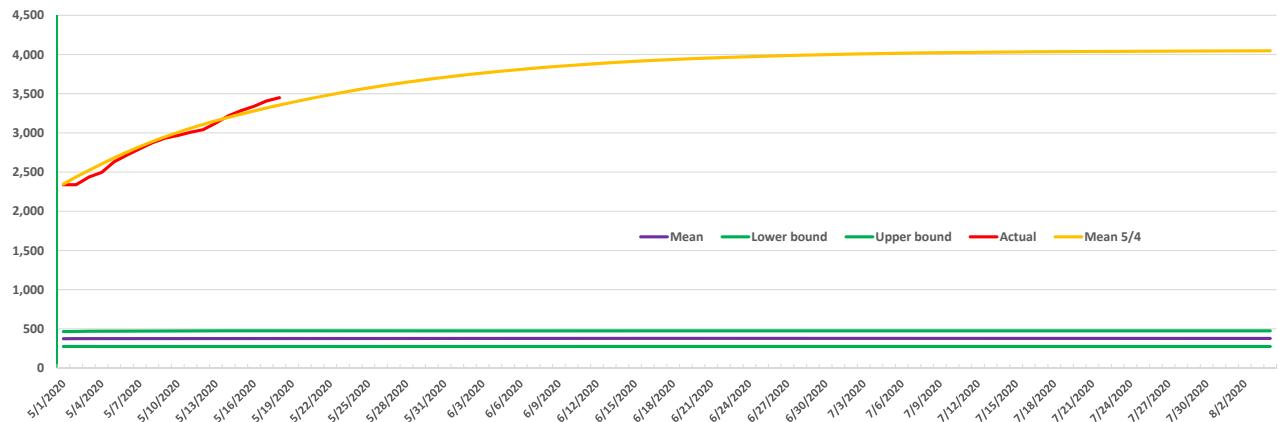
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Connecticut COVID 19 Cumulative Death Projections



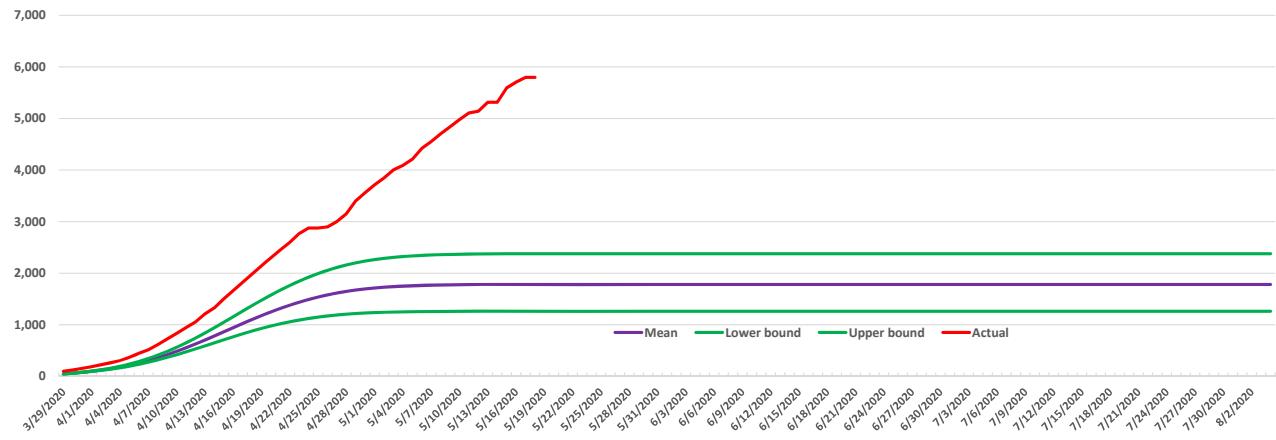
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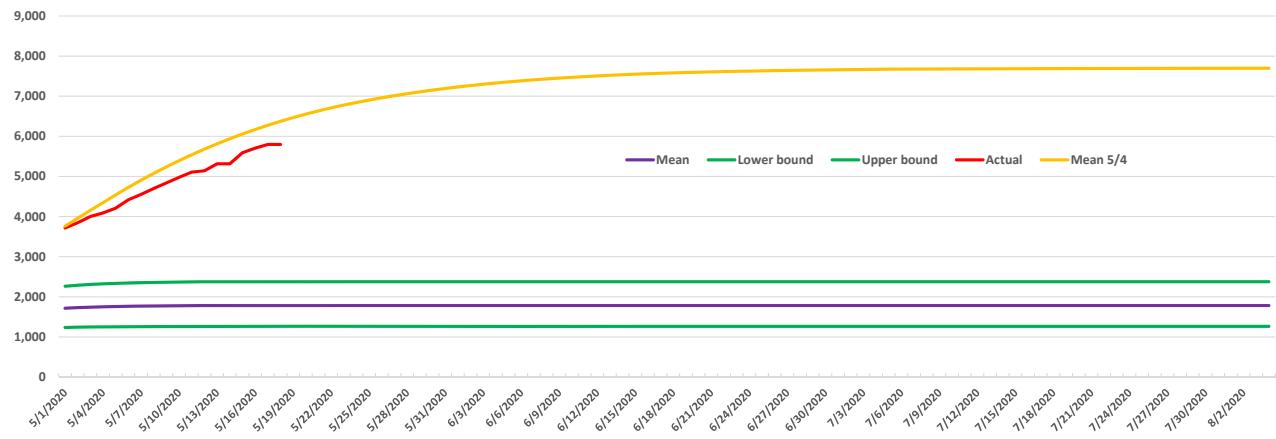
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Massachusetts COVID 19 Cumulative Death Projections



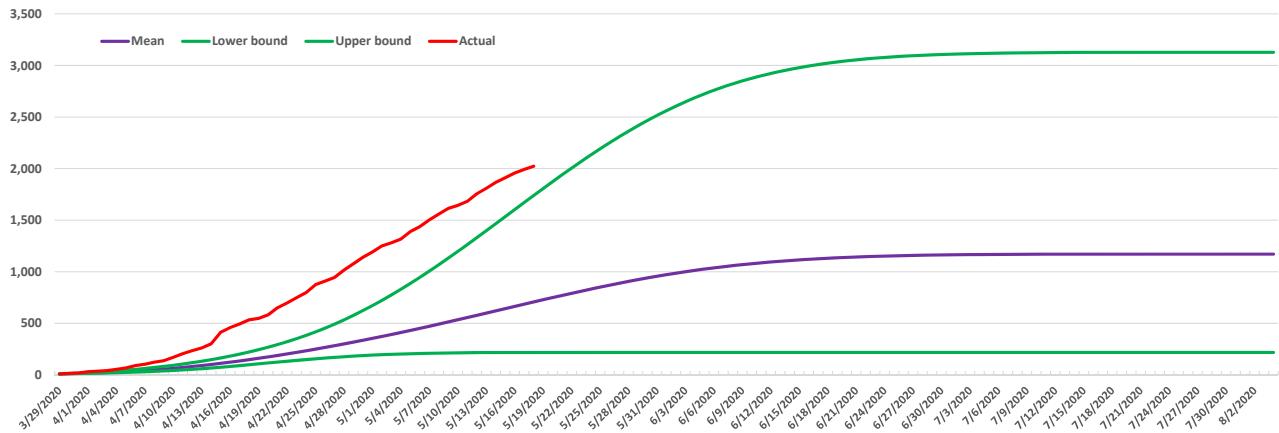
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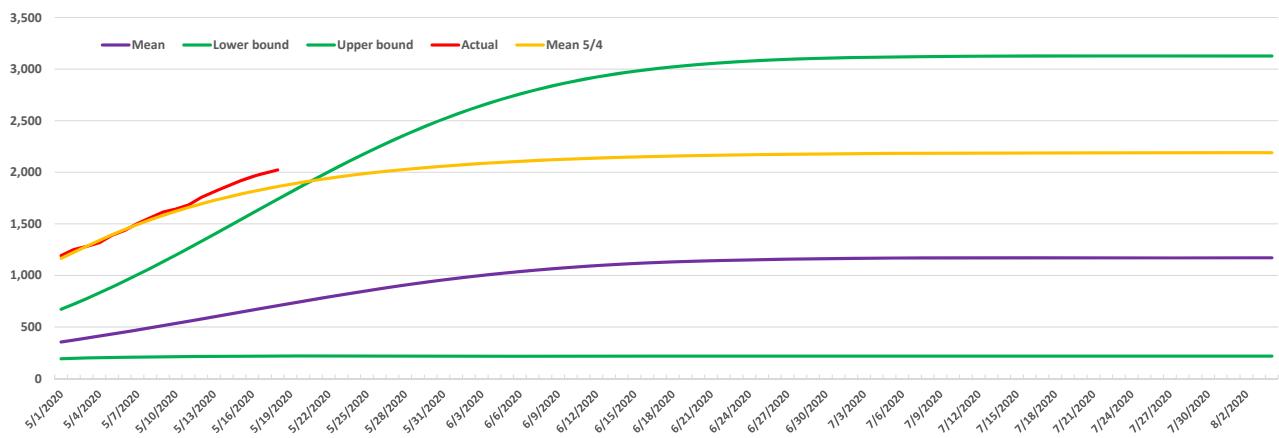
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Maryland COVID 19 Daily Death Projections March 26



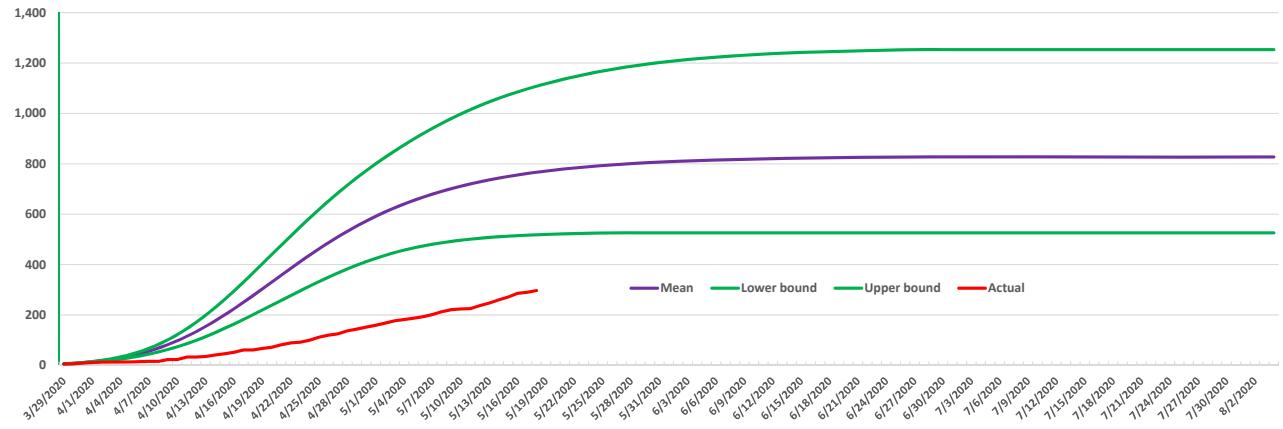
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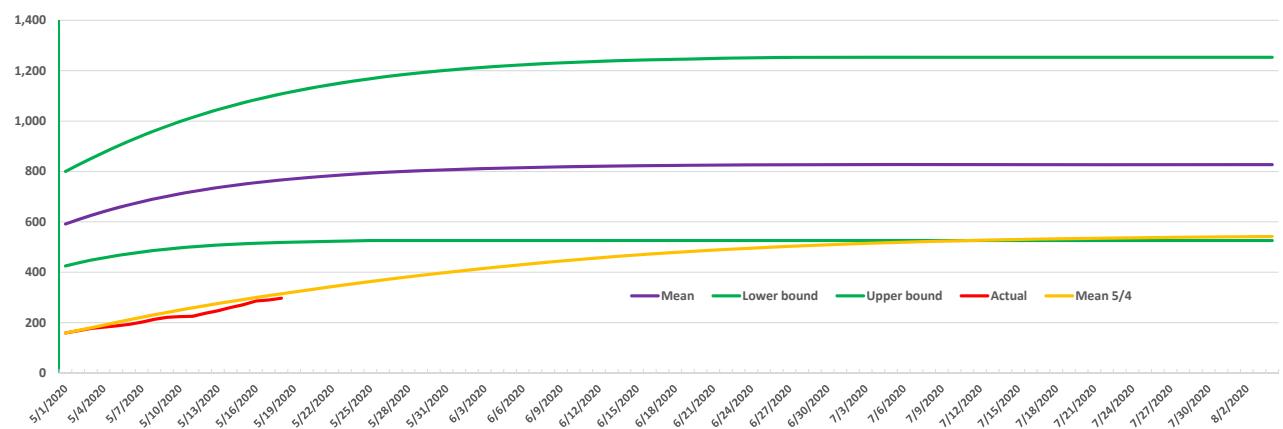
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Delaware COVID 19 Cumulative Death Projections



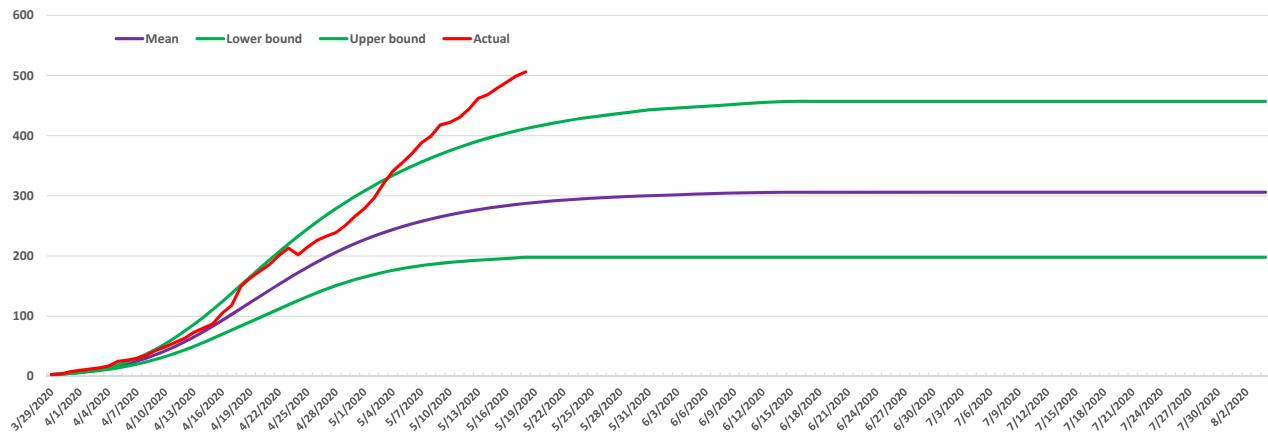
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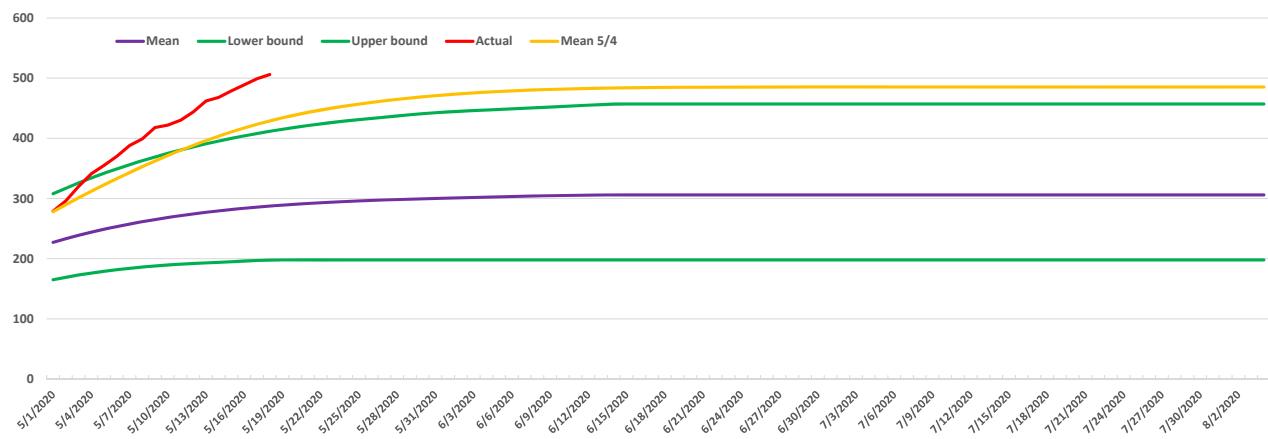
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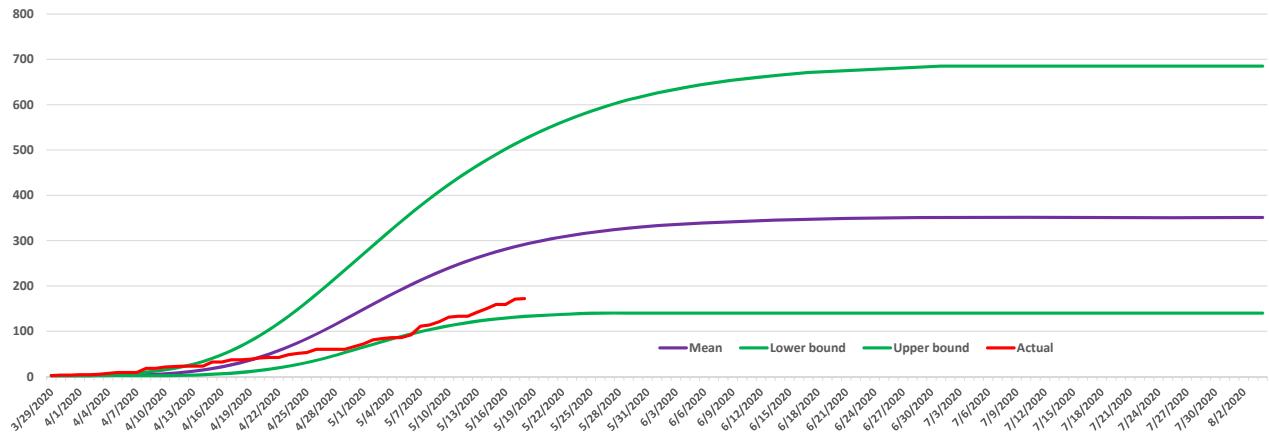
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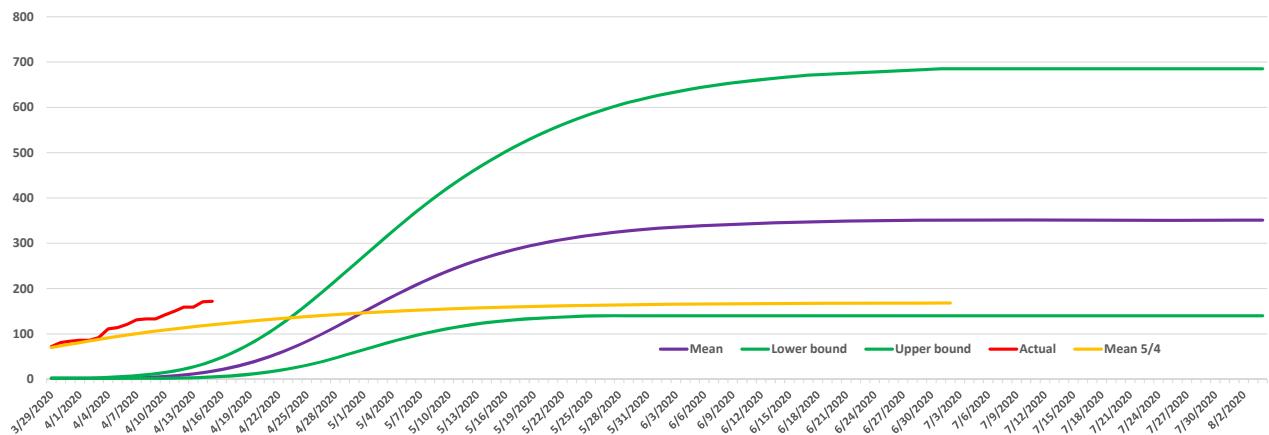
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New Hampshire COVID 19 Cumulative Death Projections



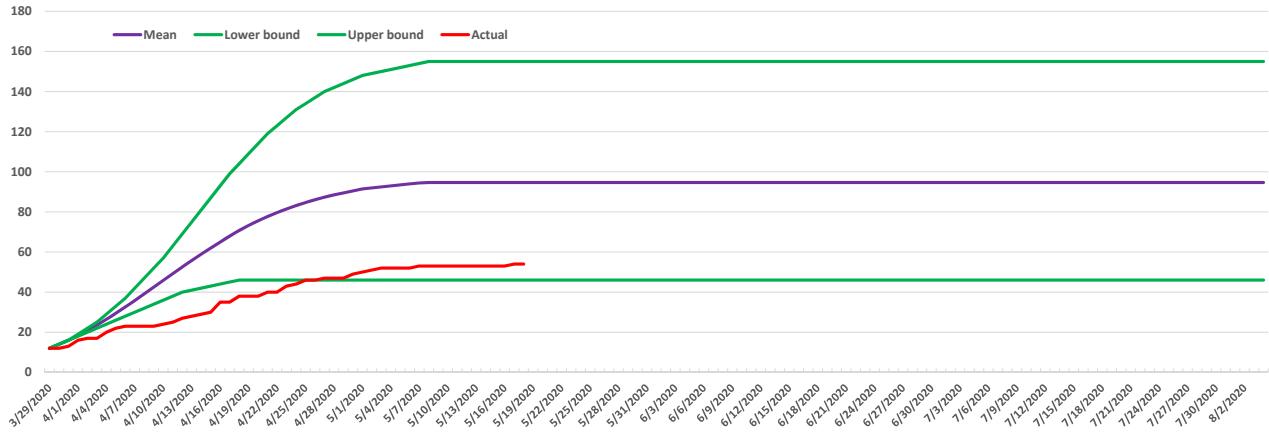
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New Hampshire COVID 19 Cumulative Death Projections



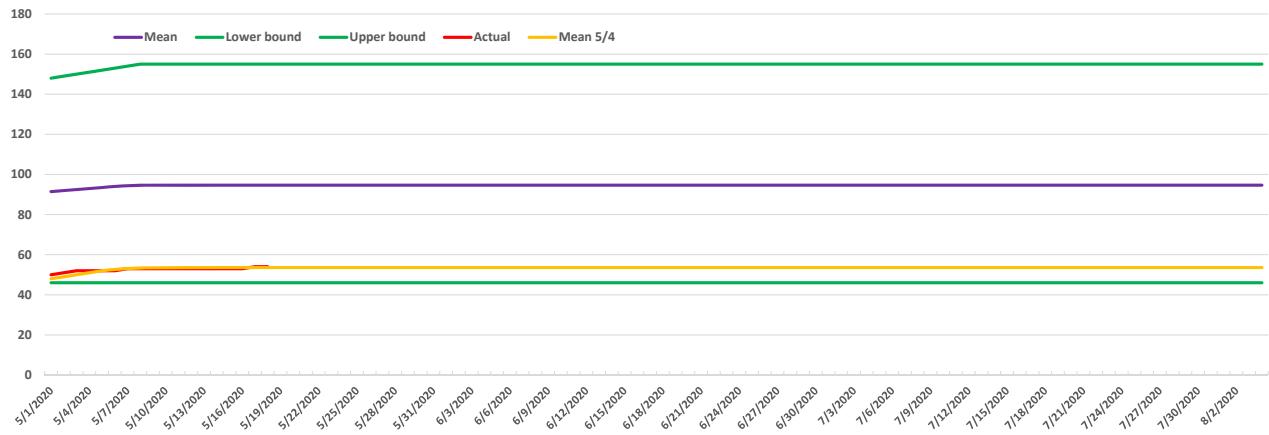
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Vermont COVID 19 Cumulative Death Projections March 26



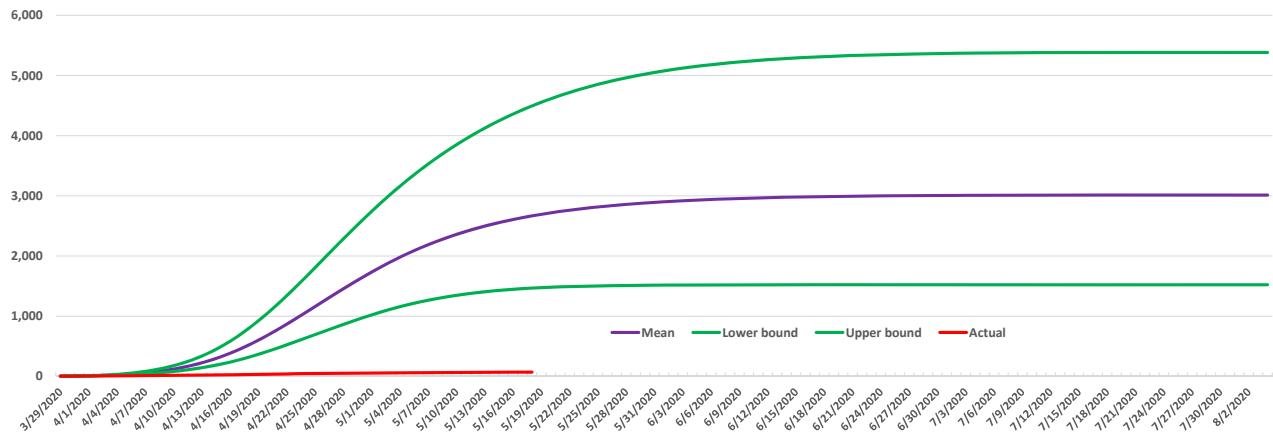
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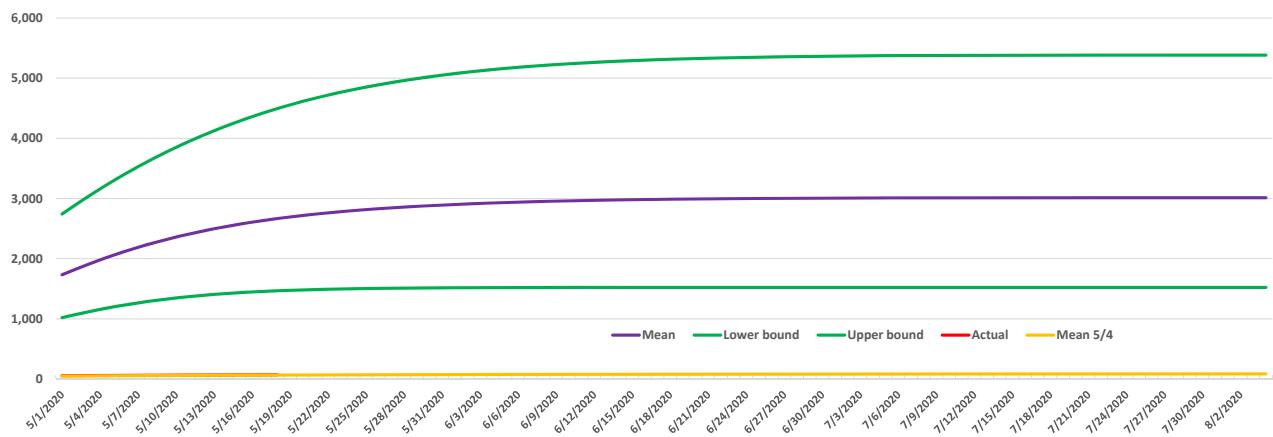
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Maine COVID 19 Cumulative Death Projections



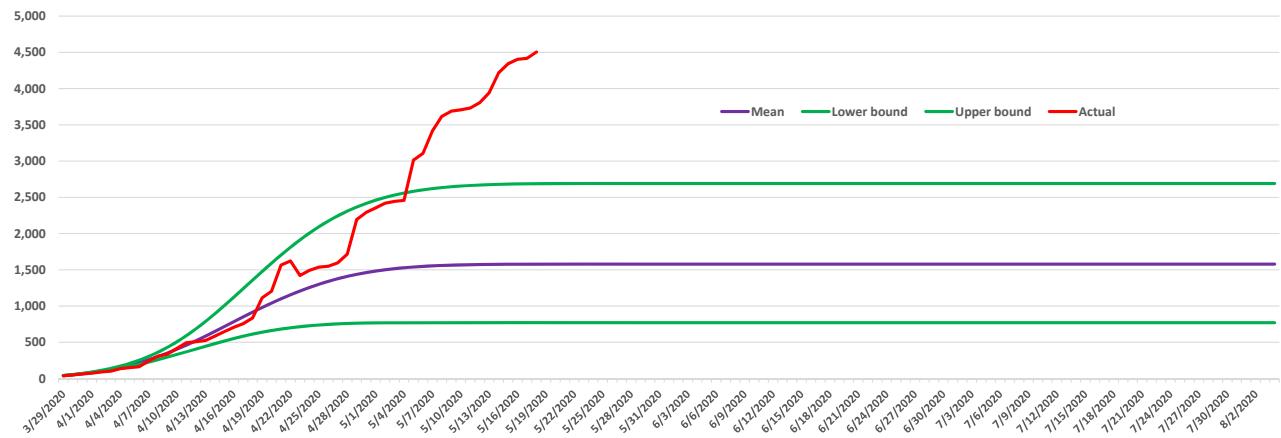
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Maine COVID 19 Cumulative Death Projections



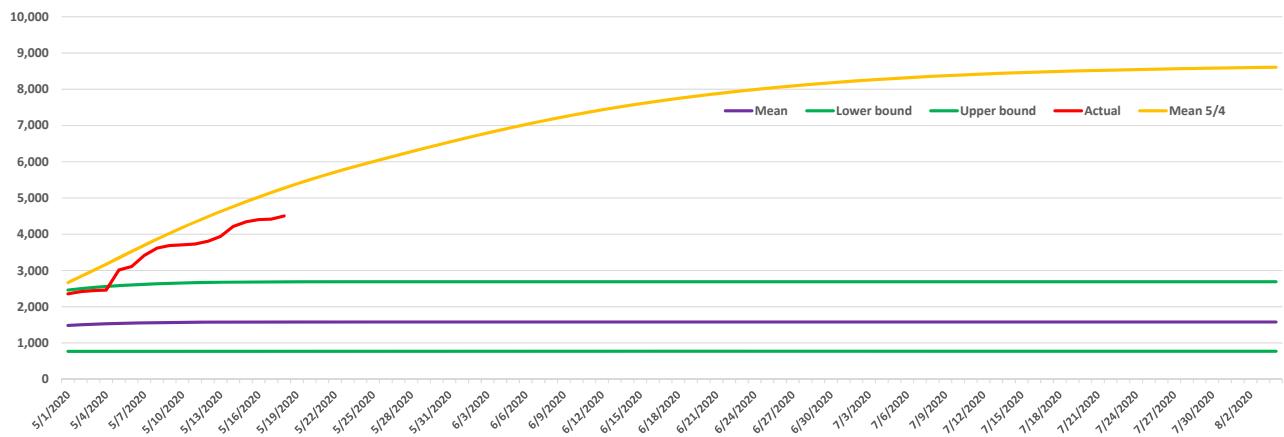
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Pennsylvania COVID 19 Cumulative Death Projections



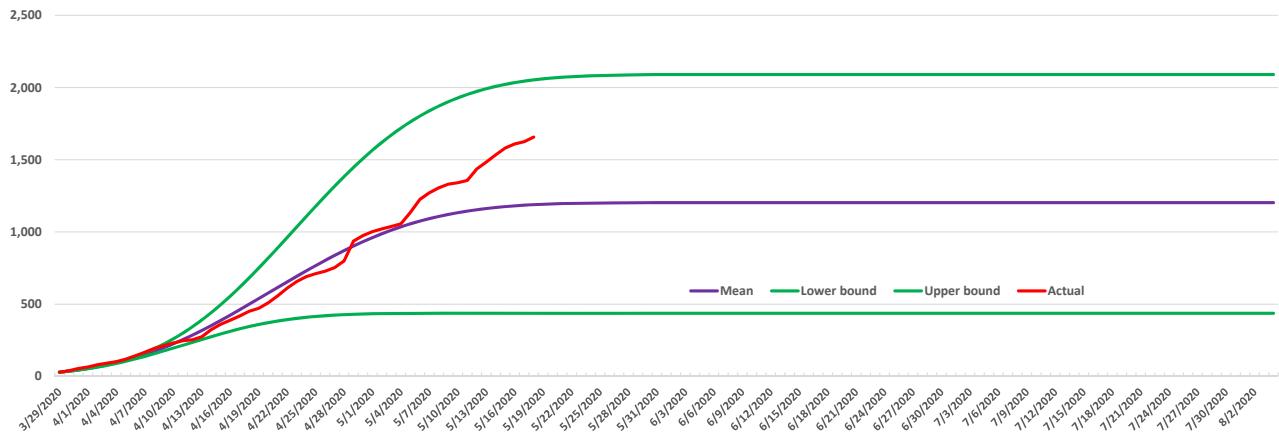
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Pennsylvania COVID 19 Cumulative Death Projections



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Ohio COVID 19 Cumulative Death Projections March 26



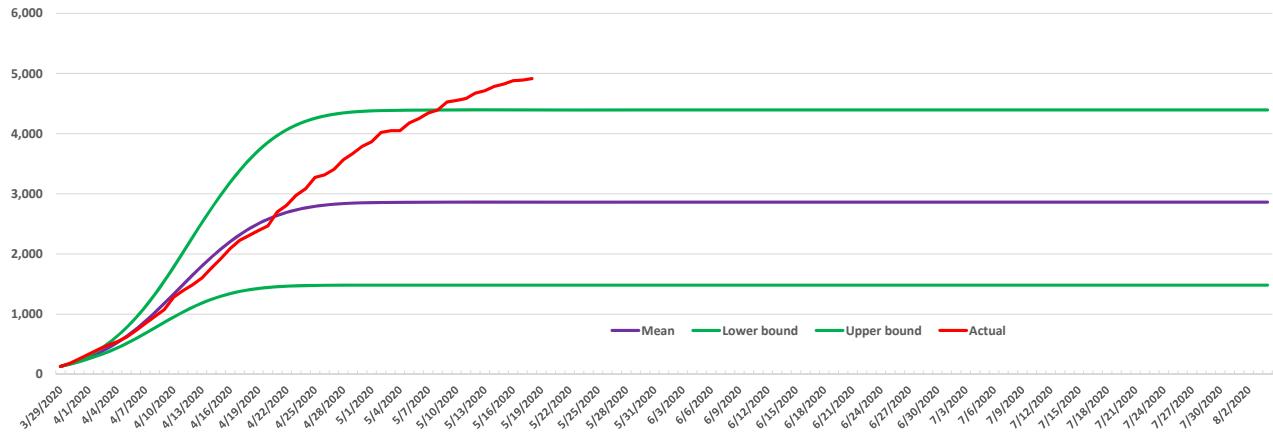
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Ohio COVID 19 Cumulative Death Projections March 26



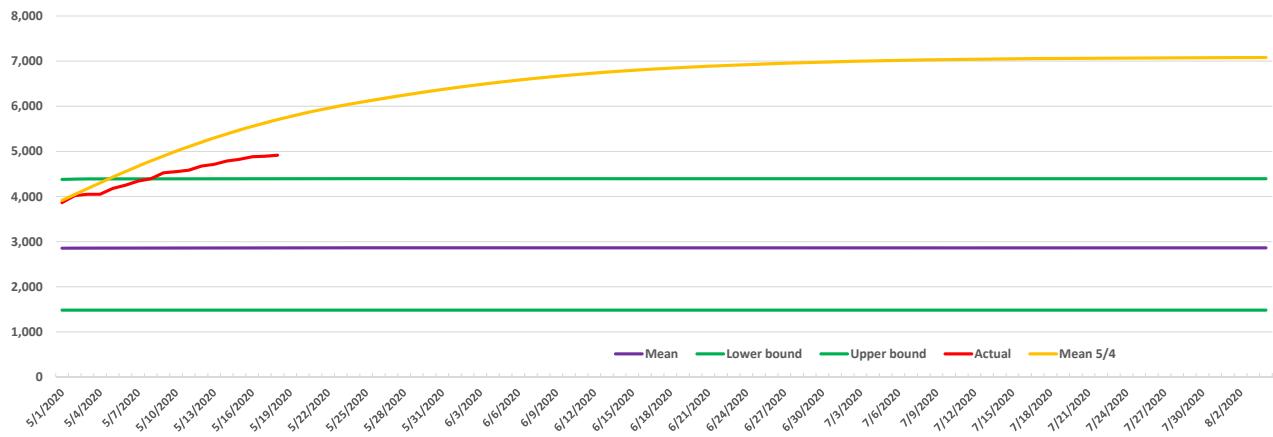
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Michigan COVID 19 Cumulative Death Projections



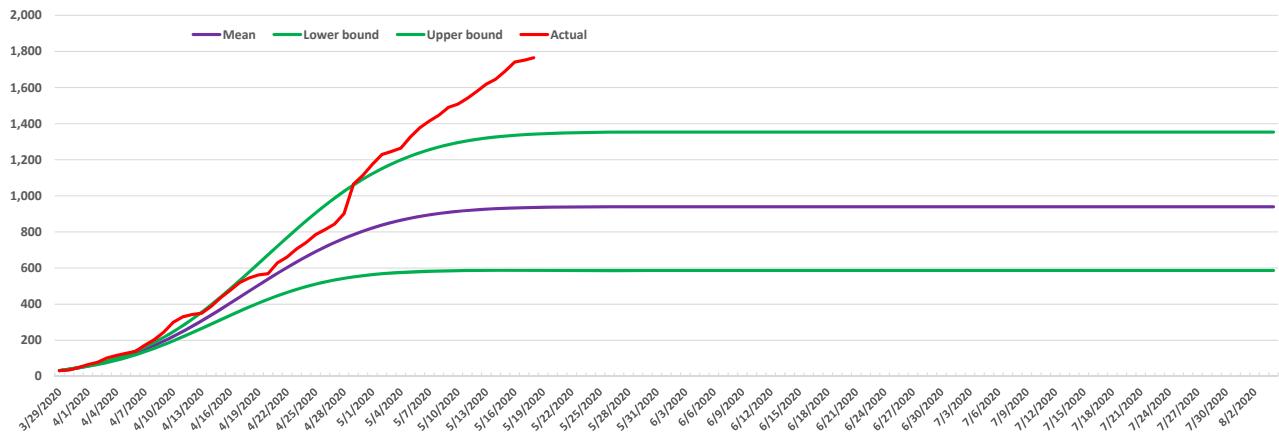
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Michigan COVID 19 Cumulative Death Projections



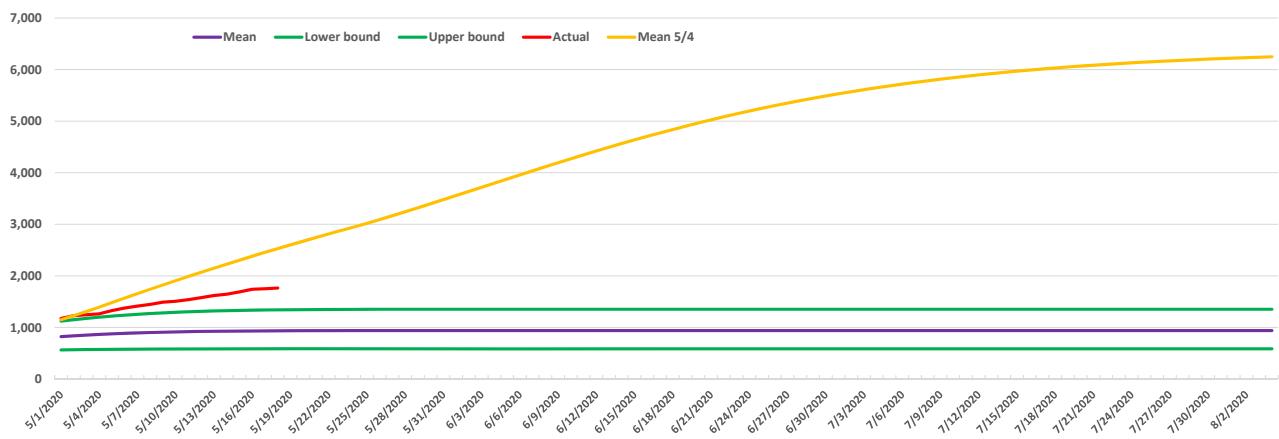
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Indiana COVID 19 Cumulative Death Projections March 26



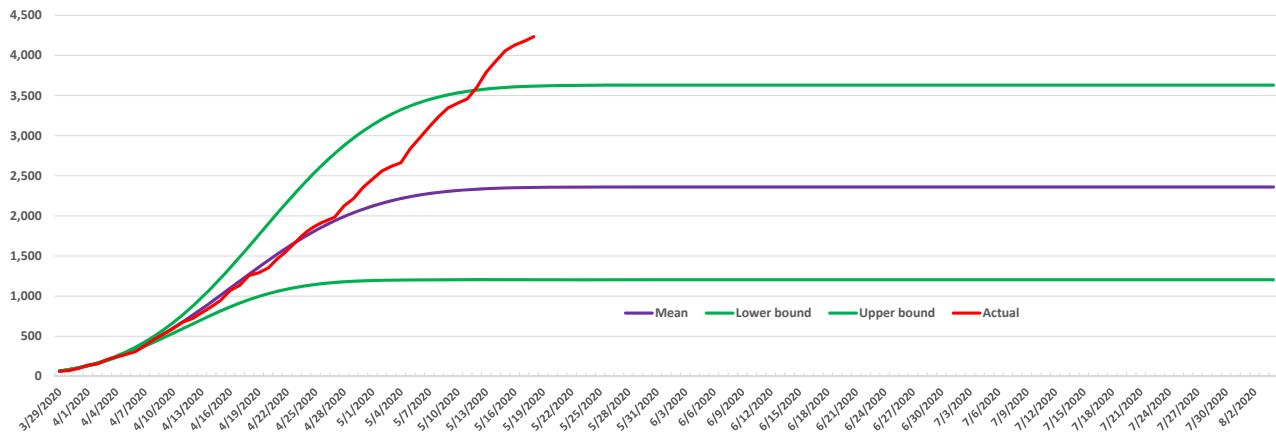
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Indiana COVID 19 Cumulative Death Projections March 26



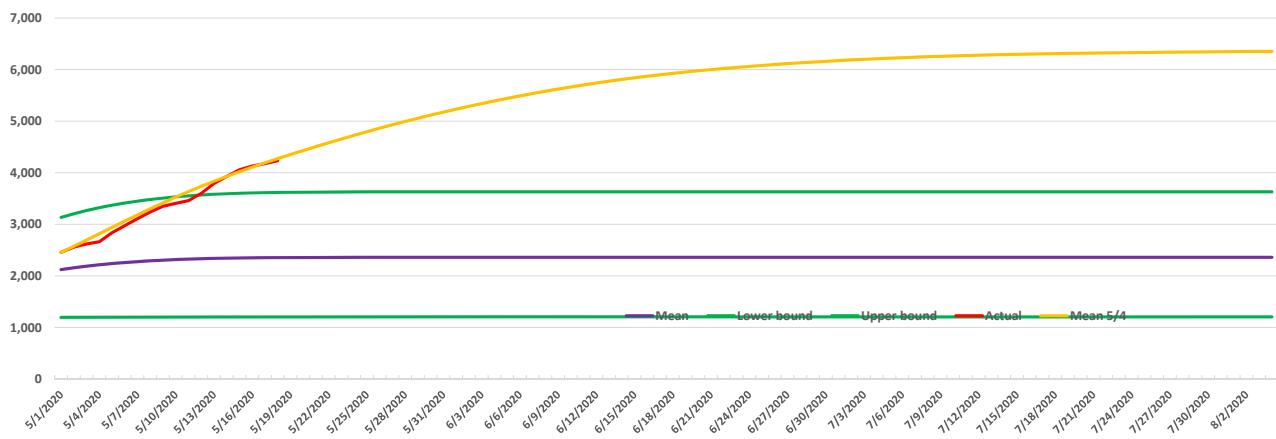
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Illinois COVID 19 Cumulative Death Projections March 26



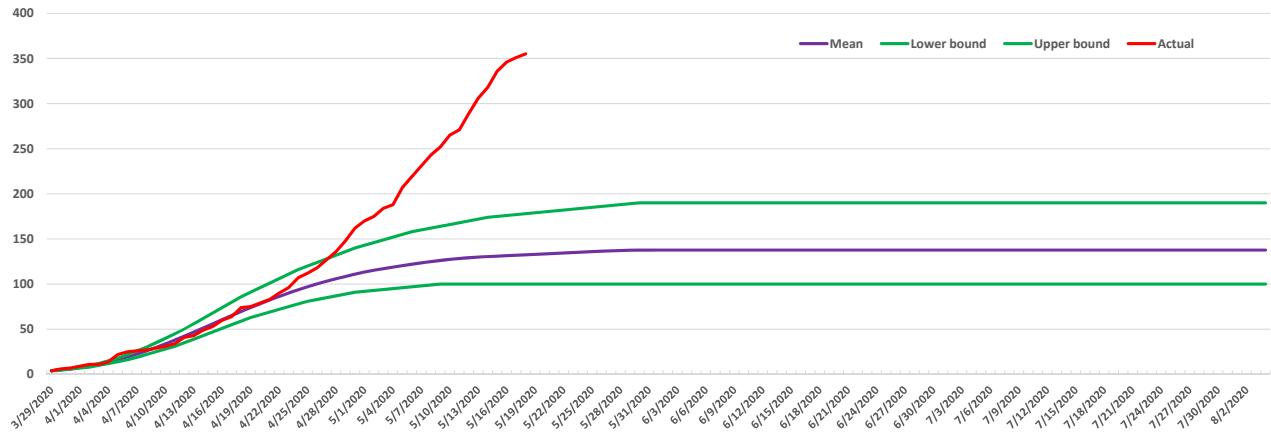
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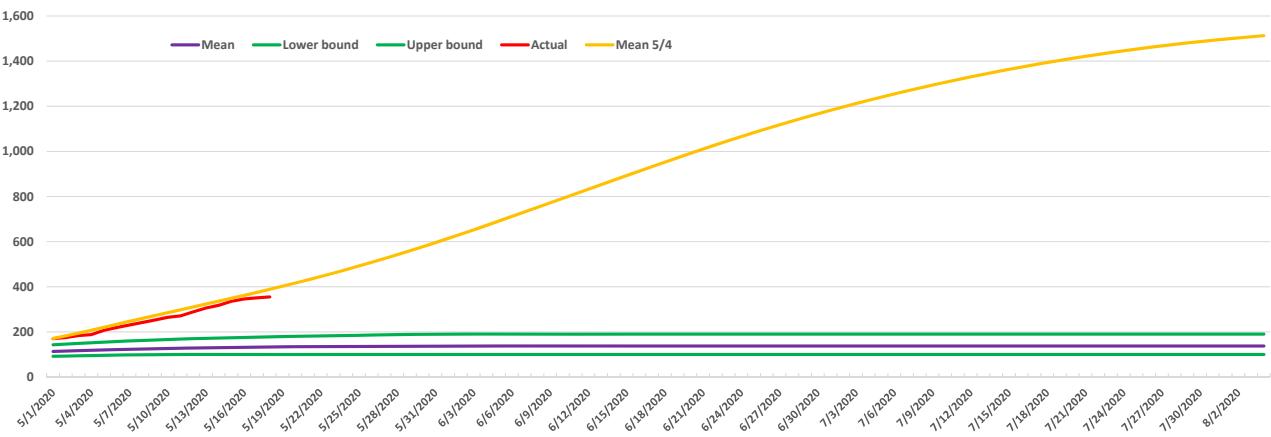
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Iowa COVID 19 Daily Death Projections March 26



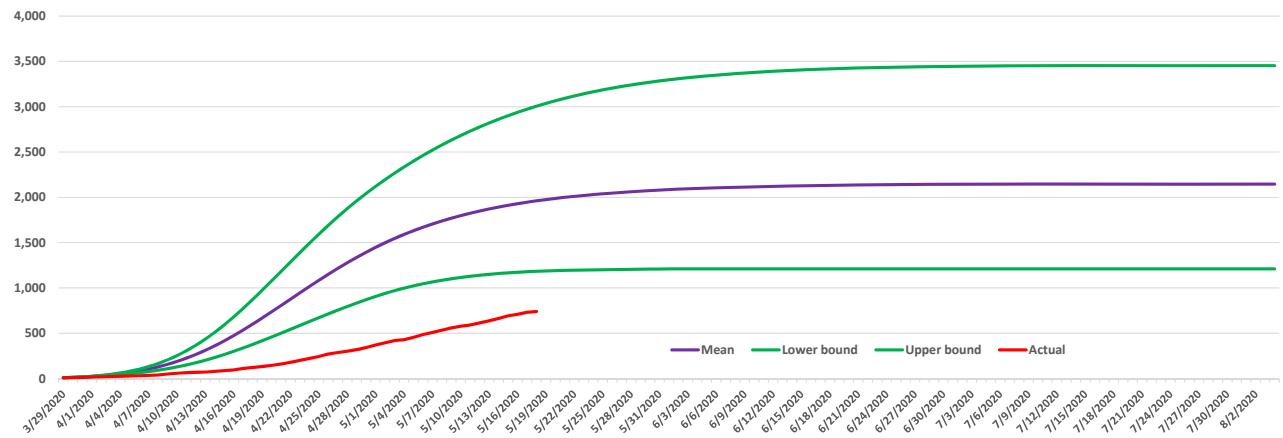
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Iowa COVID 19 Daily Death Projections March 26



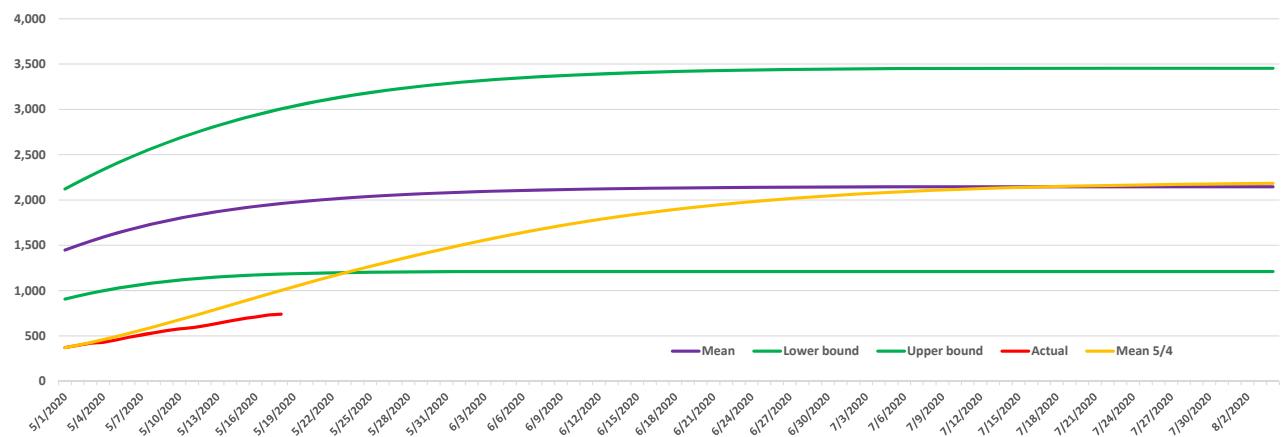
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Minnesota COVID 19 Cumulative Death Projections



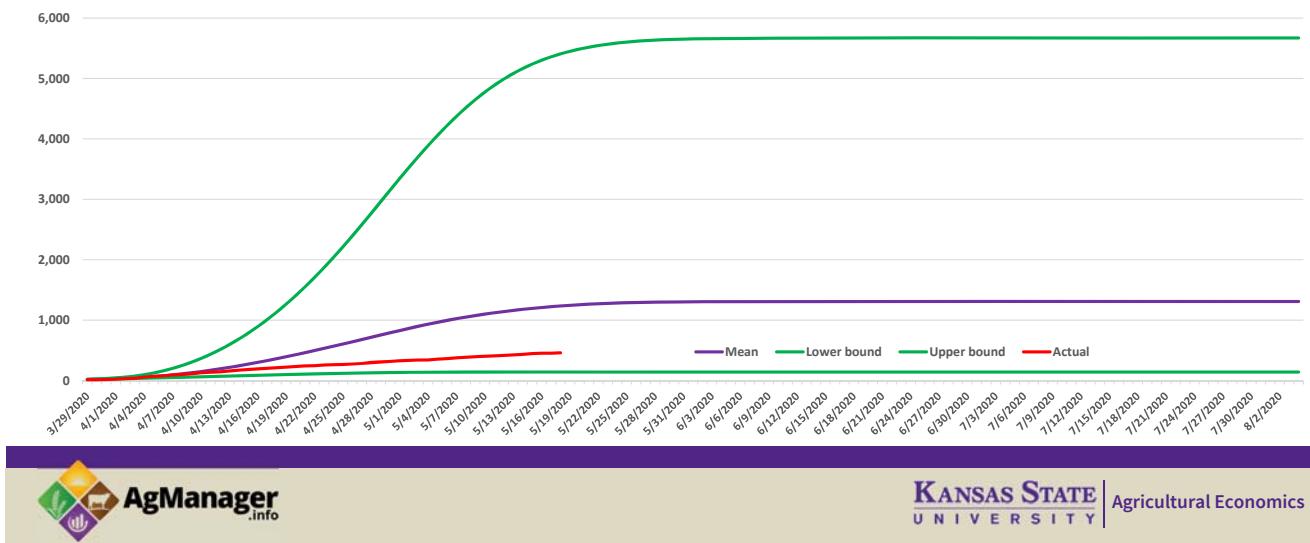
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Minnesota COVID 19 Cumulative Death Projections



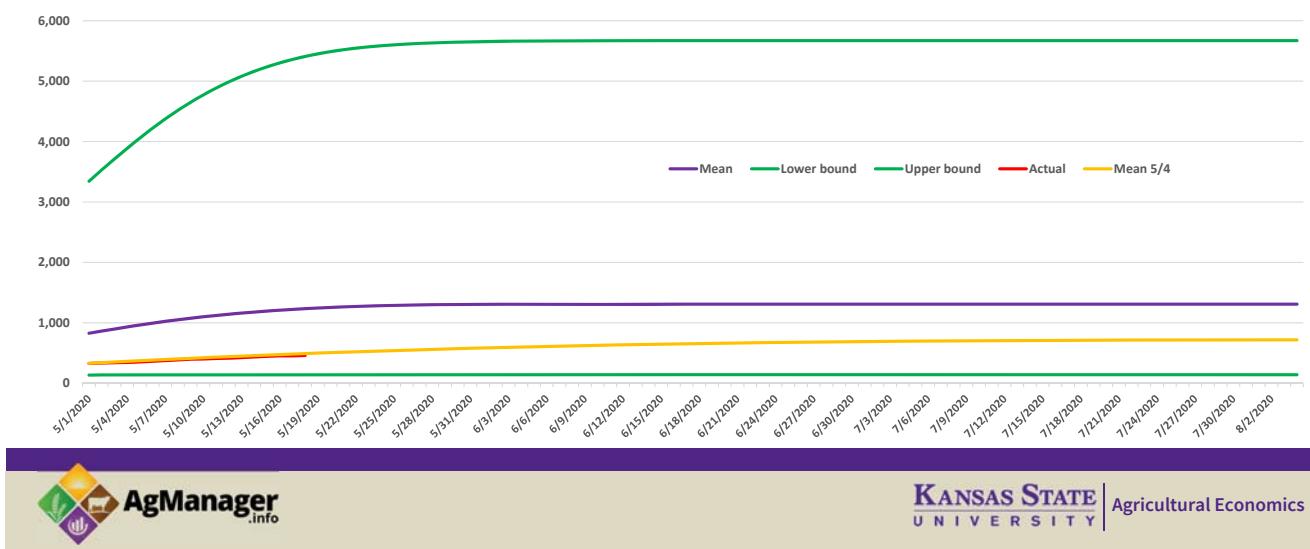
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Wisconsin COVID 19 Cumulative Death Projections



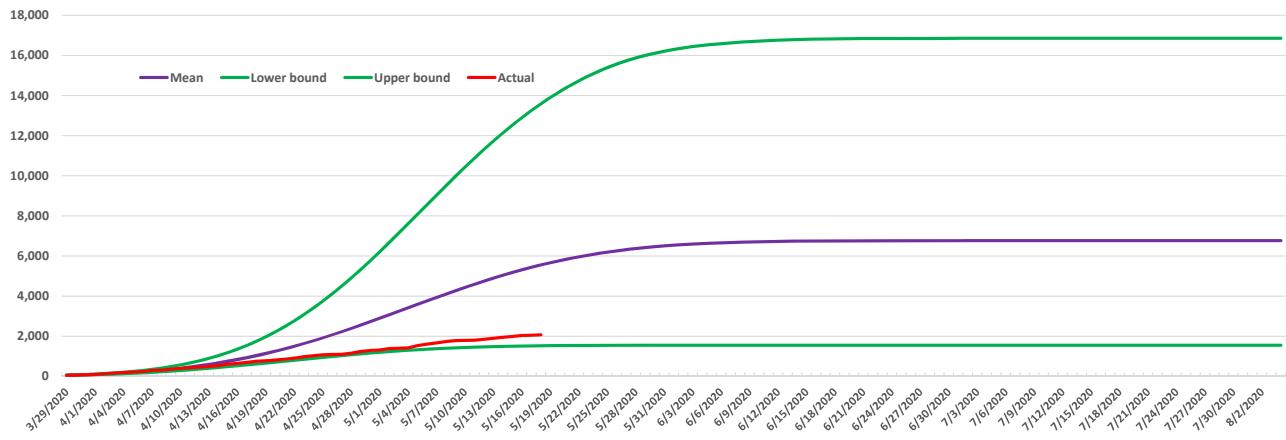
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Wisconsin COVID 19 Cumulative Death Projections



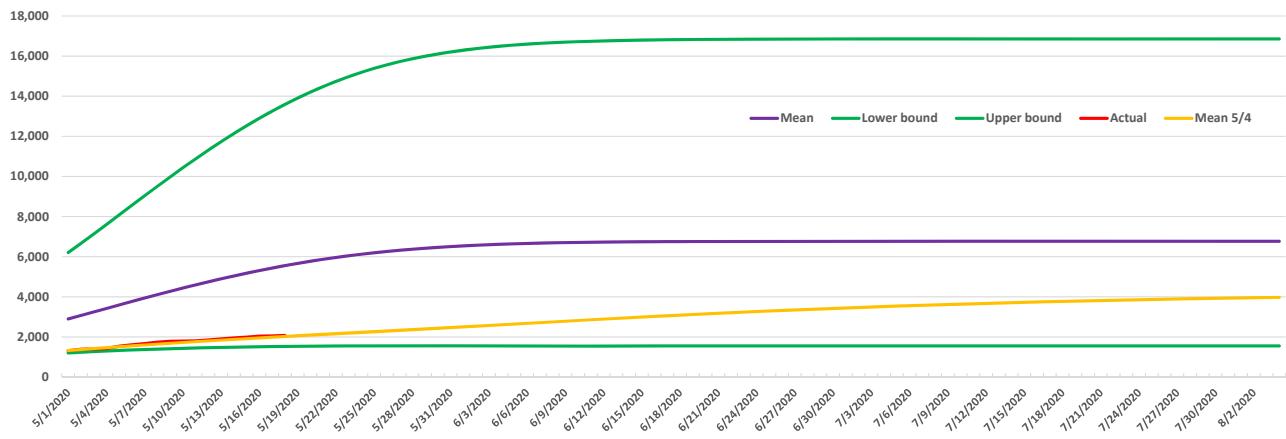
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Florida COVID 19 Cumulative Death Projections March 26



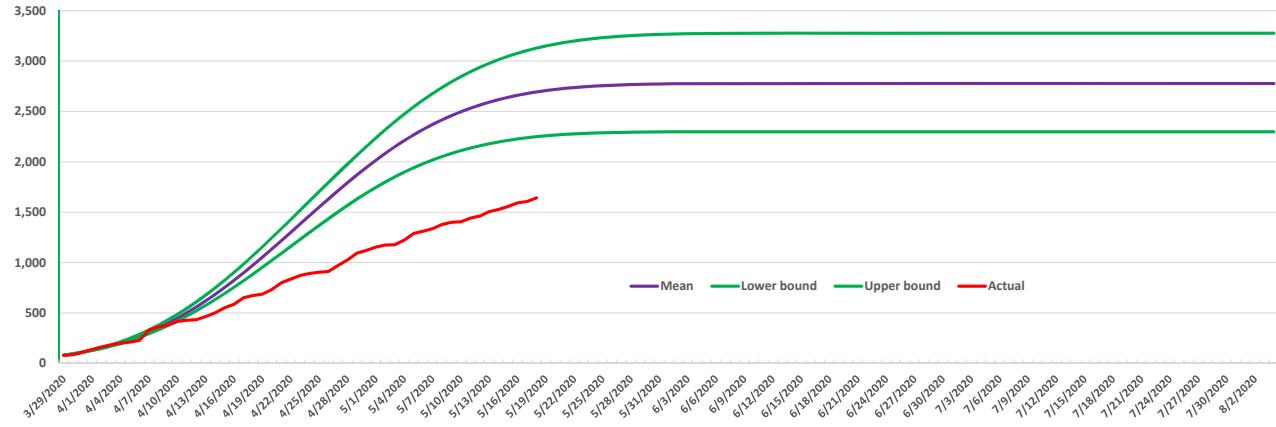
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Florida COVID 19 Cumulative Death Projections March 26



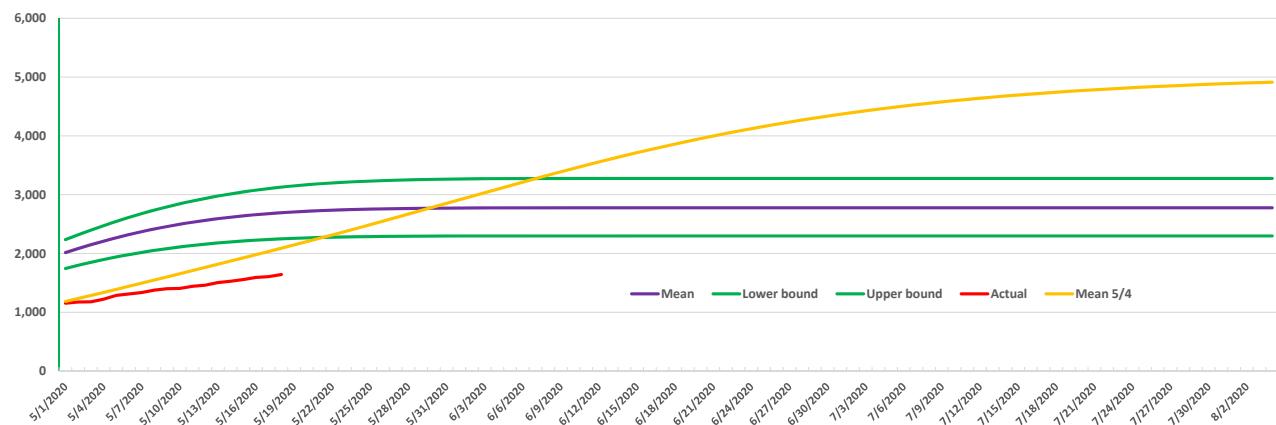
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Georgia COVID 19 Cumulative Death Projections



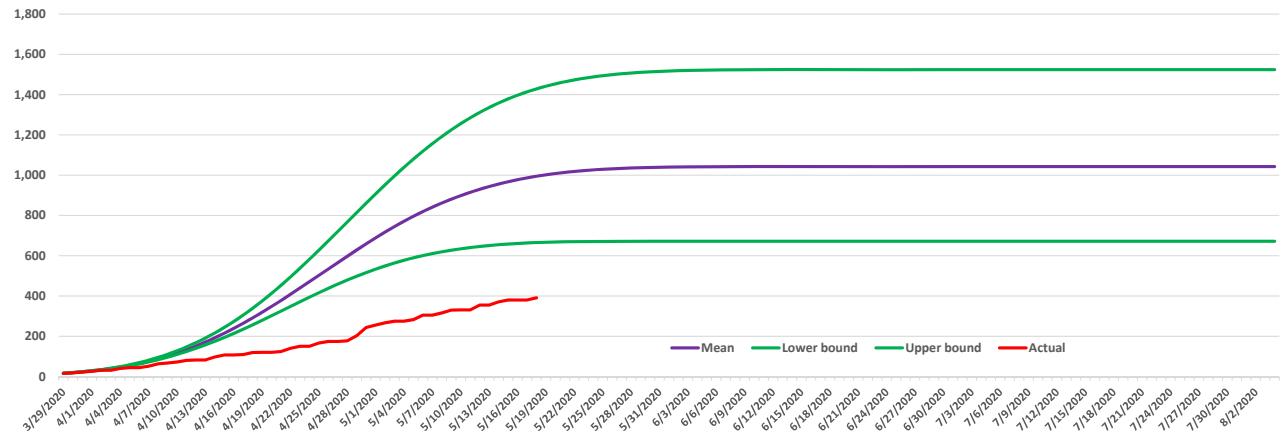
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Georgia COVID 19 Cumulative Death Projections



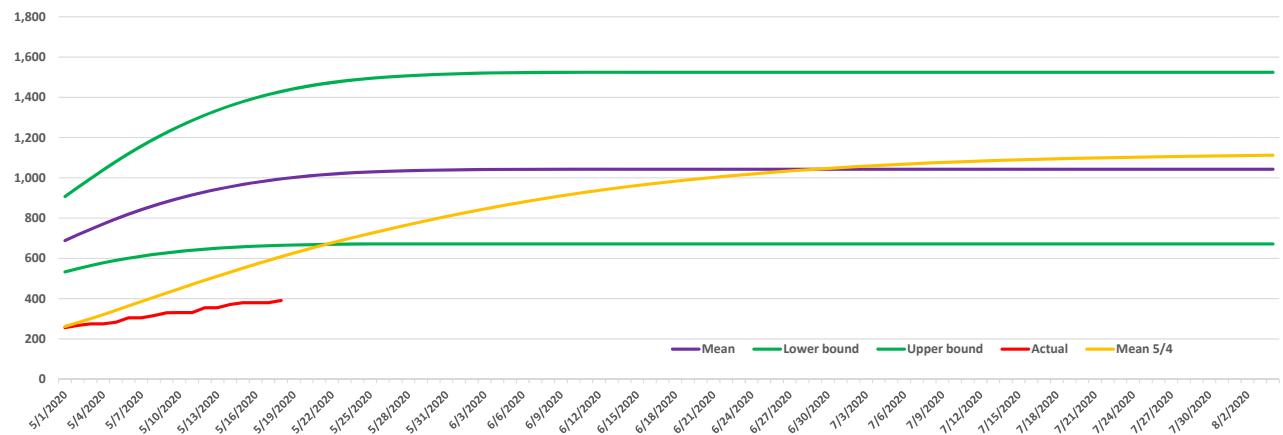
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South Carolina COVID 19 Cumulative Death Projections



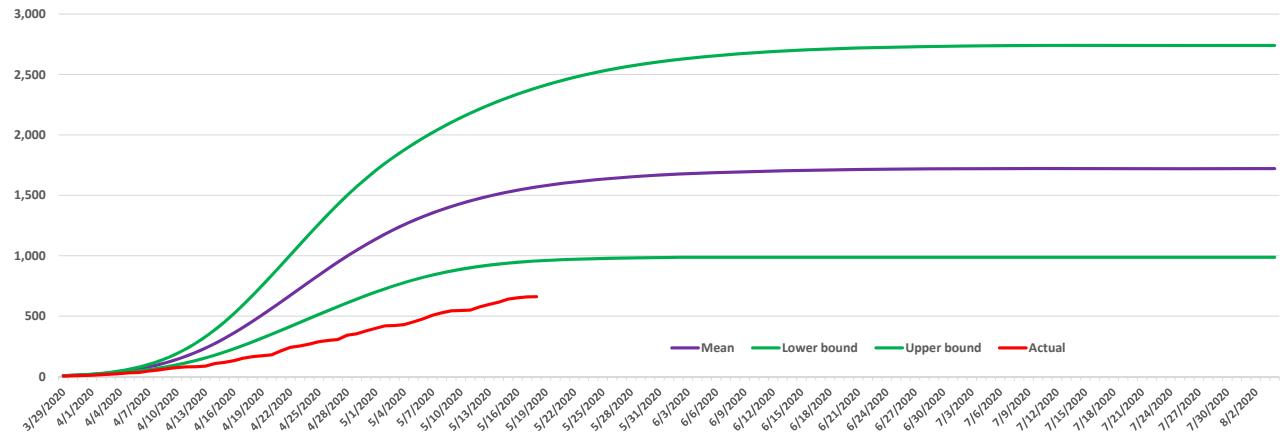
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South Carolina COVID 19 Cumulative Death Projections



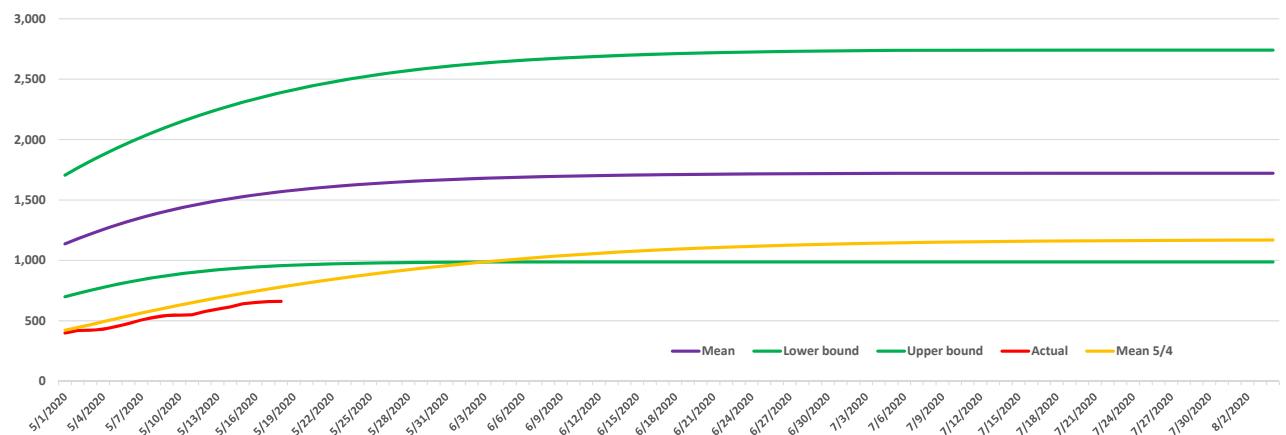
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North Carolina COVID 19 Cumulative Death Projections



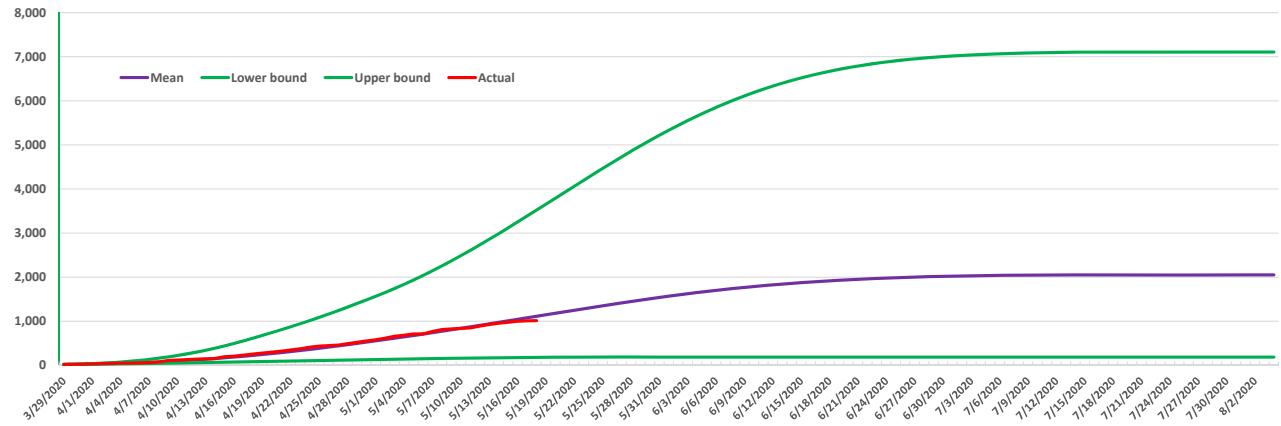
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North Carolina COVID 19 Cumulative Death Projections



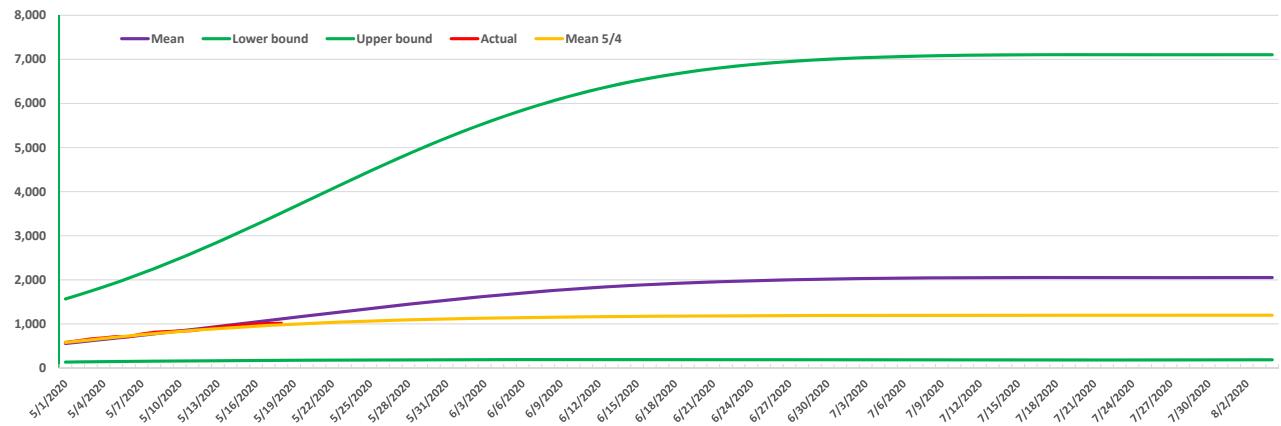
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Virginia COVID 19 Cumulative Death Projections



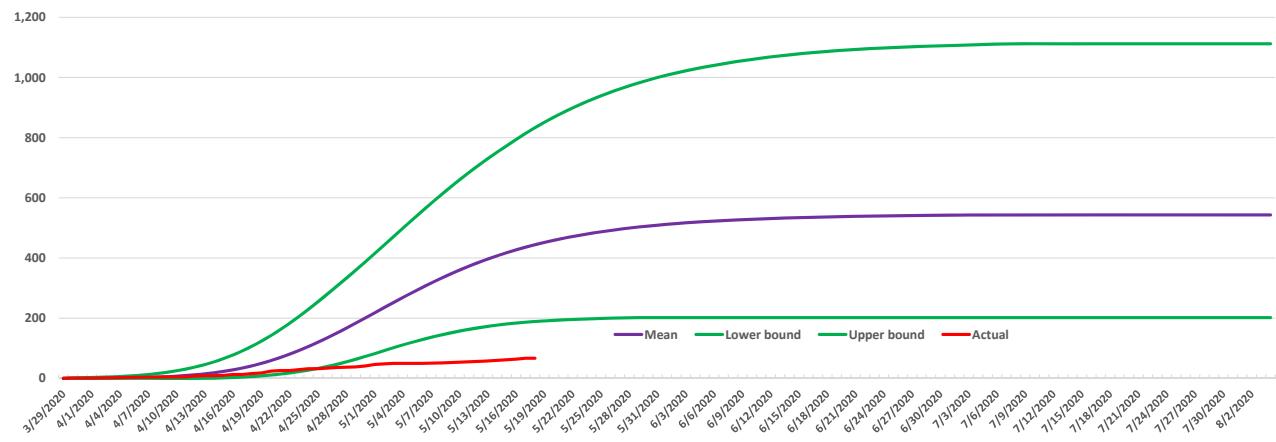
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Virginia COVID 19 Cumulative Death Projections



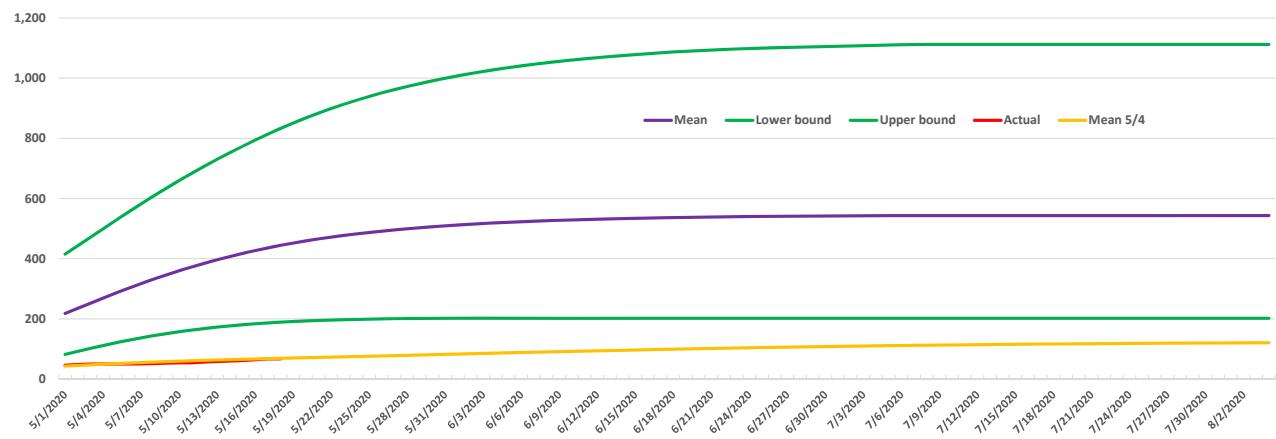
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West Virginia COVID 19 Cumulative Death Projections



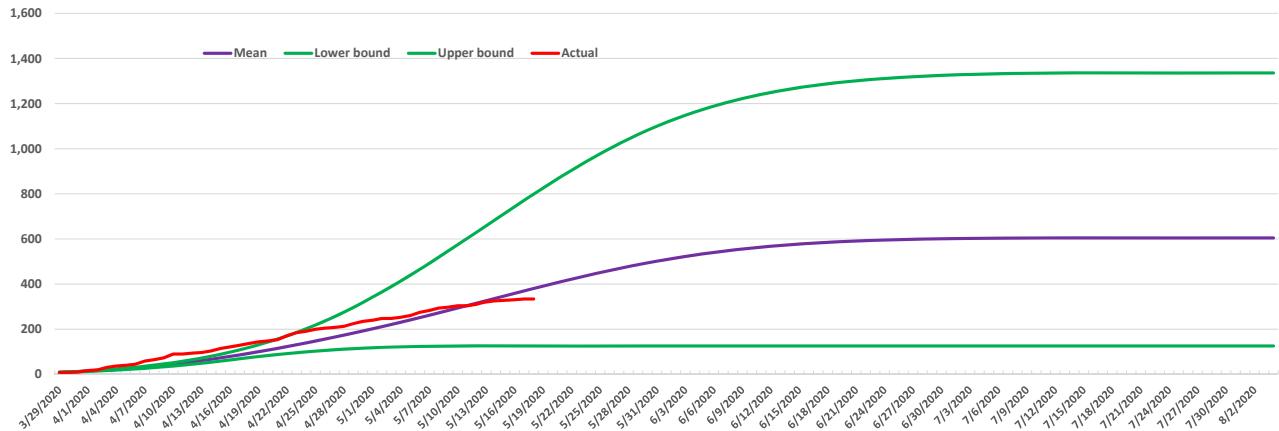
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West Virginia COVID 19 Cumulative Death Projections



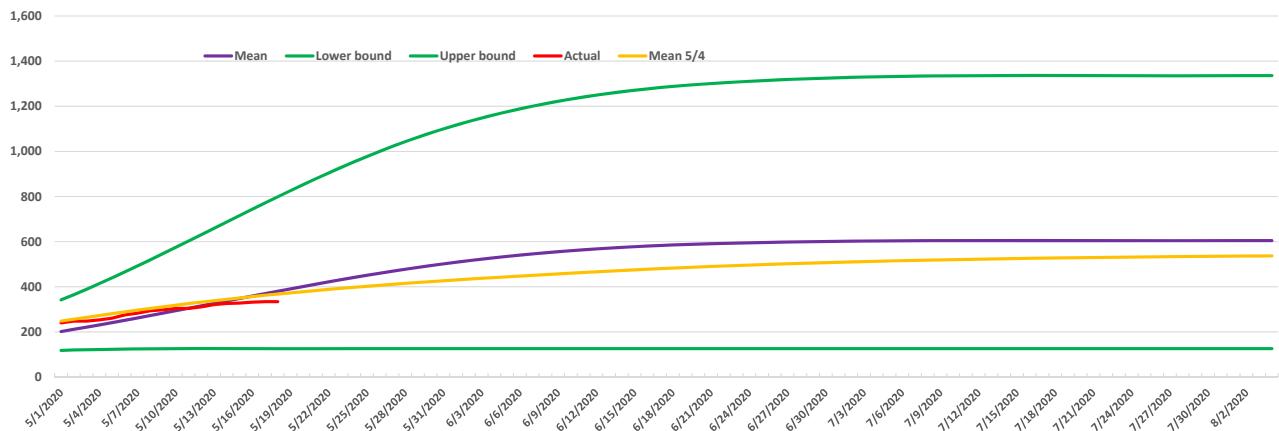
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Kentucky COVID 19 Cumulative Death Projections March 26



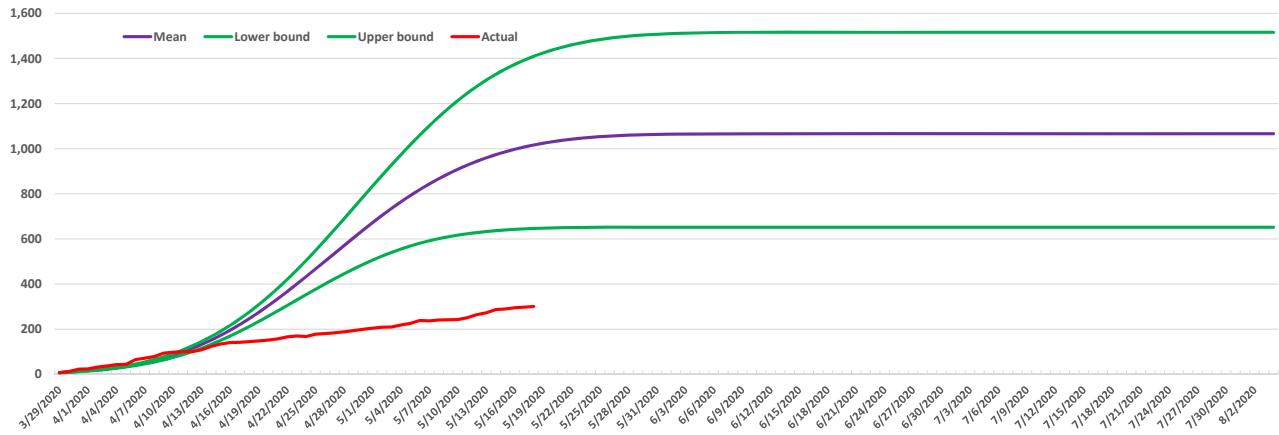
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Kentucky COVID 19 Cumulative Death Projections March 26



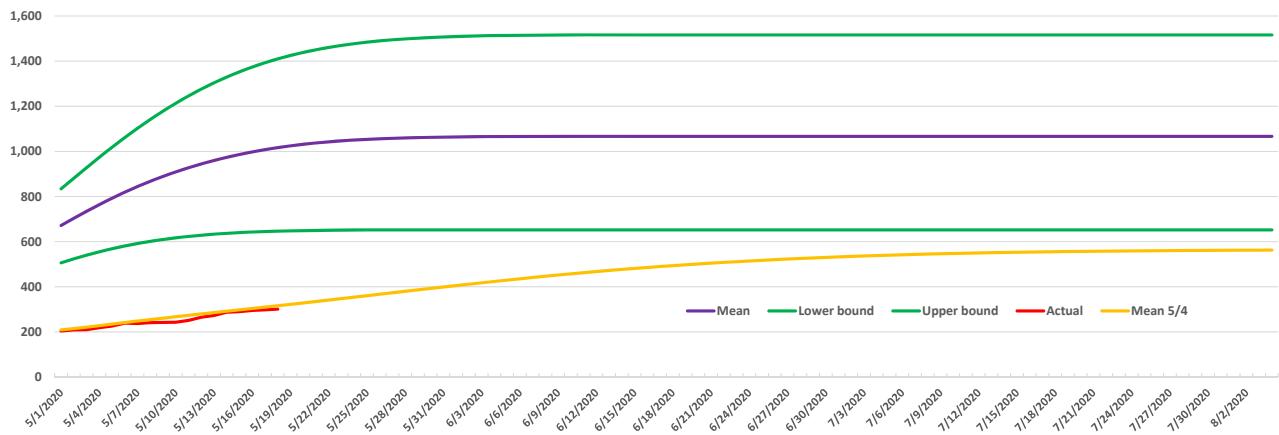
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Tennessee COVID 19 Cumulative Death Projections March 26



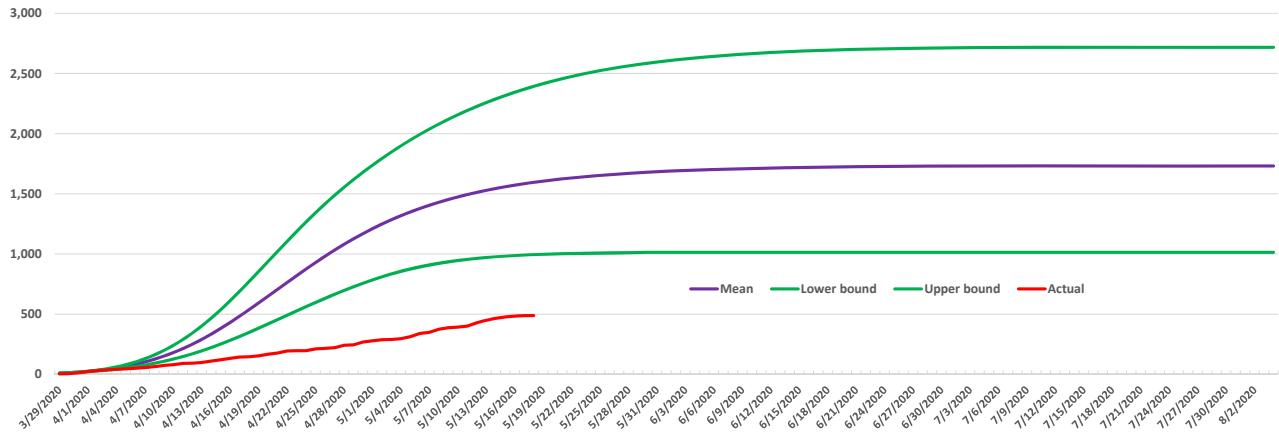
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Tennessee COVID 19 Cumulative Death Projections March 26



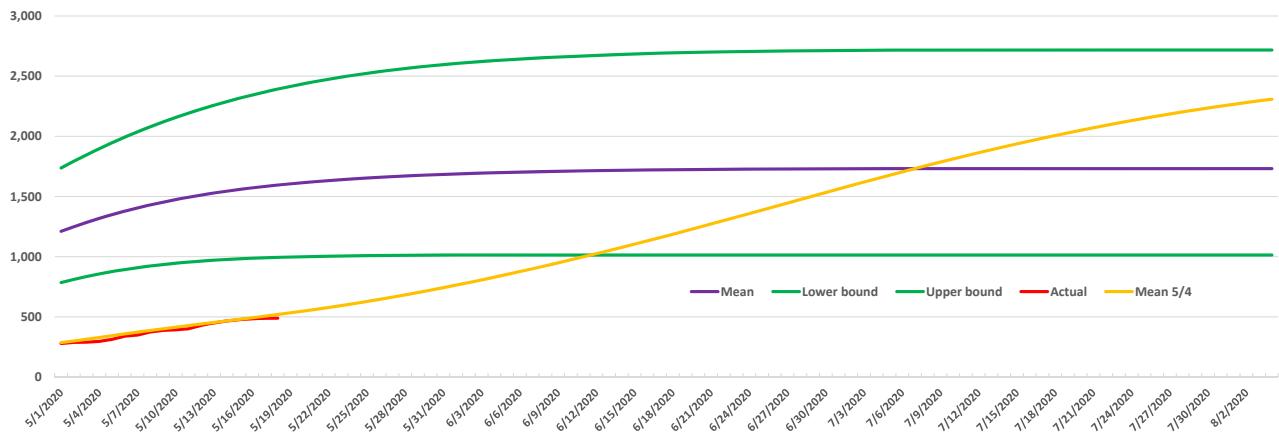
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Alabama COVID 19 Cumulative Death Projections March 26



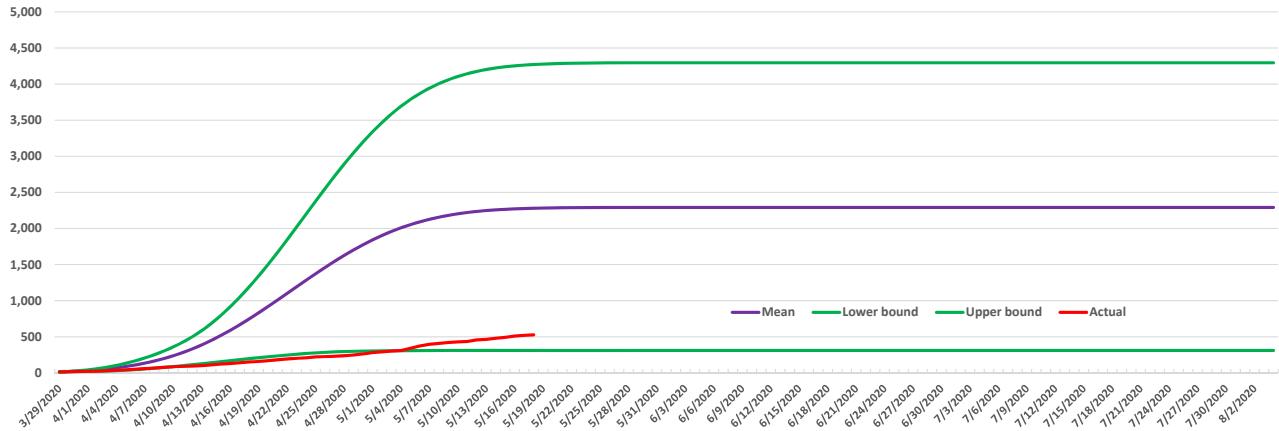
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Alabama COVID 19 Cumulative Death Projections March 26



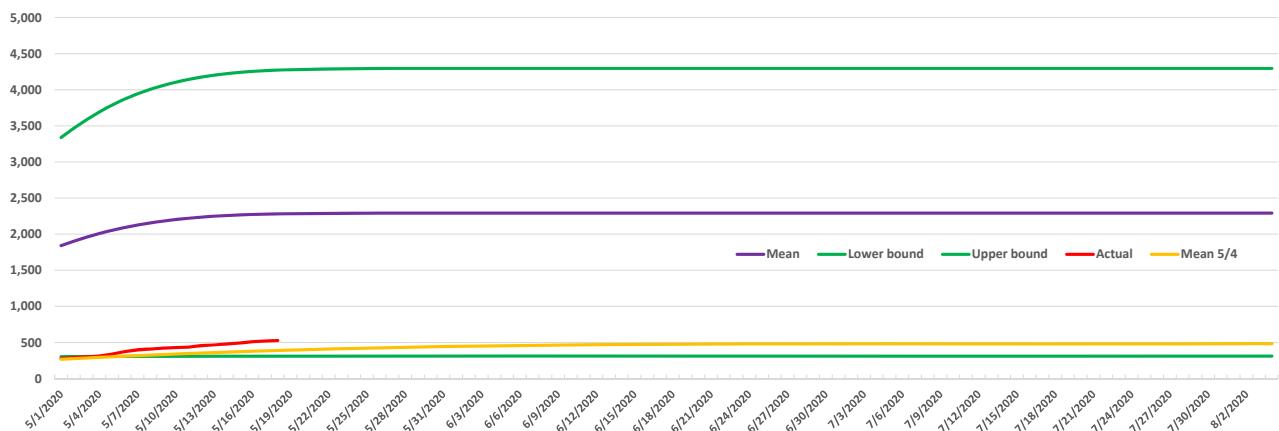
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Mississippi COVID 19 Daily Death Projections March 26



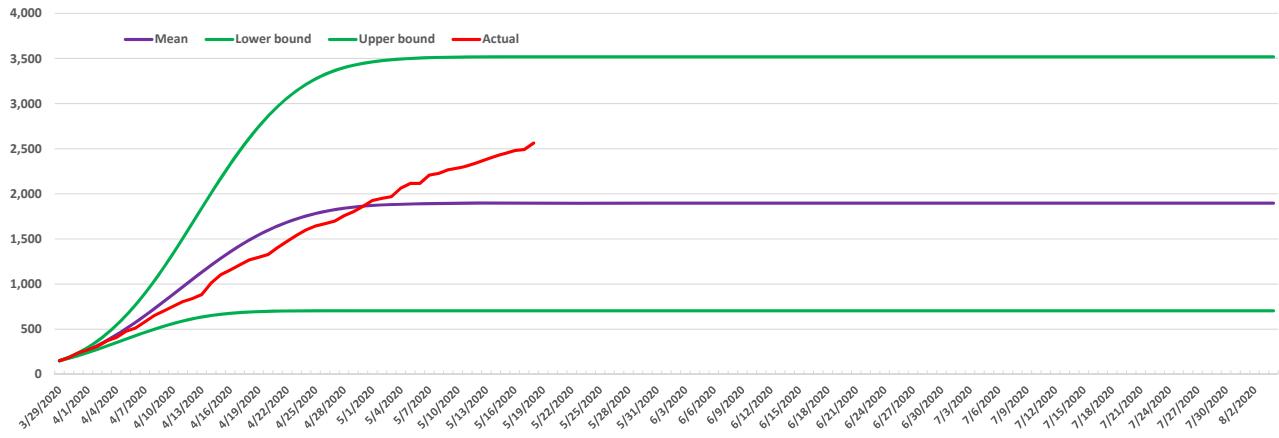
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Mississippi COVID 19 Daily Death Projections March 26



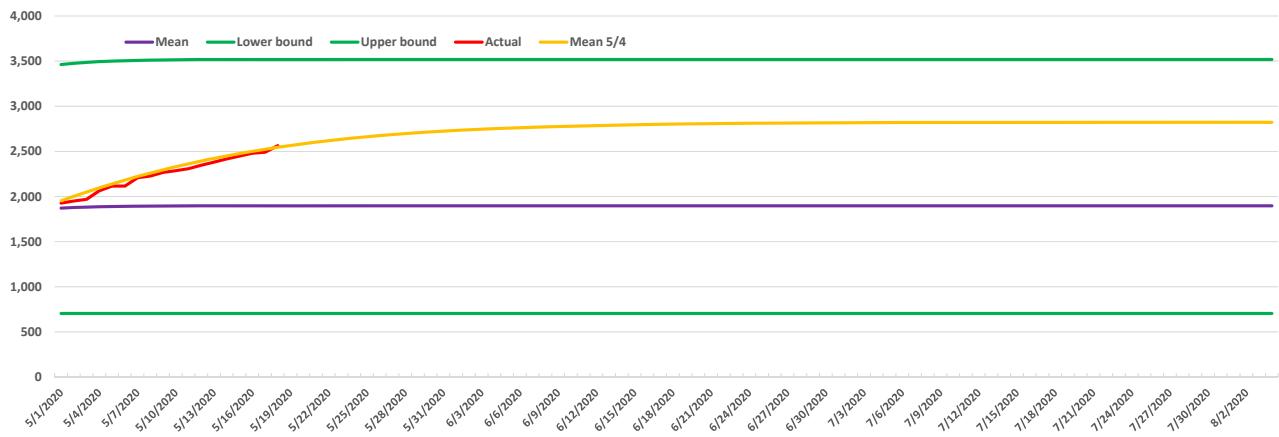
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Louisiana COVID 19 Daily Death Projections March 26



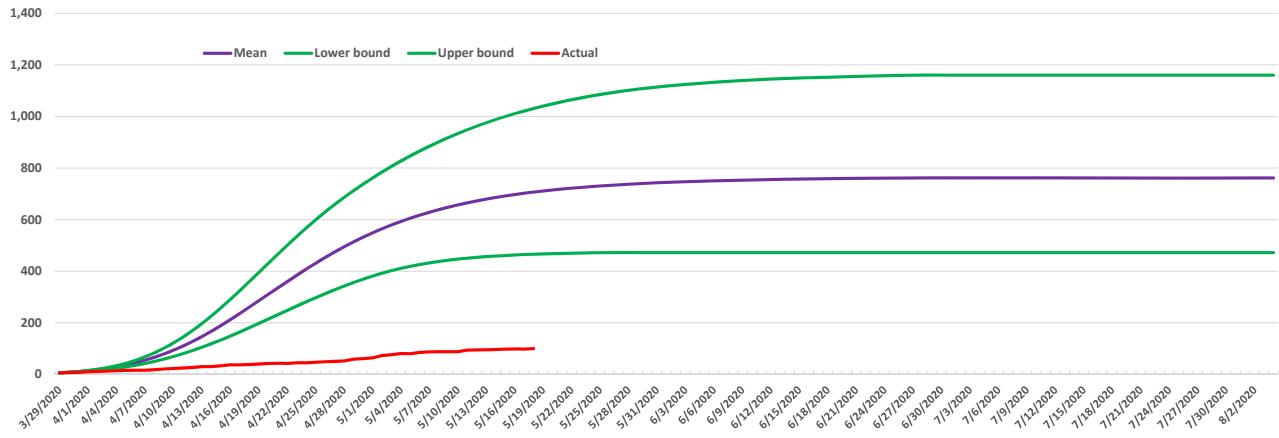
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Louisiana COVID 19 Daily Death Projections March 26



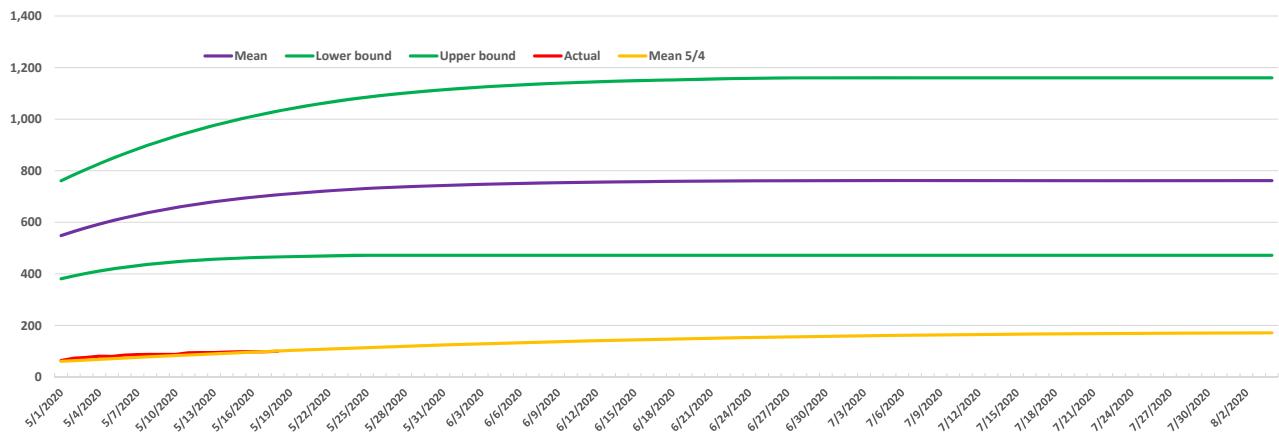
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Arkansas COVID 19 Cumulative Death Projections March 26



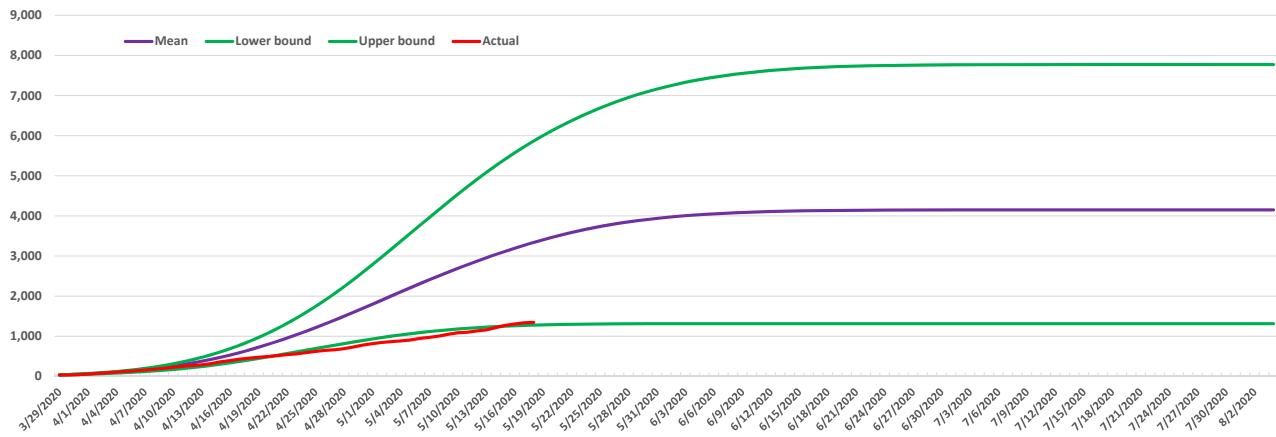
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Arkansas COVID 19 Cumulative Death Projections March 26



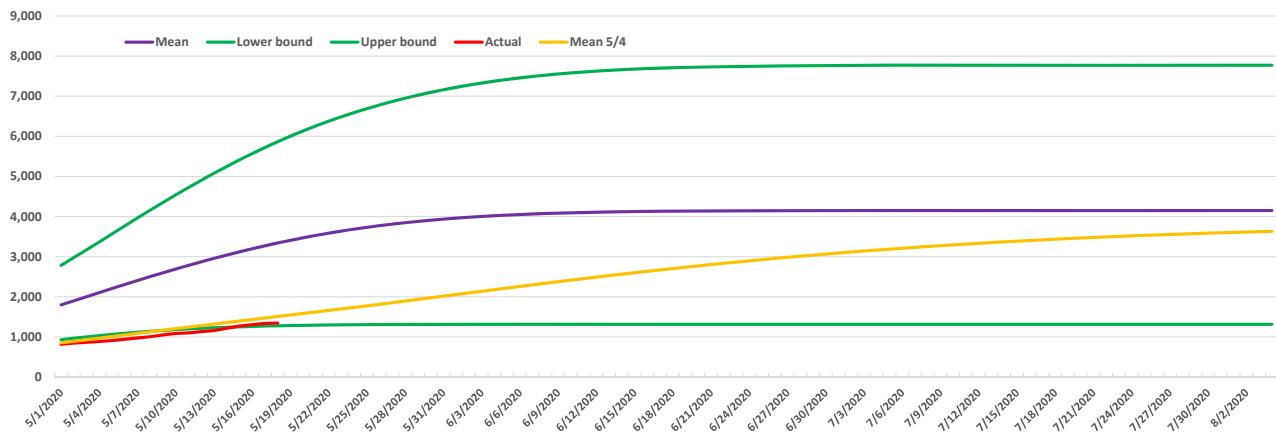
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Texas COVID 19 Daily Death Projections March 26



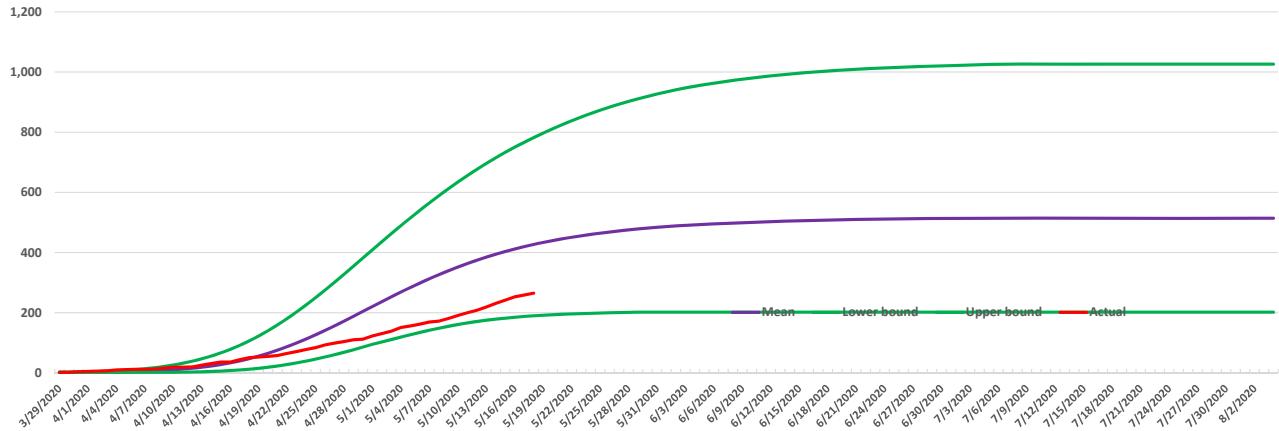
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Texas COVID 19 Daily Death Projections March 26



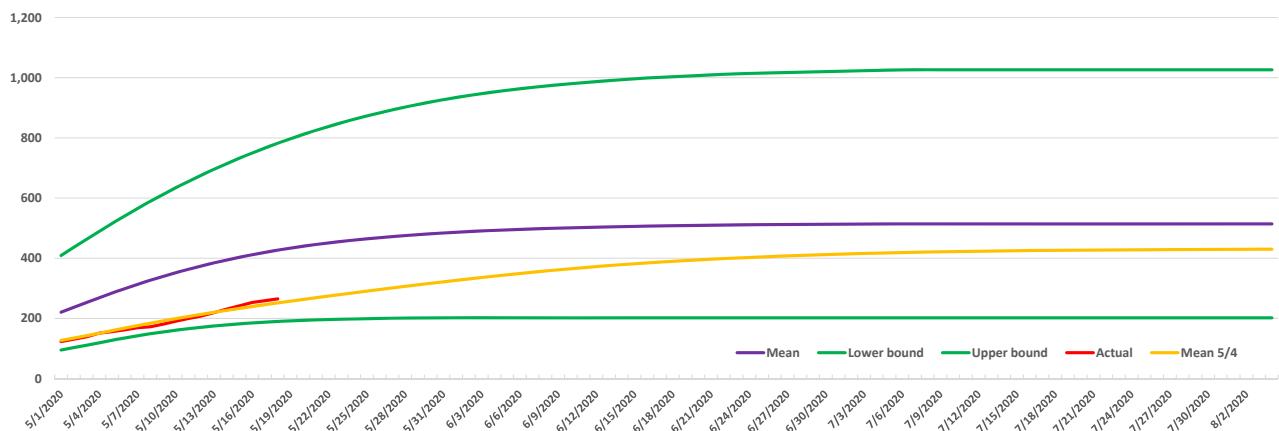
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New Mexico COVID 19 Daily Death Projections March 26



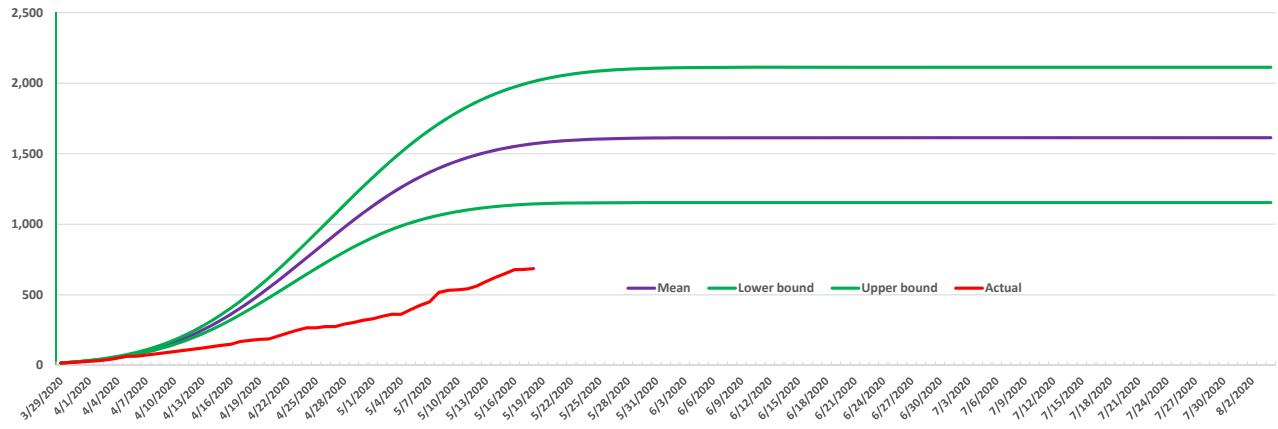
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New Mexico COVID 19 Daily Death Projections March 26



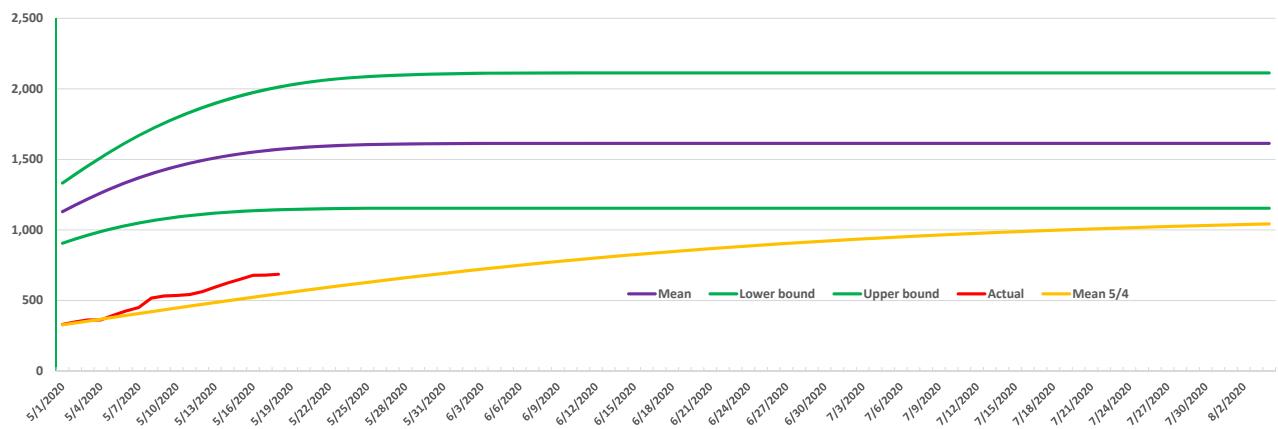
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Arizona COVID 19 Cumulative Death Projections



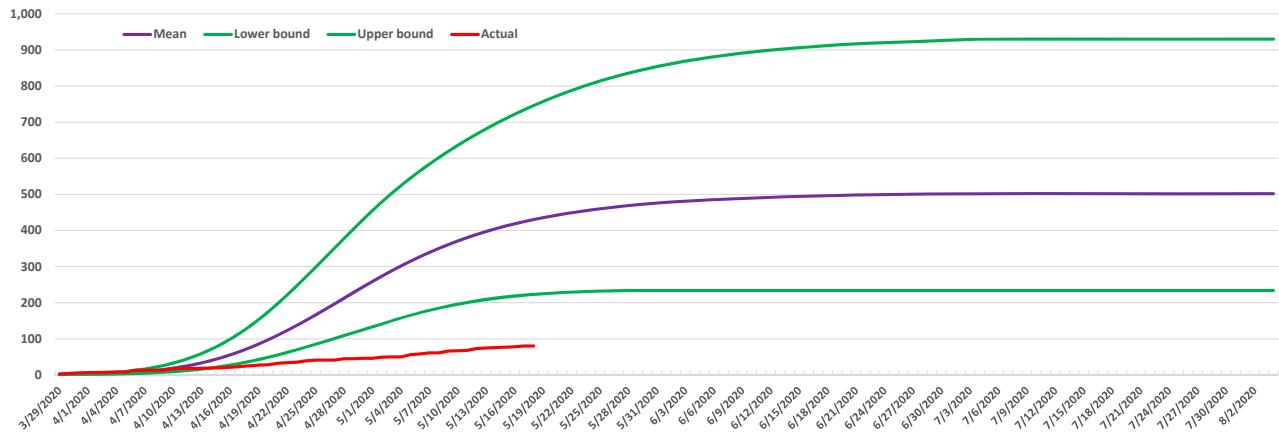
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Arizona COVID 19 Cumulative Death Projections



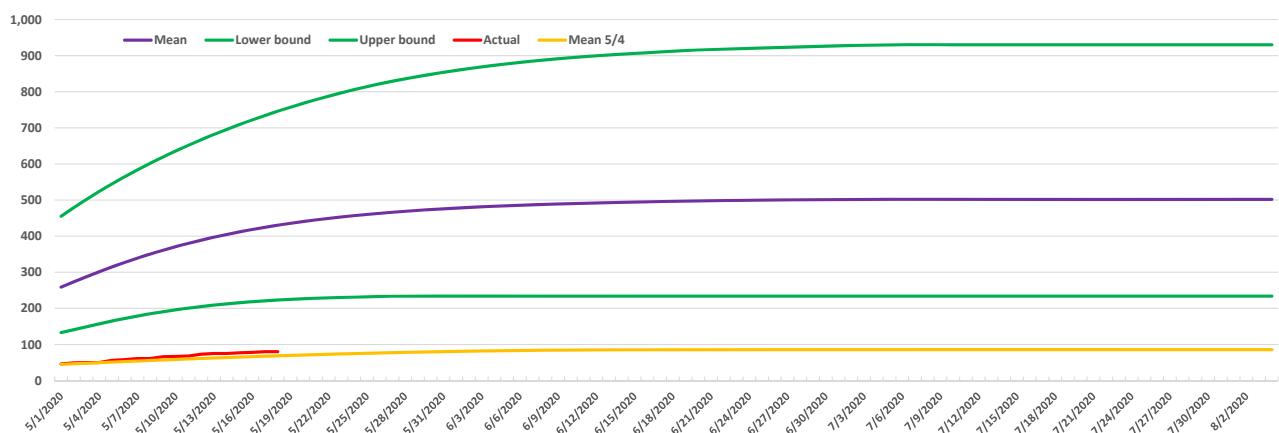
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Utah COVID 19 Daily Death Projections March 26



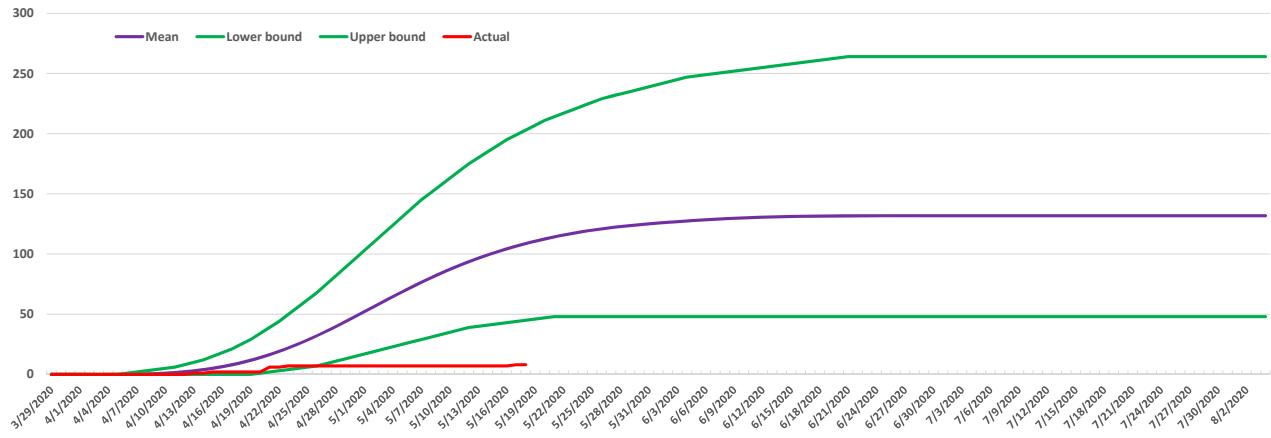
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Utah COVID 19 Daily Death Projections March 26



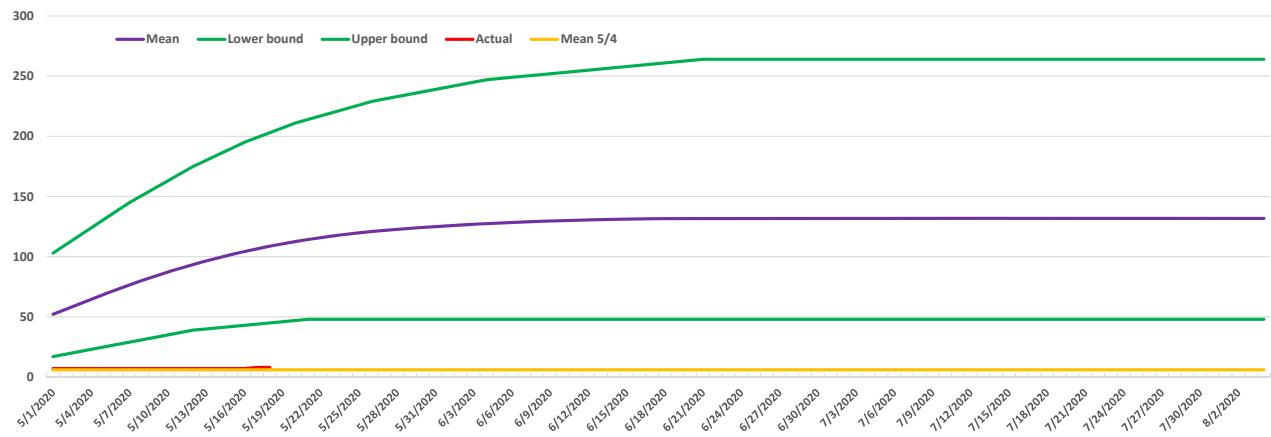
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Wyoming COVID 19 Cumulative Death Projections March 26



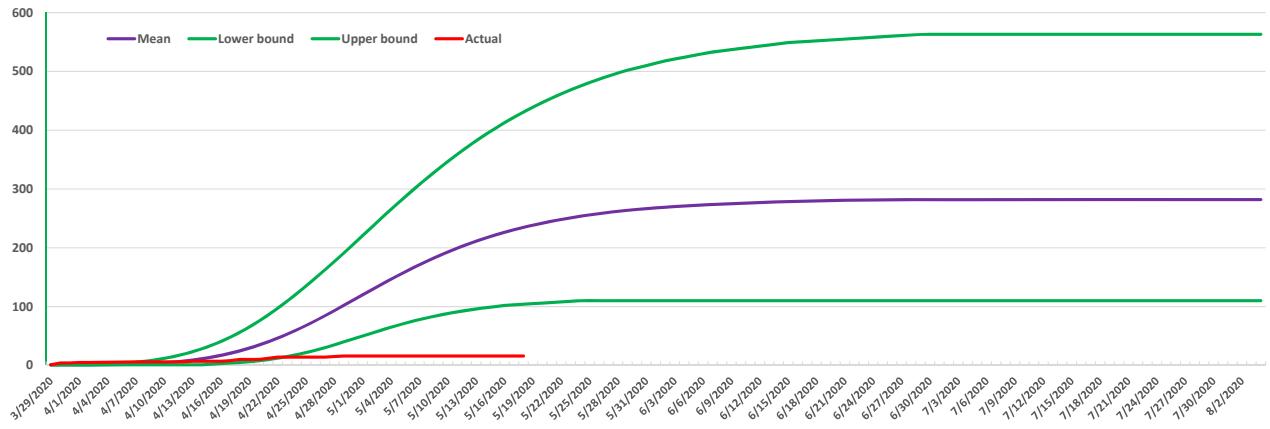
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Wyoming COVID 19 Cumulative Death Projections March 26



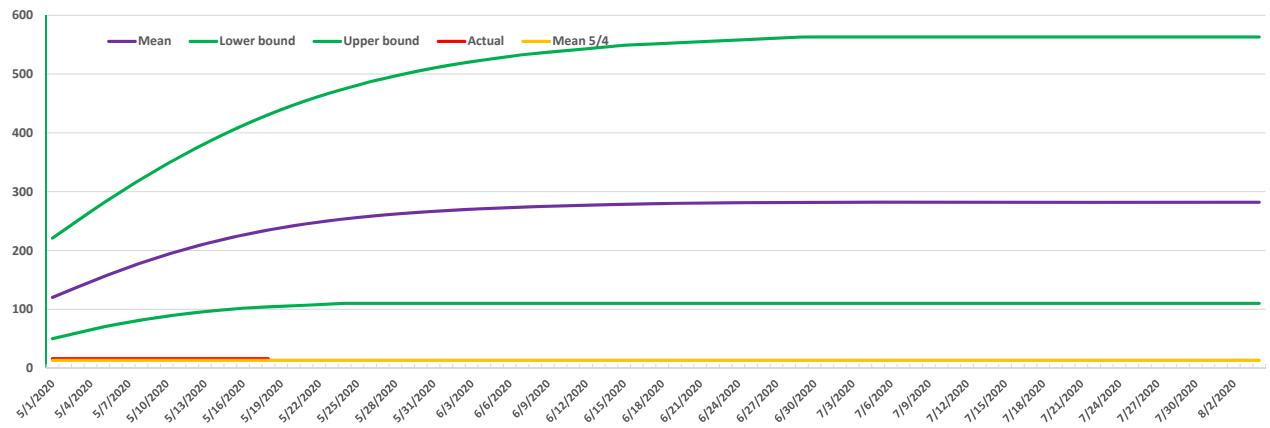
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Montana COVID 19 Cumulative Death Projections



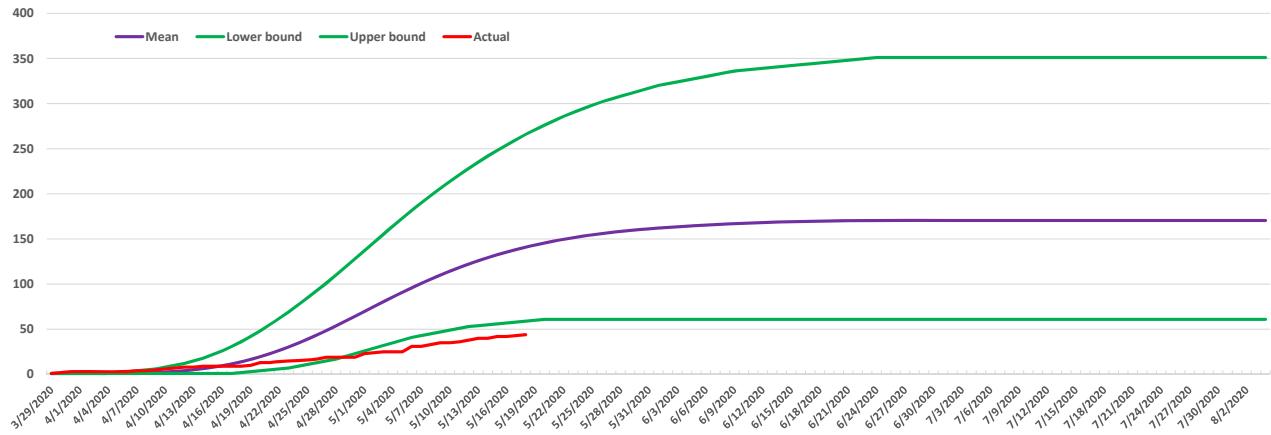
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Montana COVID 19 Cumulative Death Projections



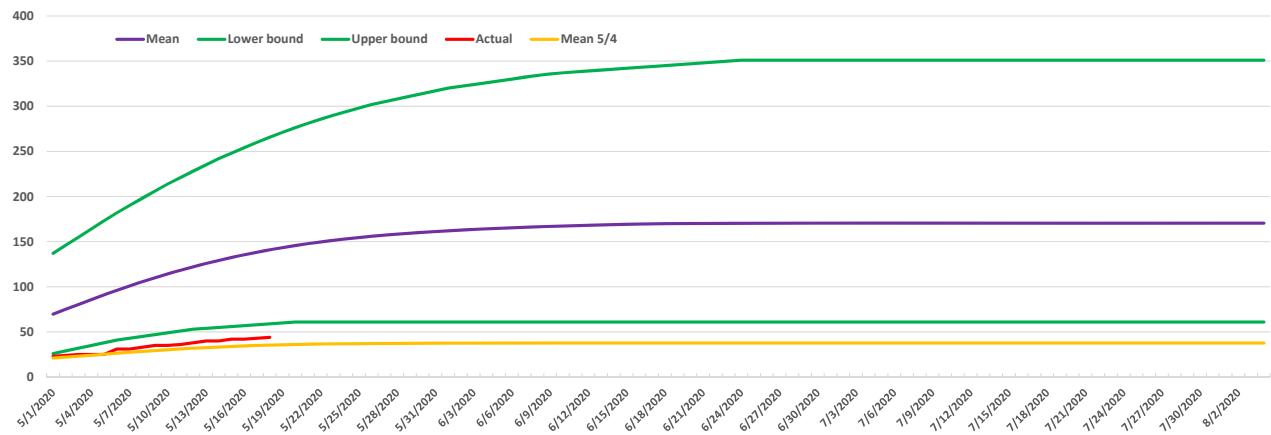
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North Dakota COVID 19 Cumulative Death Projections March 26



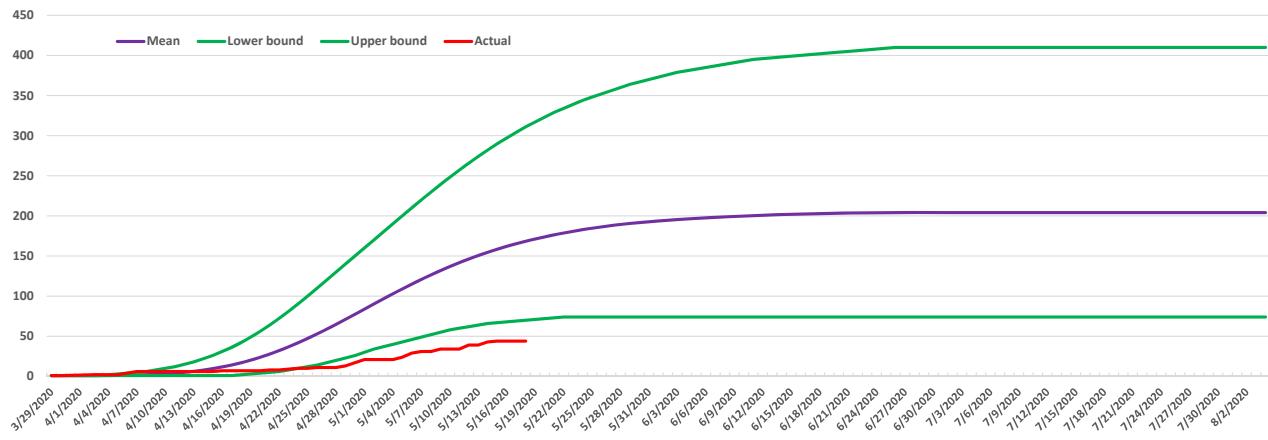
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North Dakota COVID 19 Cumulative Death Projections March 26



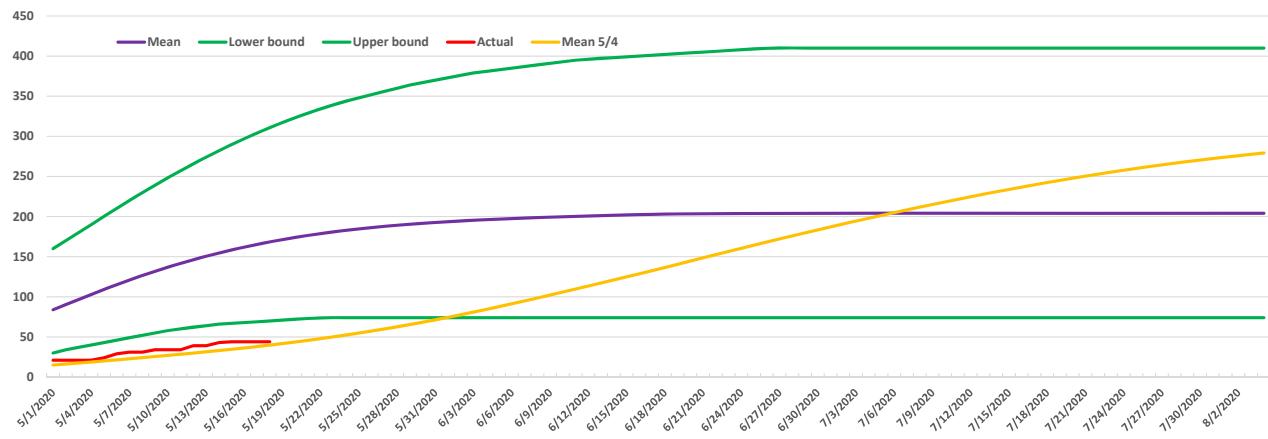
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South Dakota COVID 19 Daily Death Projections March 26



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South Dakota COVID 19 Daily Death Projections March 26



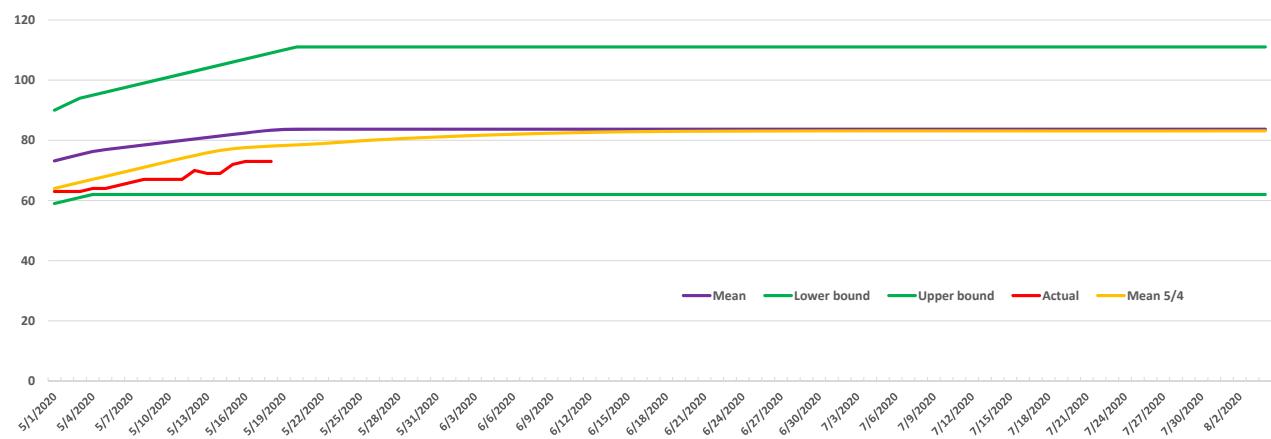
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Idaho COVID 19 Cumulative Death Projections March 26



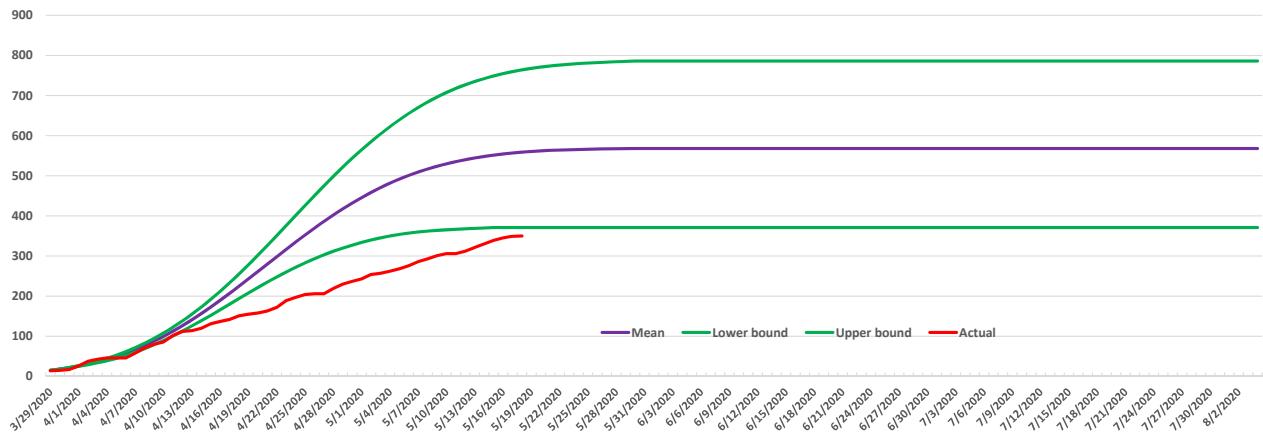
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Idaho COVID 19 Cumulative Death Projections March 26



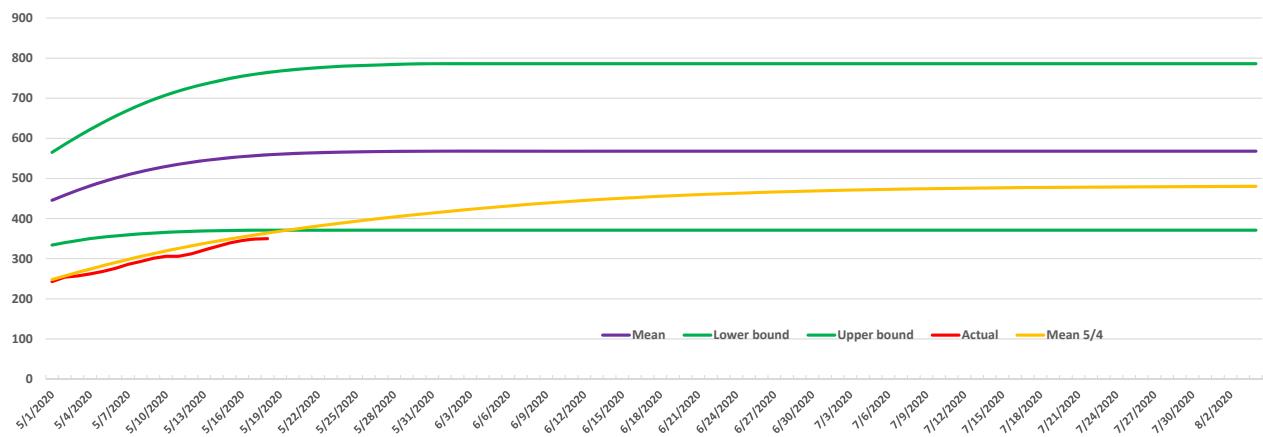
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Nevada COVID 19 Cumulative Death Projections



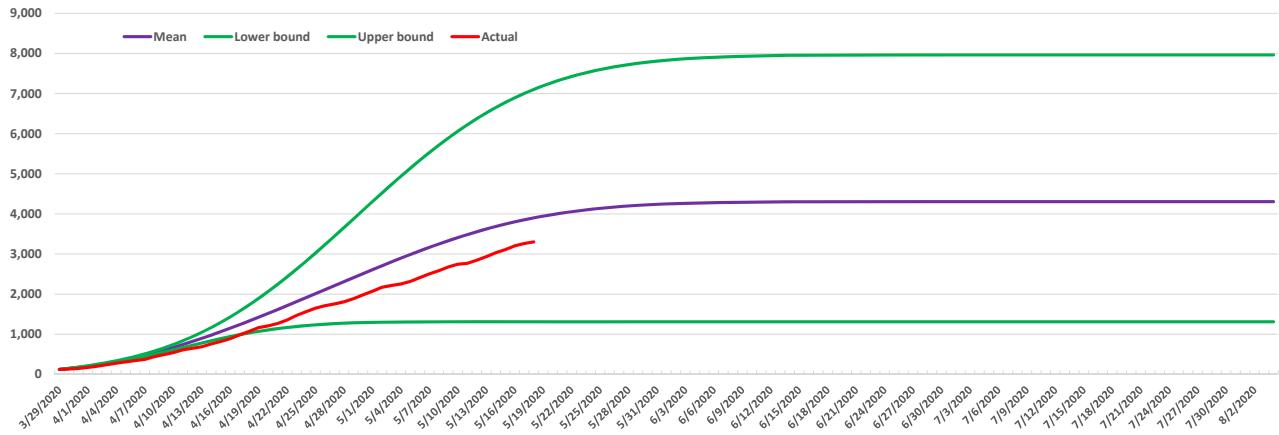
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Nevada COVID 19 Cumulative Death Projections



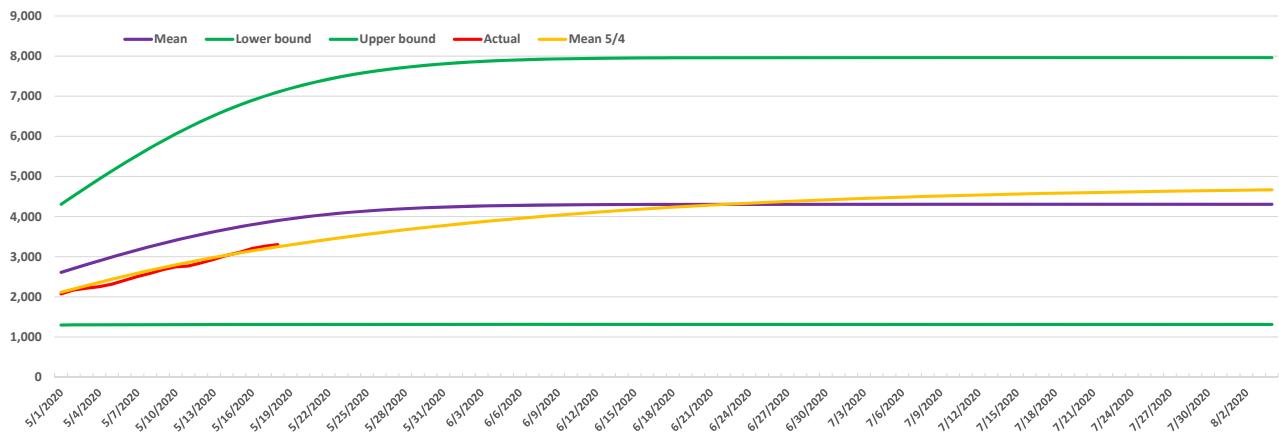
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California COVID 19 Cumulative Death Projections March 26



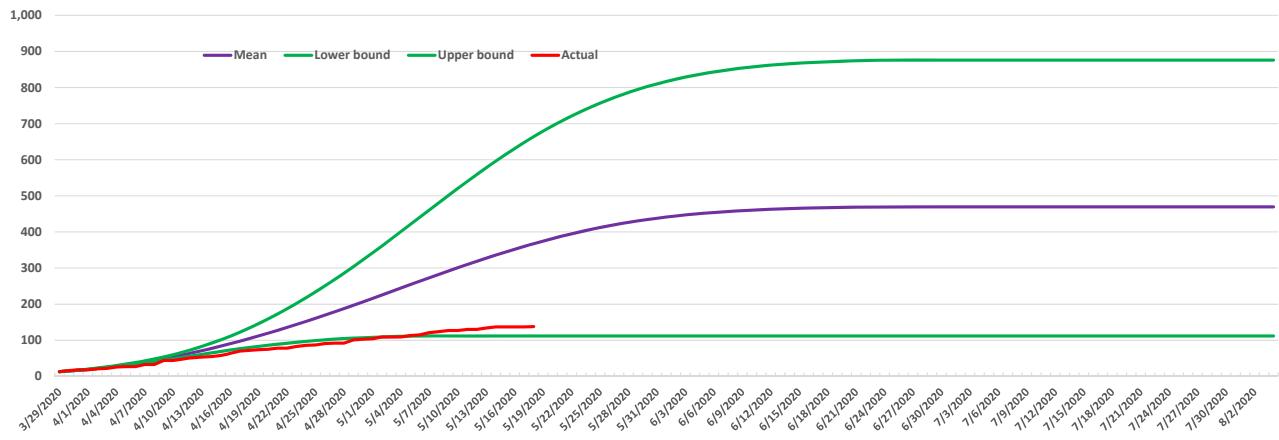
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California COVID 19 Cumulative Death Projections March 26



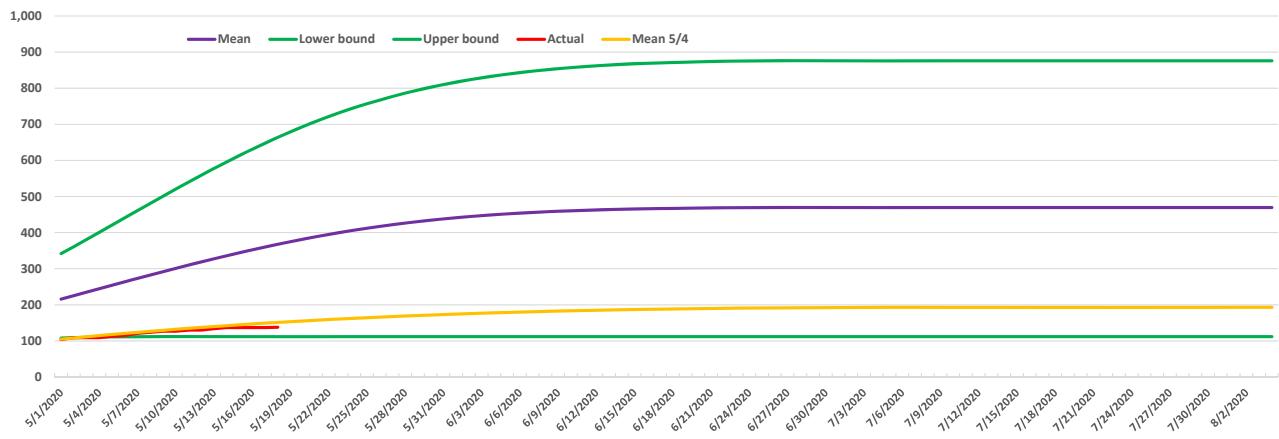
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Oregon COVID 19 Cumulative Death Projections March 26



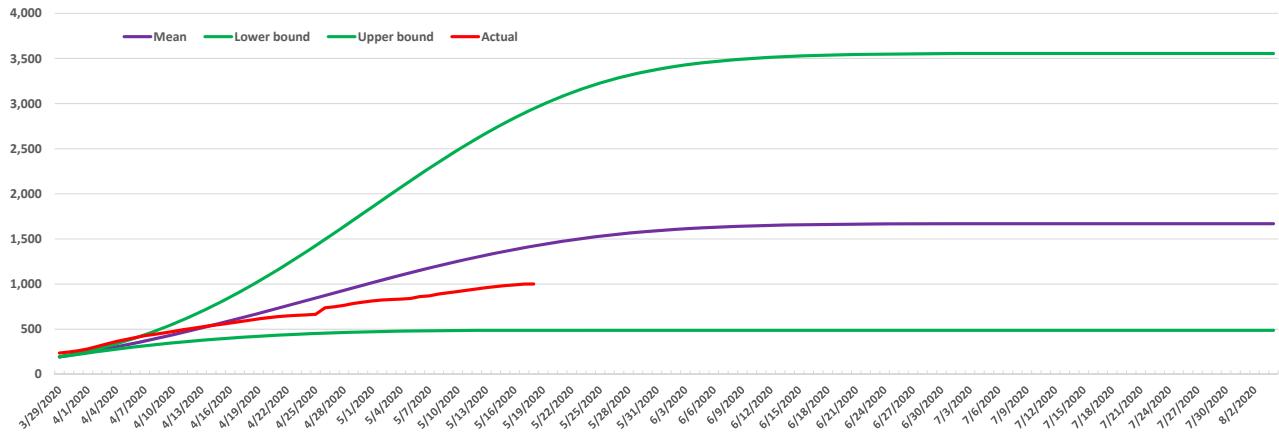
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Oregon COVID 19 Cumulative Death Projections March 26



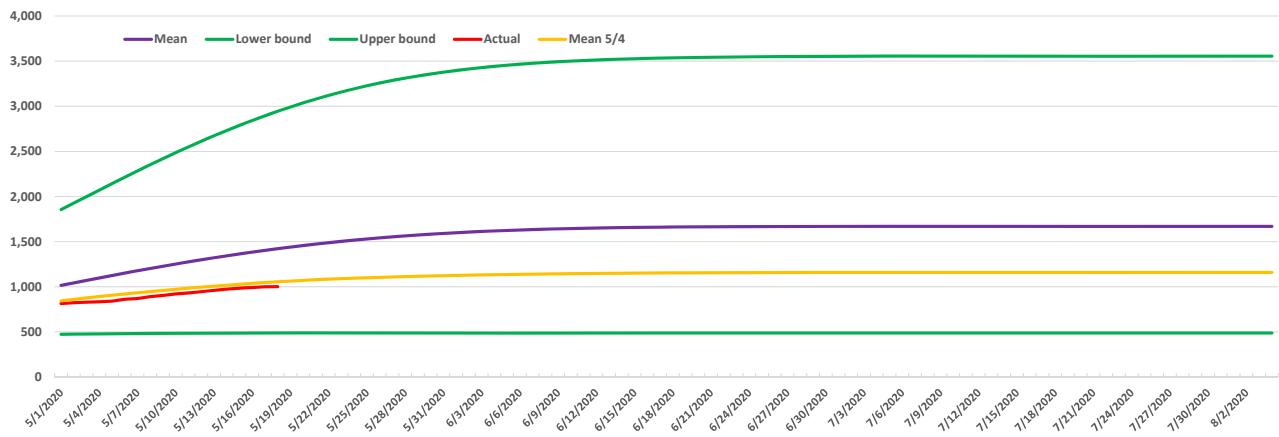
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Washington COVID 19 Cumulative Death Projections March 26



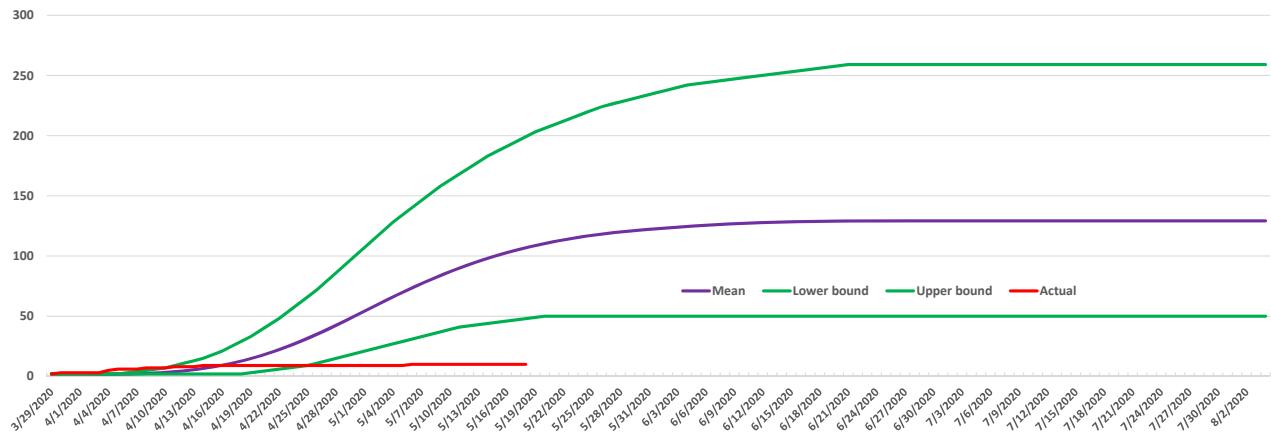
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Washington COVID 19 Cumulative Death Projections March 26



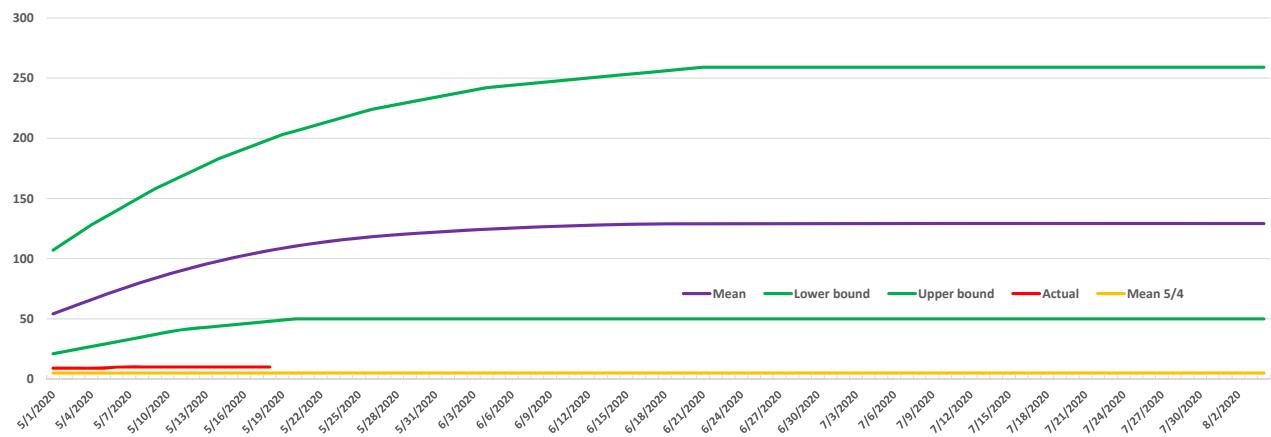
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Alaska COVID 19 Cumulative Death Projections March 26



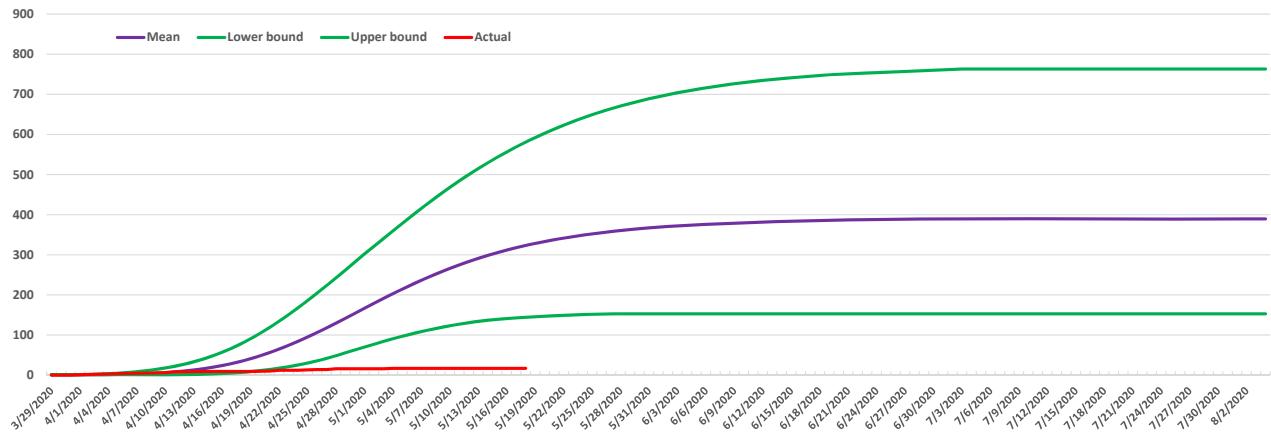
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Alaska COVID 19 Cumulative Death Projections March 26



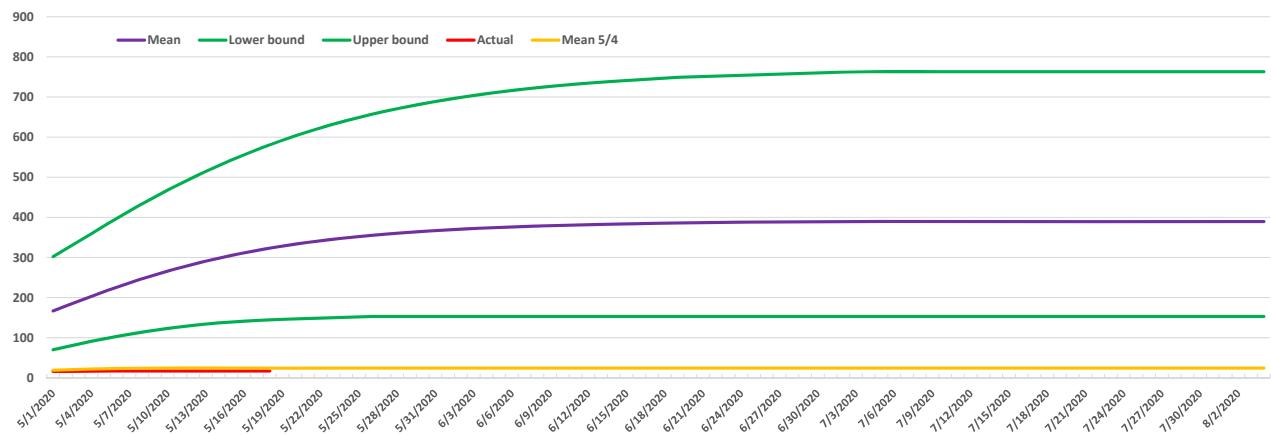
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Hawaii COVID 19 Daily Death Projections March 26



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Hawaii COVID 19 Daily Death Projections March 26



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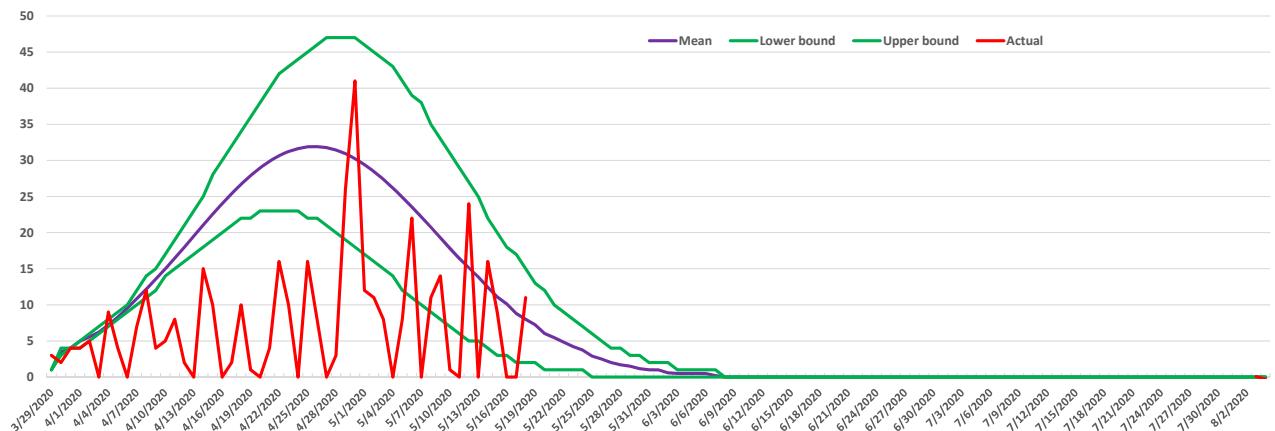
Concluding Thoughts

- The IMHE model has been used to drive policy decisions that have resulted in large negative economic effects for the U.S. in general and the agricultural economy specifically
- This is a first look at those states that began relaxing restriction earlier
 - States that have relaxed earliest include Florida, Georgia, Tennessee and Texas
- Analysis indicates that these states have not so far seen a large increase in deaths
- Graphical analysis indicates that the model revision at the first of May is generally more accurate although there are states that over and under predict



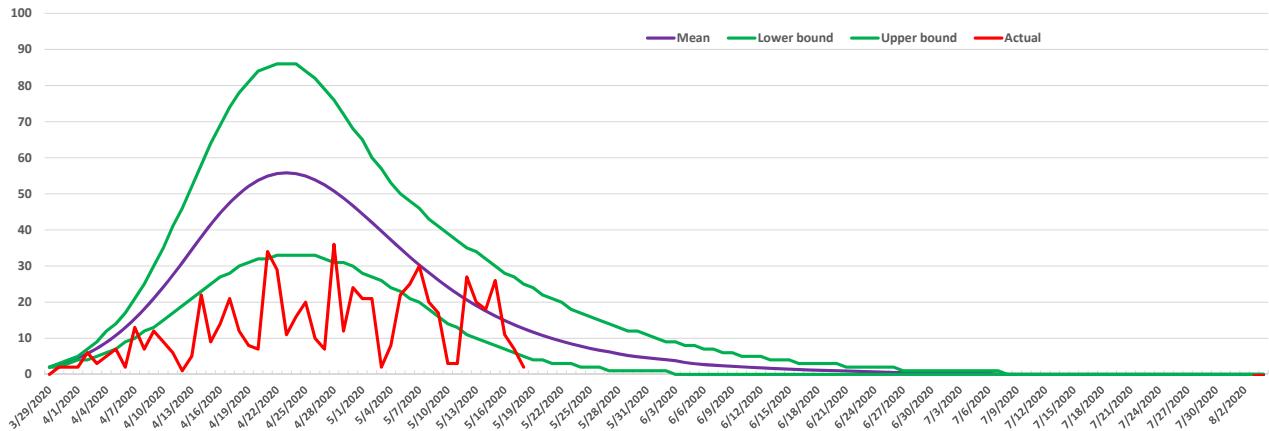
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South Carolina COVID 19 Daily Death Projections March 26



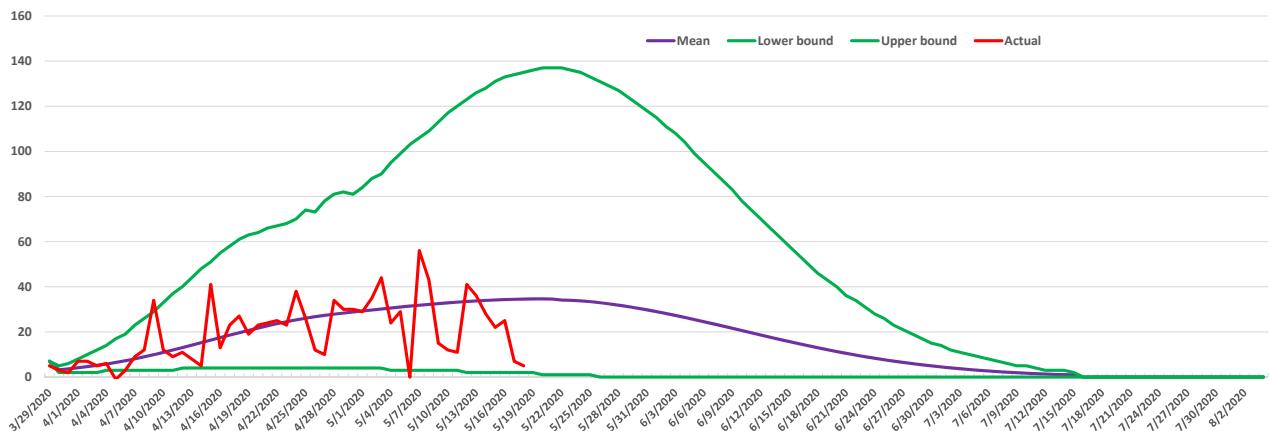
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North Carolina COVID 19 Daily Death Projections March 26



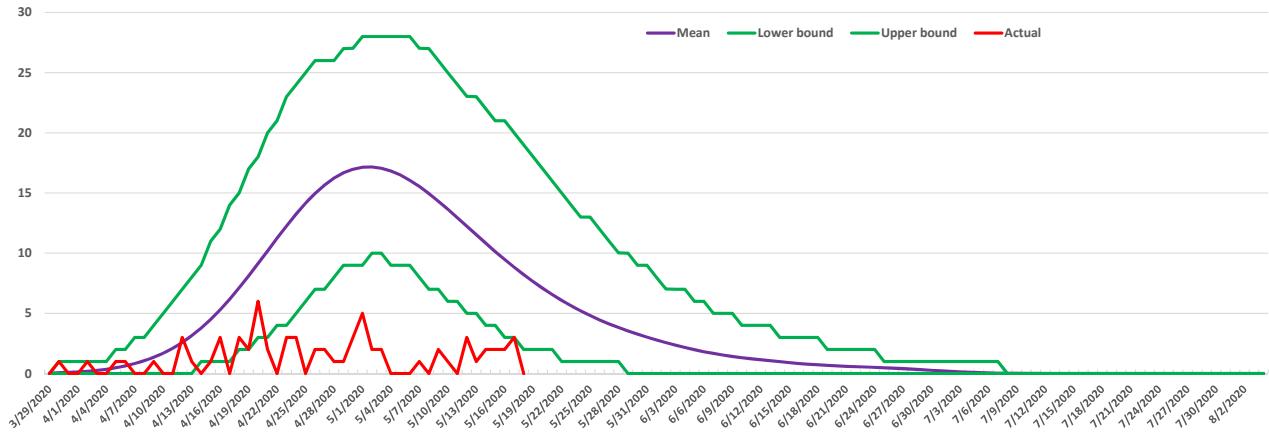
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Virginia COVID 19 Daily Death Projections March 26



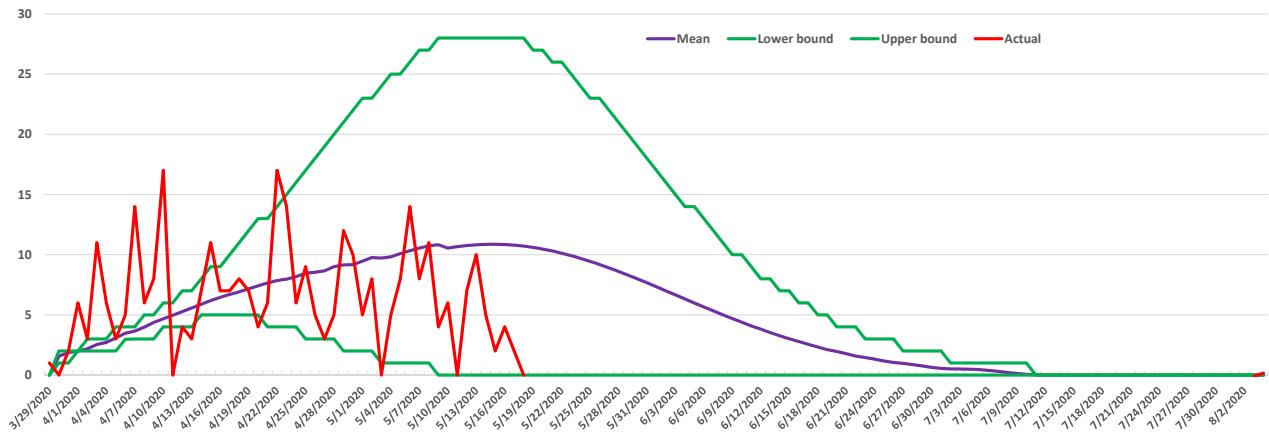
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West Virginia COVID 19 Daily Death Projections March 26



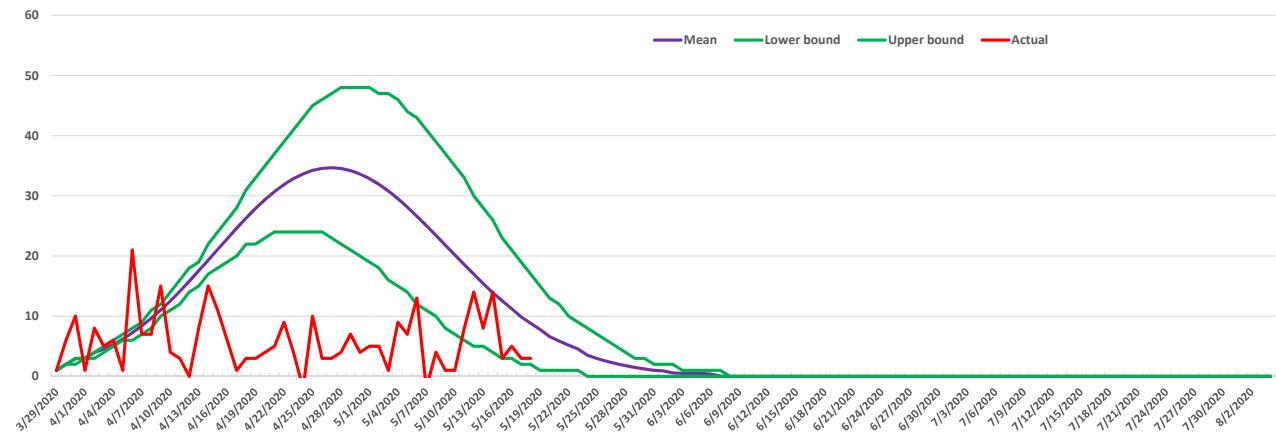
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Kentucky COVID 19 Daily Death Projections March 26



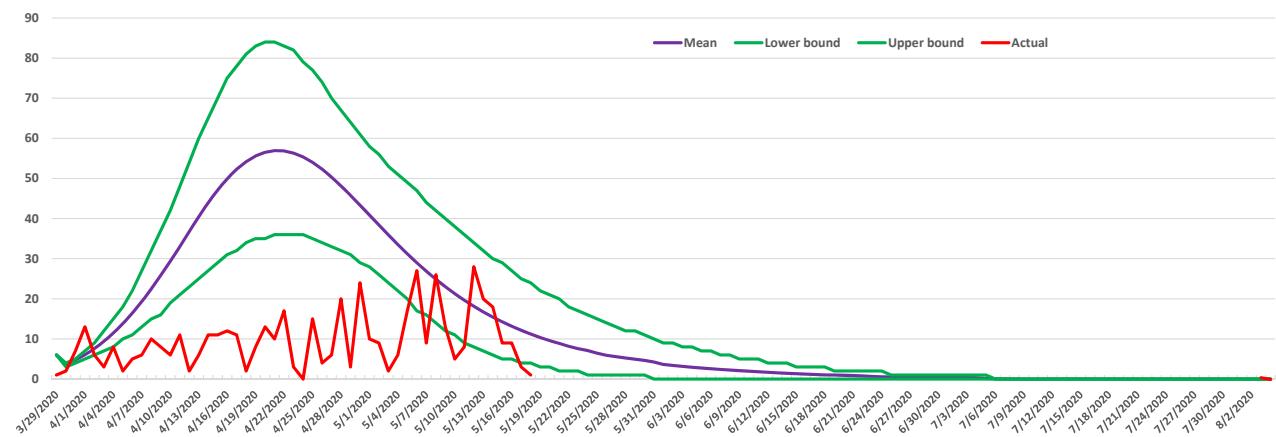
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Tennessee COVID 19 Daily Death Projections March 26



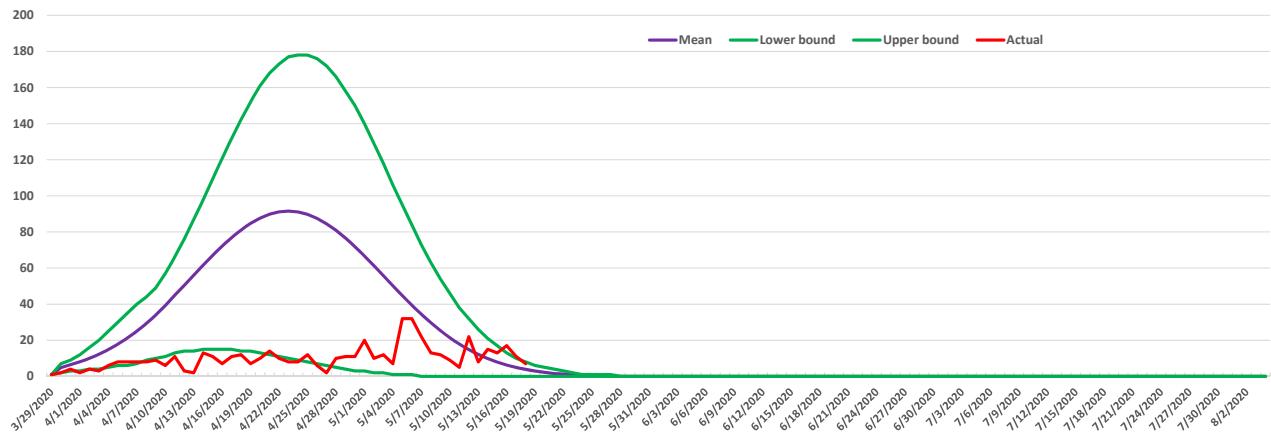
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Alabama COVID 19 Daily Death Projections March 26



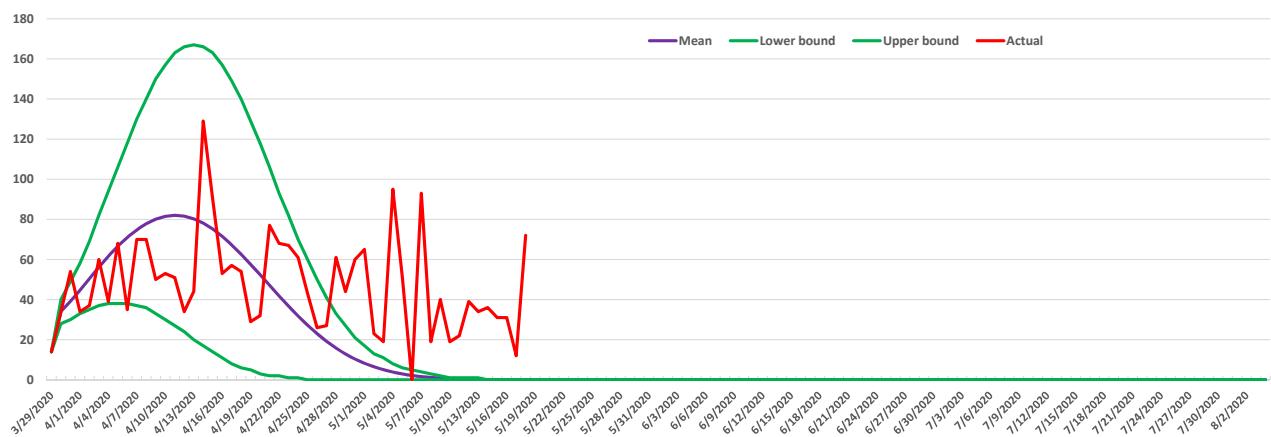
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Mississippi COVID 19 Daily Death Projections March 26



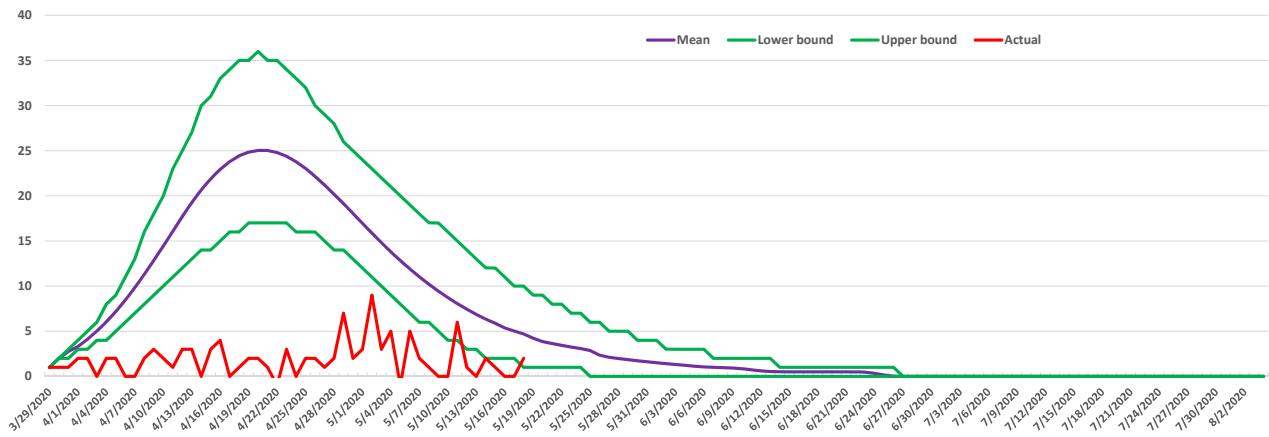
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Louisiana COVID 19 Daily Death Projections March 26



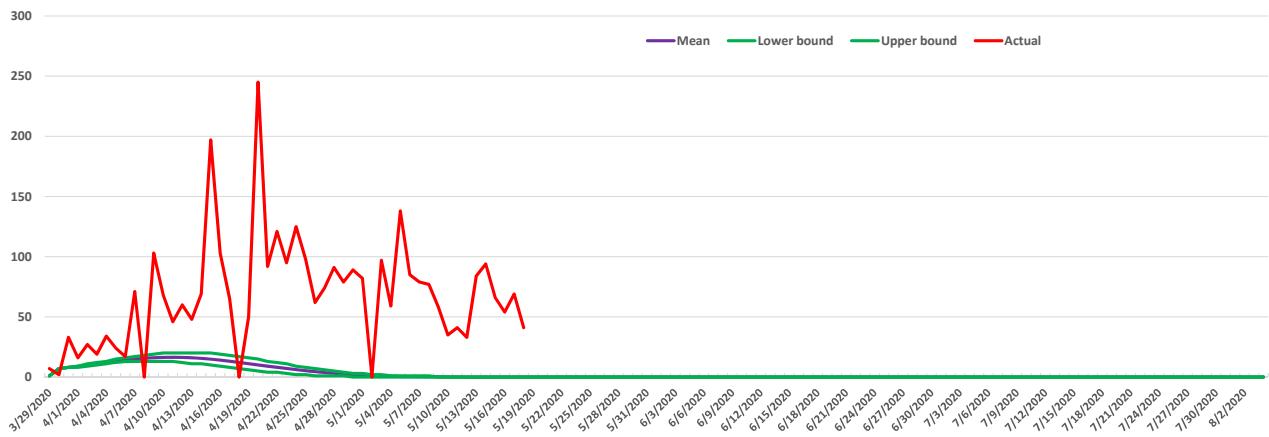
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Arkansas COVID 19 Daily Death Projections March 26



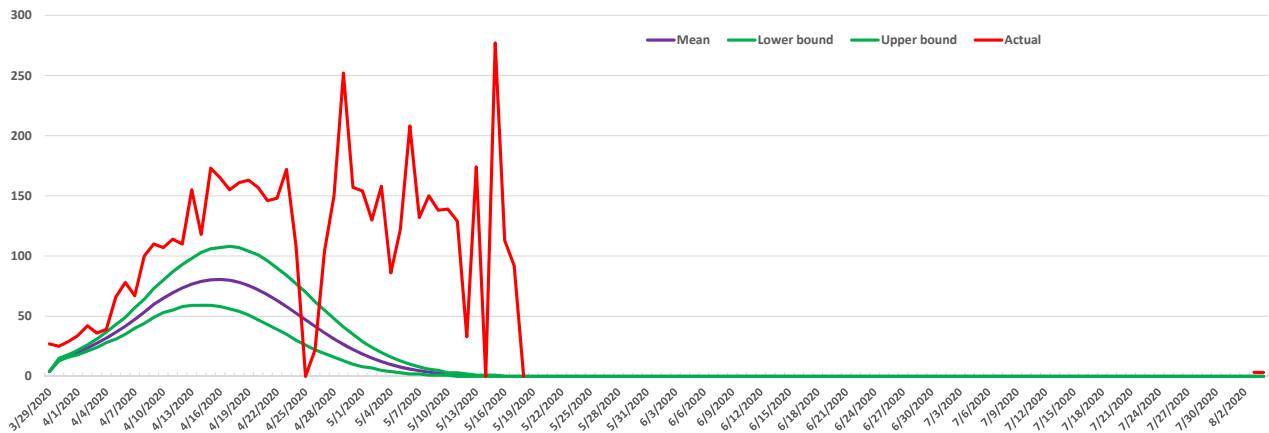
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Connecticut COVID 19 Daily Death Projections March 26



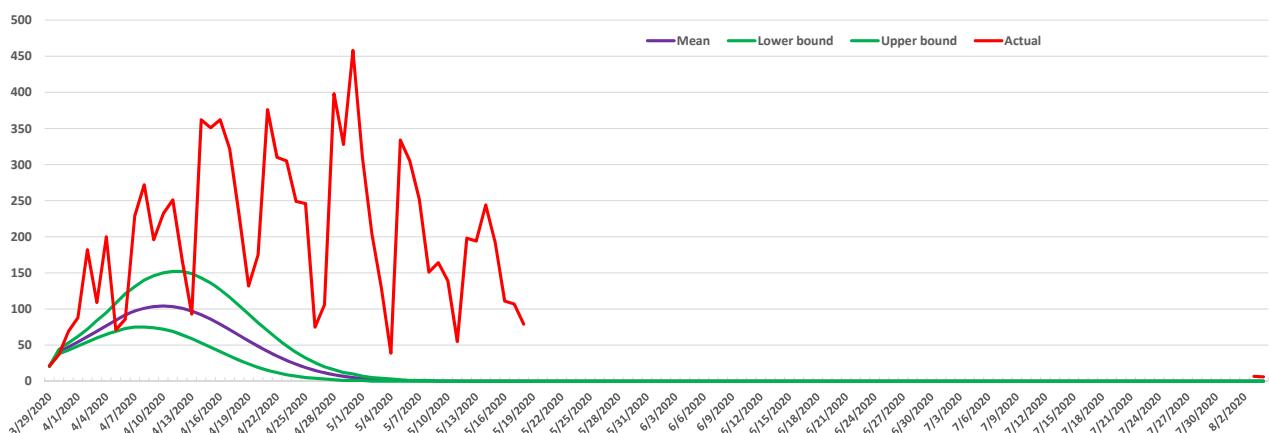
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Massachusetts COVID 19 Daily Death Projections March 26



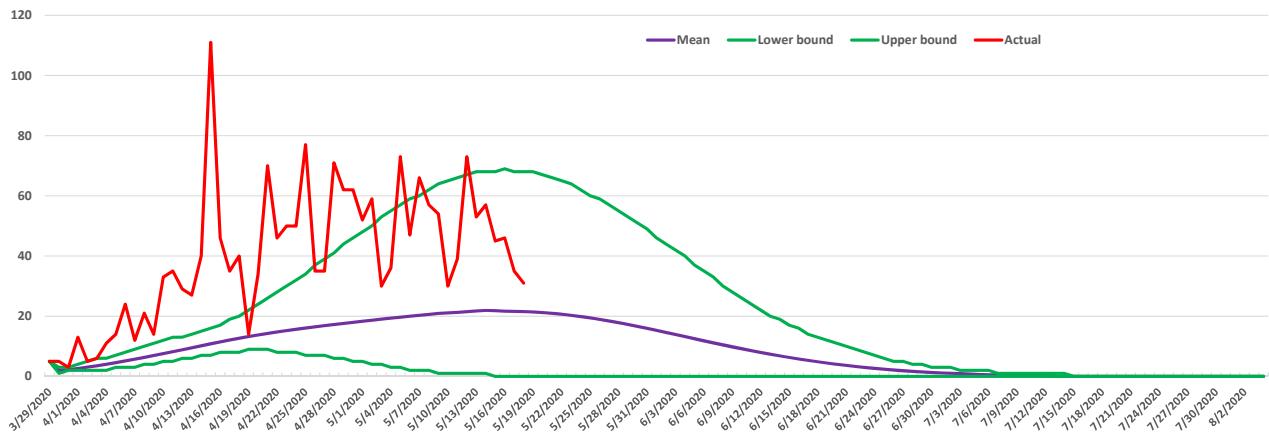
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New Jersey COVID 19 Daily Death Projections March 26



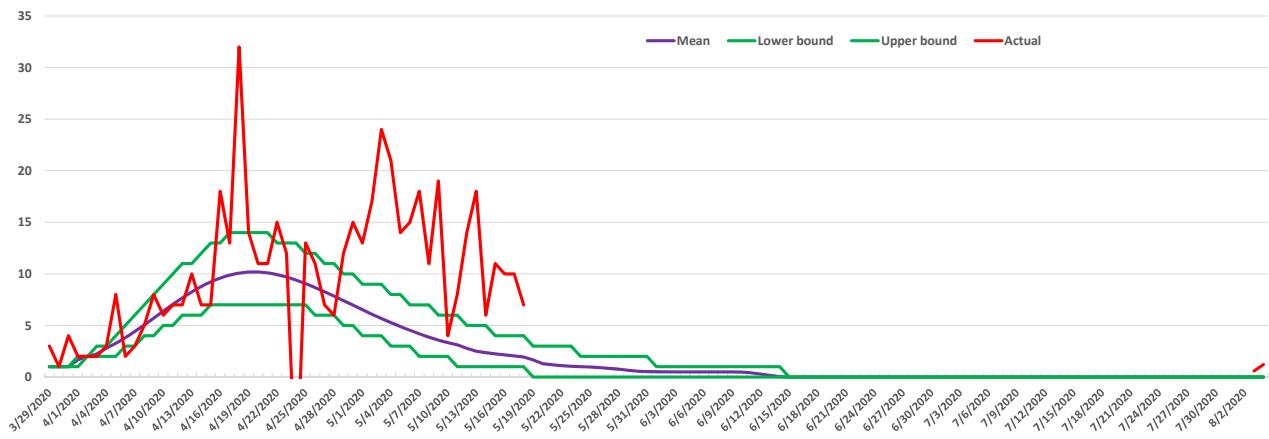
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Maryland COVID 19 Daily Death Projections March 26



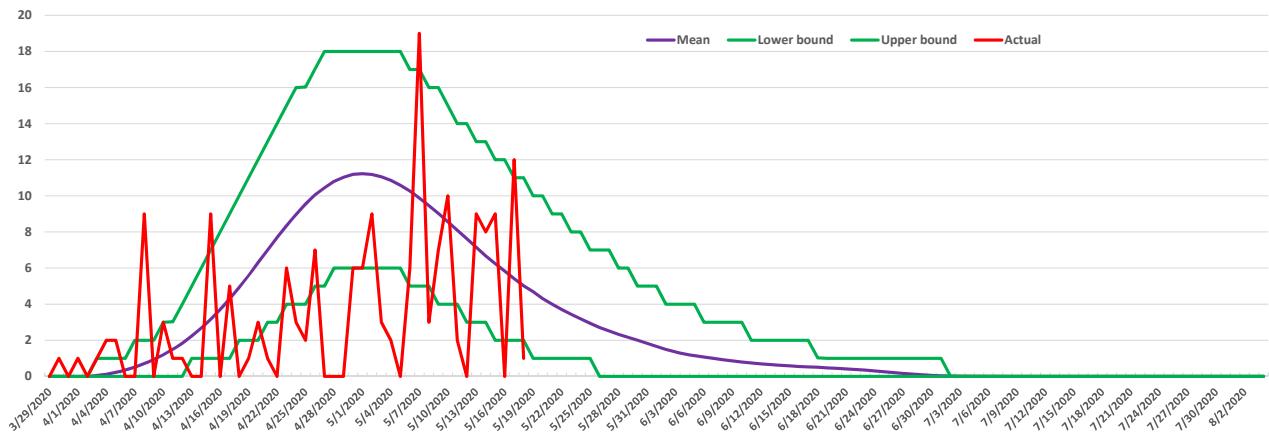
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Rhode Island COVID 19 Daily Death Projections March 26



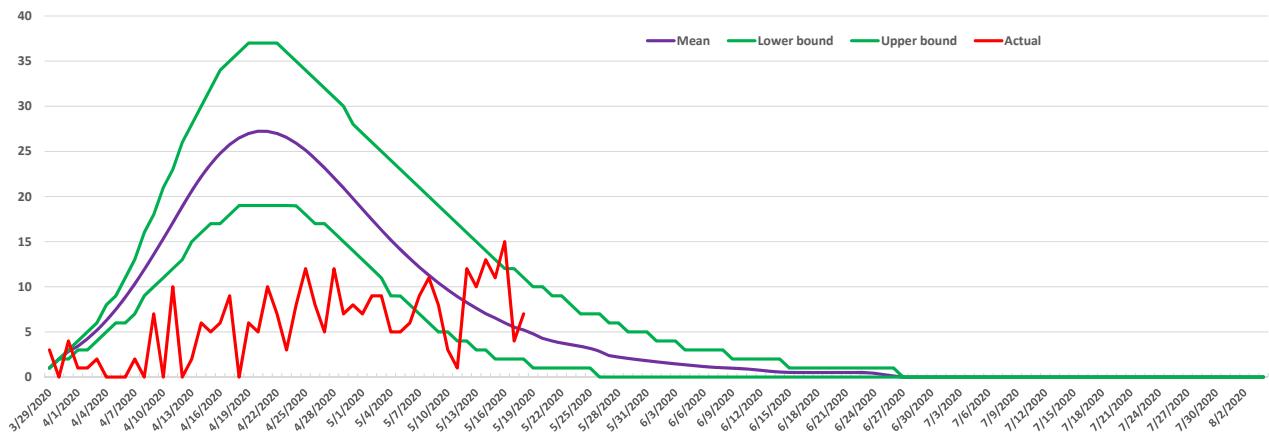
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New Hampshire COVID 19 Daily Death Projections March 26



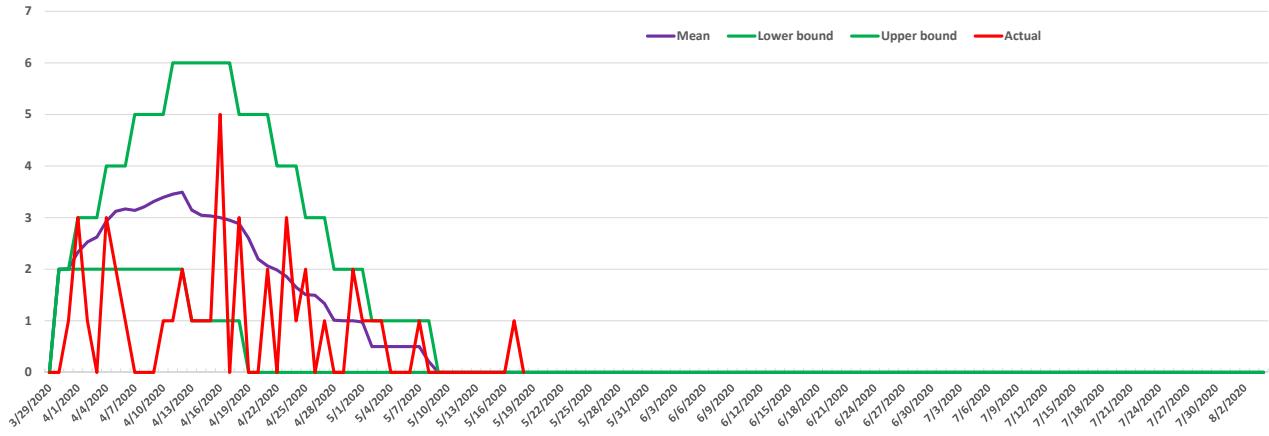
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Delaware COVID 19 Daily Death Projections March 26



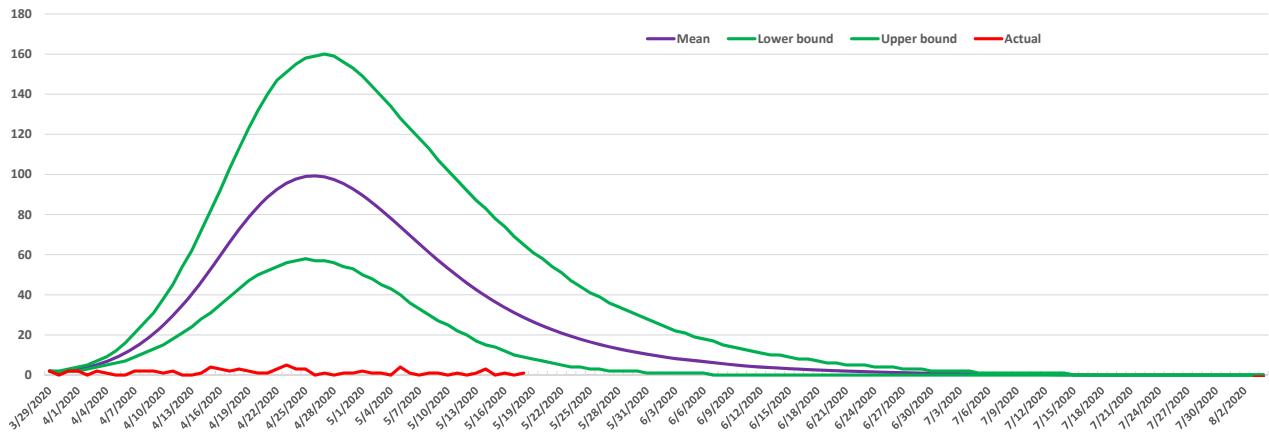
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Vermont COVID 19 Daily Death Projections March 26



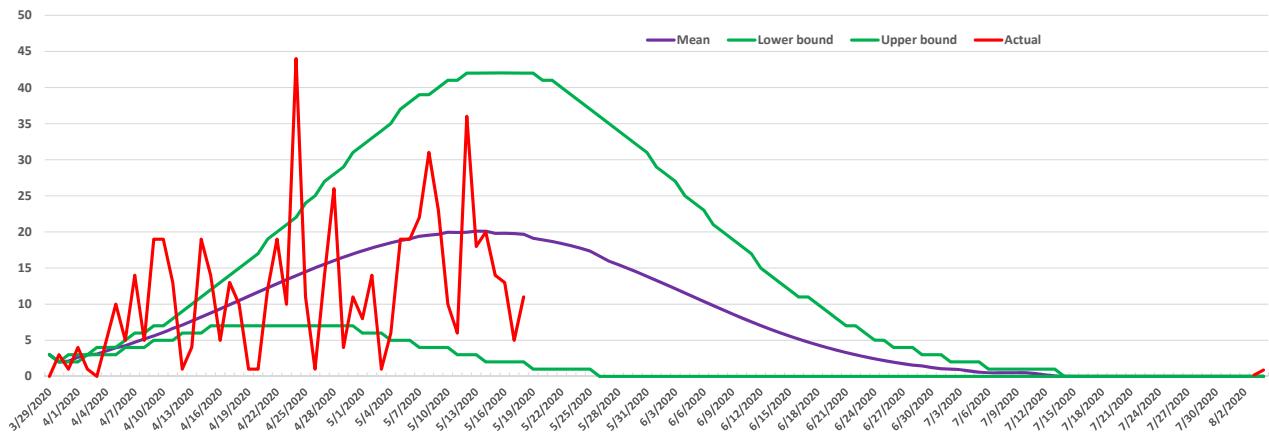
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Maine COVID 19 Daily Death Projections March 26



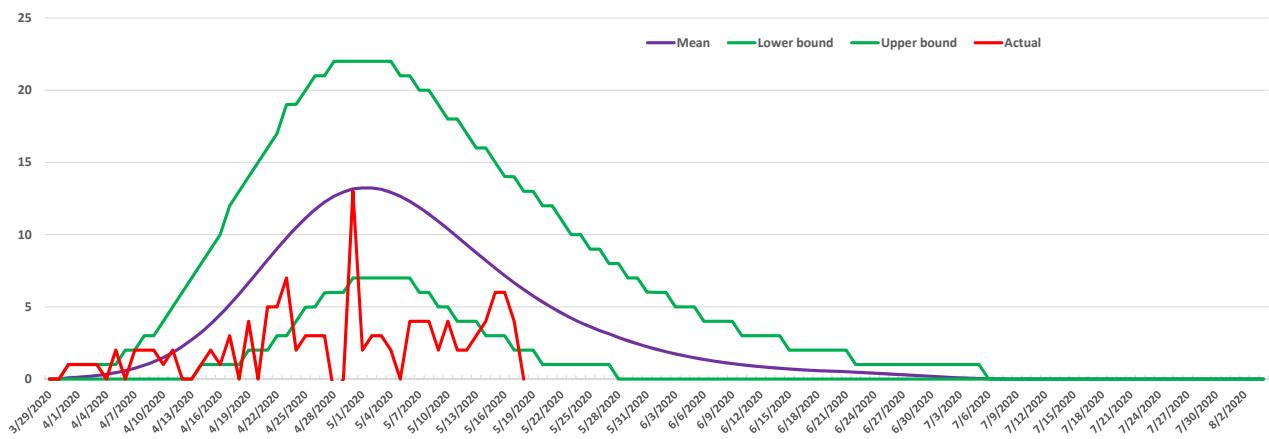
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Missouri COVID 19 Daily Death Projections March 26



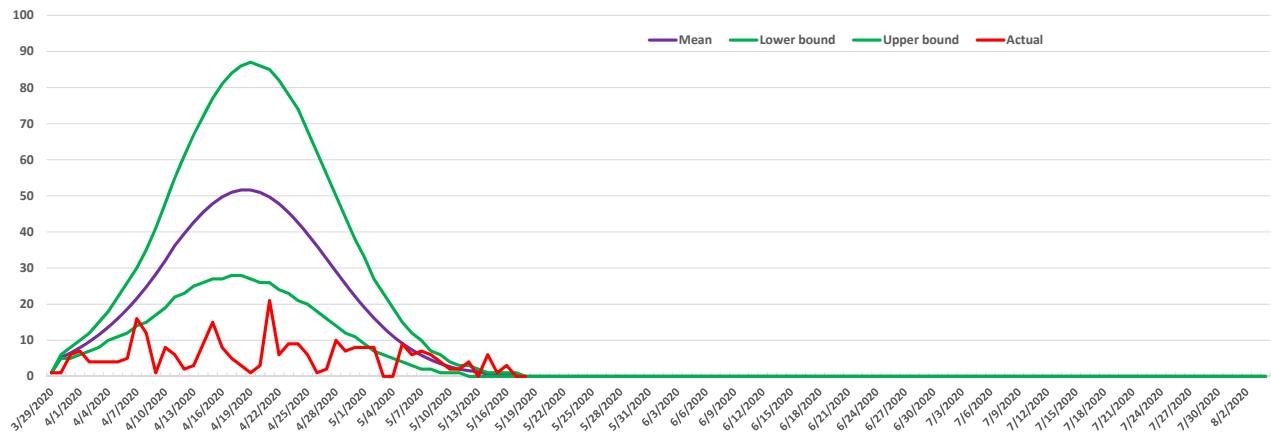
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Nebraska COVID 19 Daily Death Projections March 26



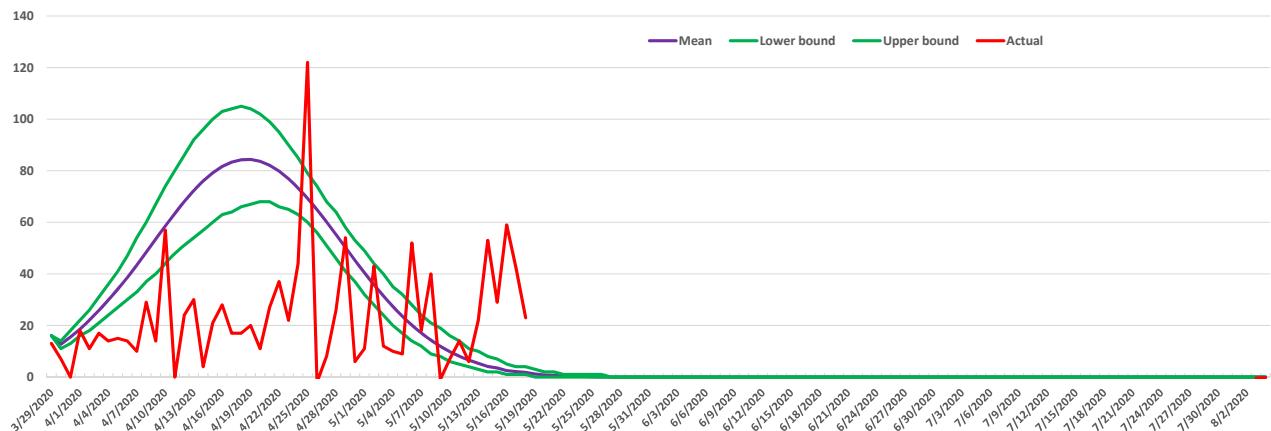
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Oklahoma COVID 19 Daily Death Projections March 26



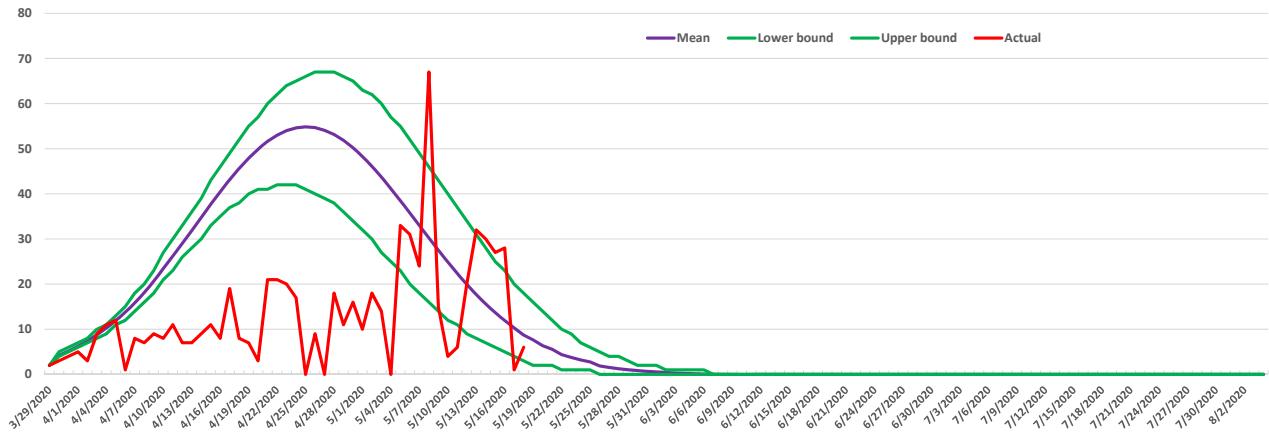
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Colorado COVID 19 Daily Death Projections March 26



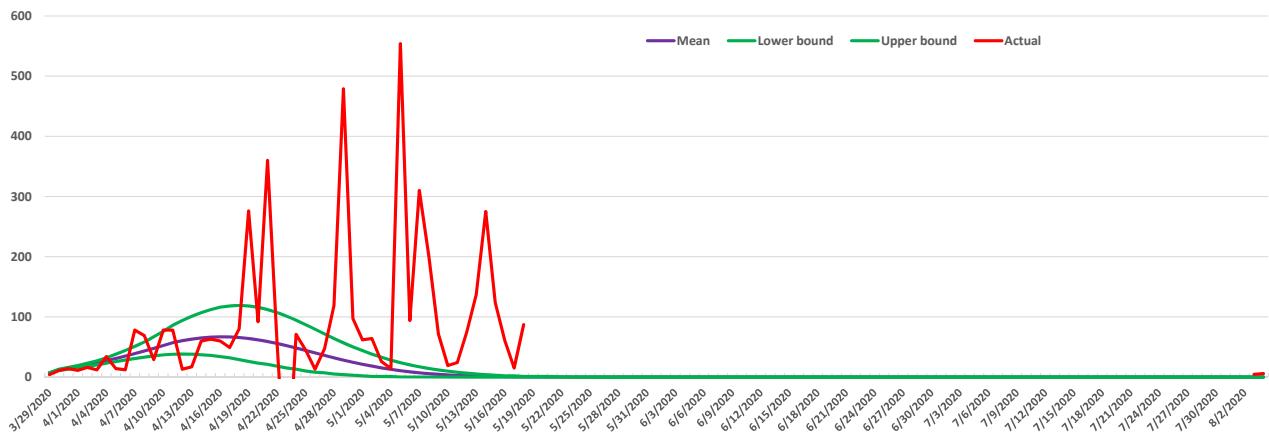
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Arizona COVID 19 Daily Death Projections March 26



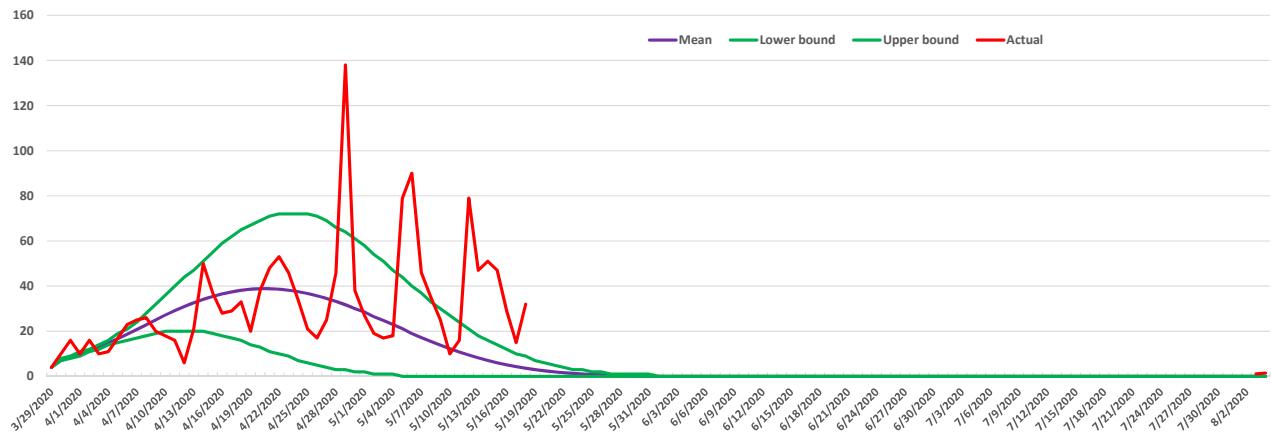
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Pennsylvania COVID 19 Daily Death Projections March 26



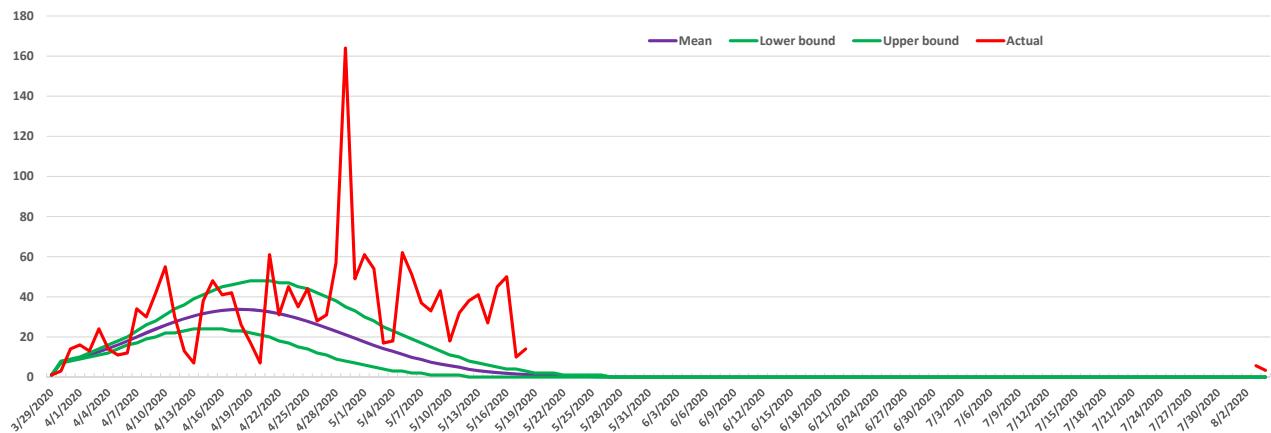
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Ohio COVID 19 Daily Death Projections March 26



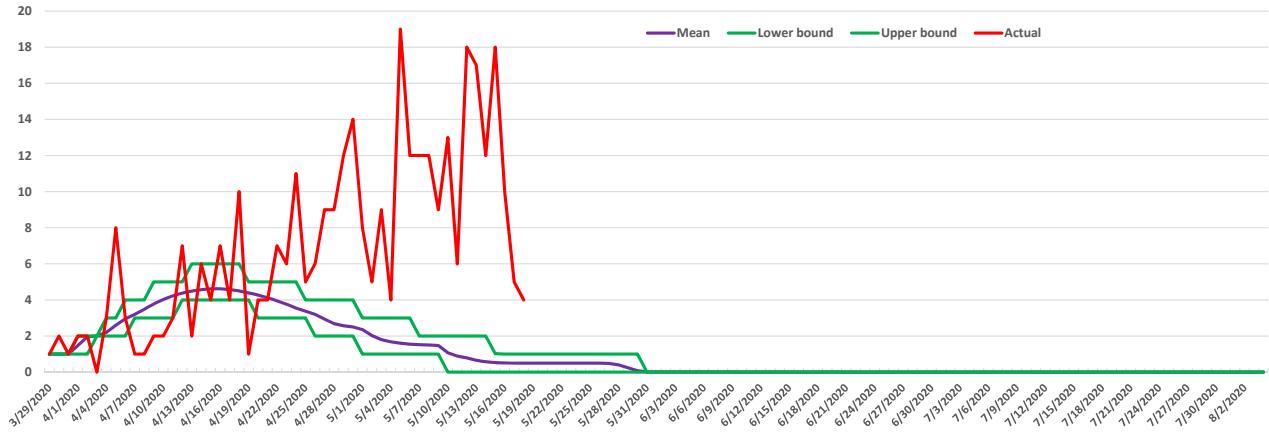
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Indiana COVID 19 Daily Death Projections March 26



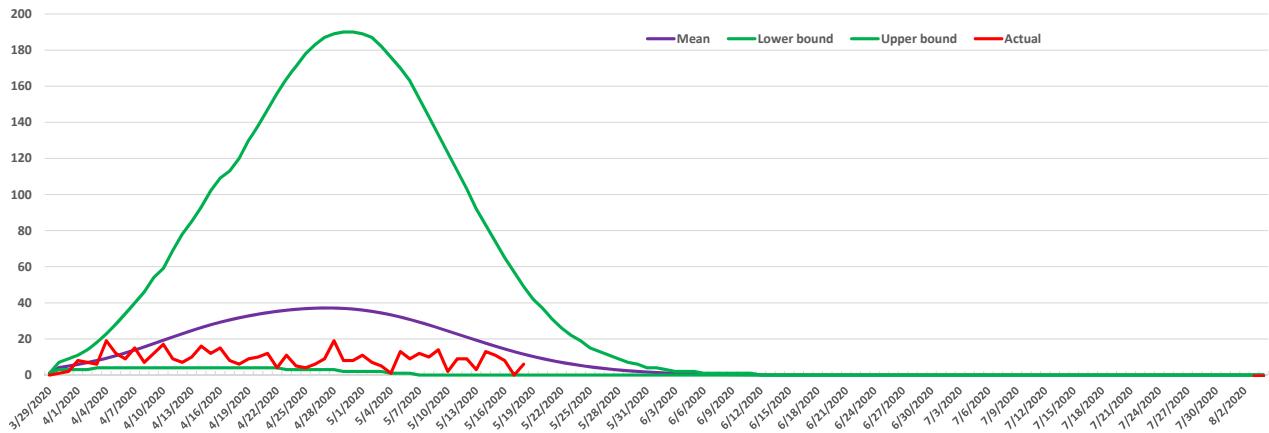
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Iowa COVID 19 Daily Death Projections March 26



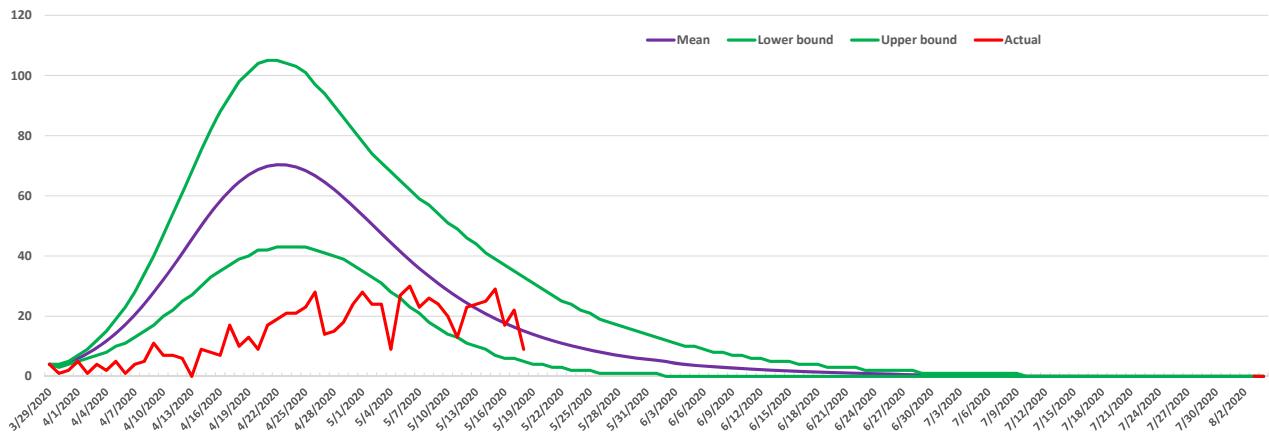
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Wisconsin COVID 19 Daily Death Projections March 26



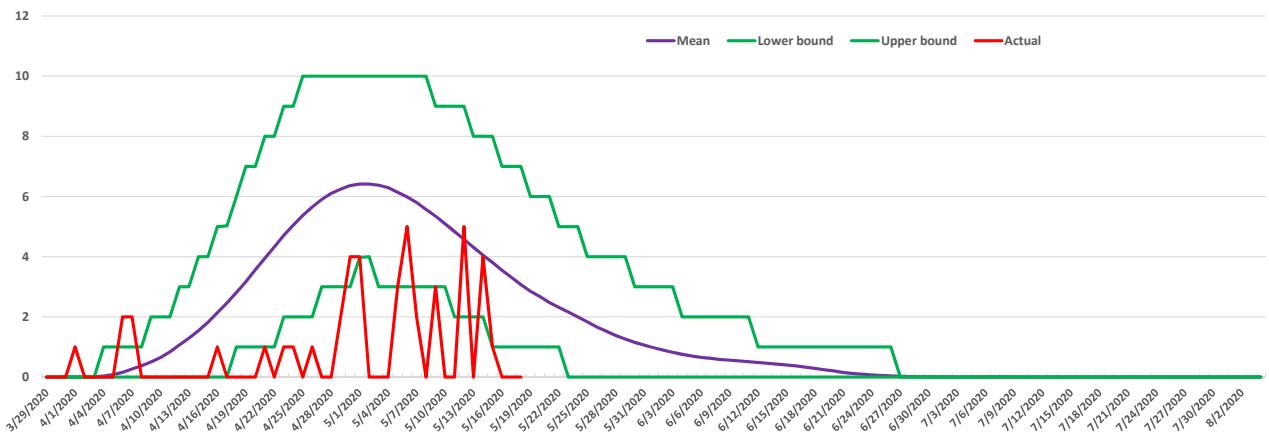
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Minnesota COVID 19 Daily Death Projections March 26



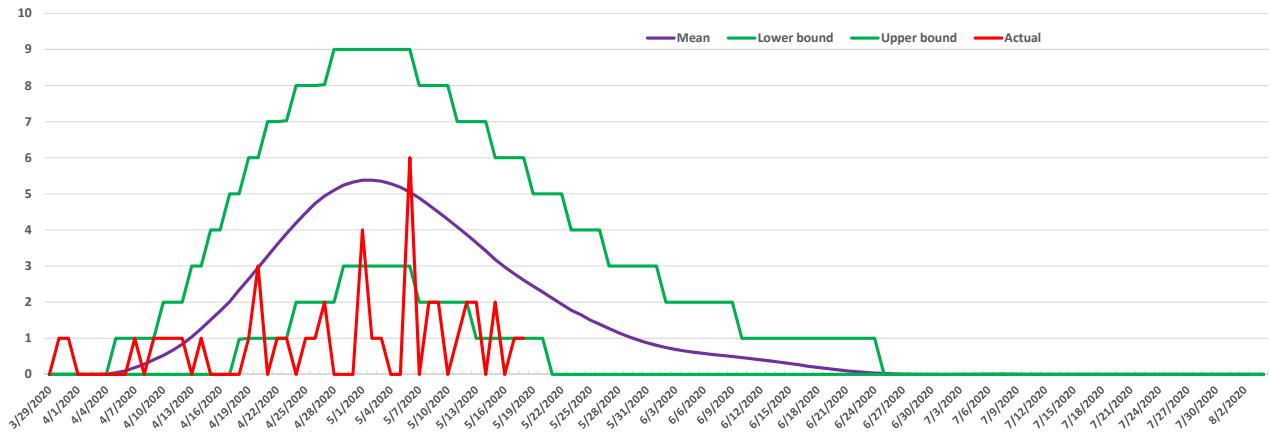
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South Dakota COVID 19 Daily Death Projections March 26



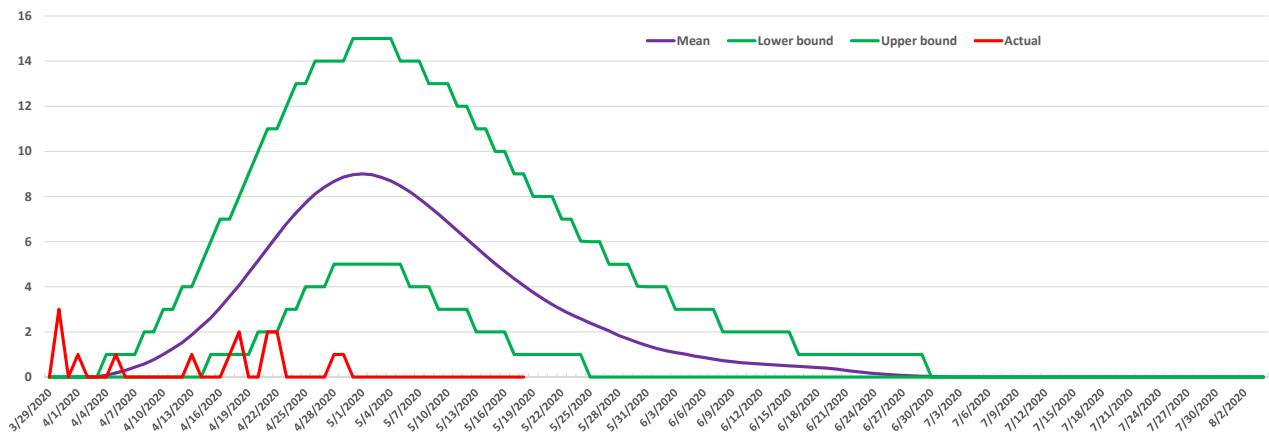
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North Dakota COVID 19 Daily Death Projections March 26



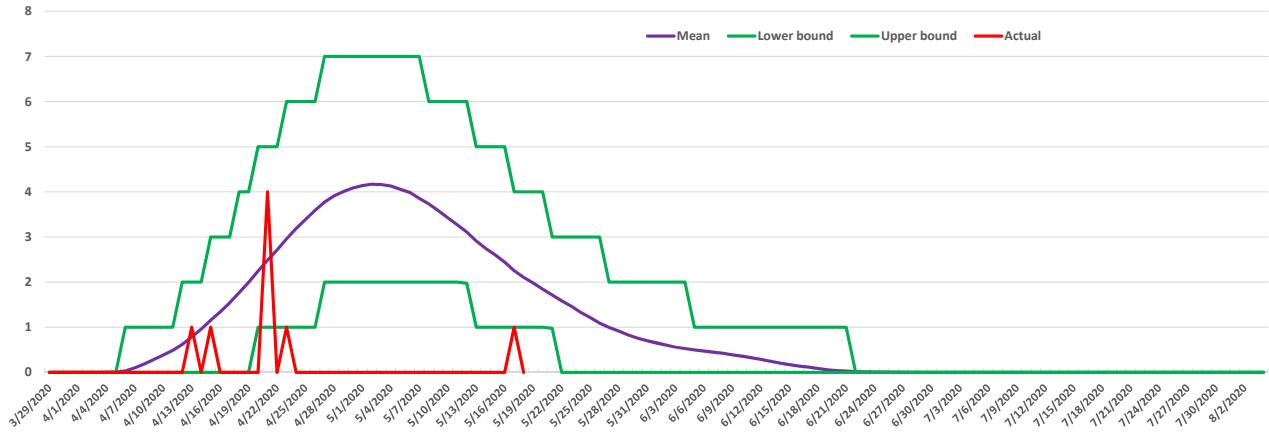
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Montana COVID 19 Daily Death Projections March 26



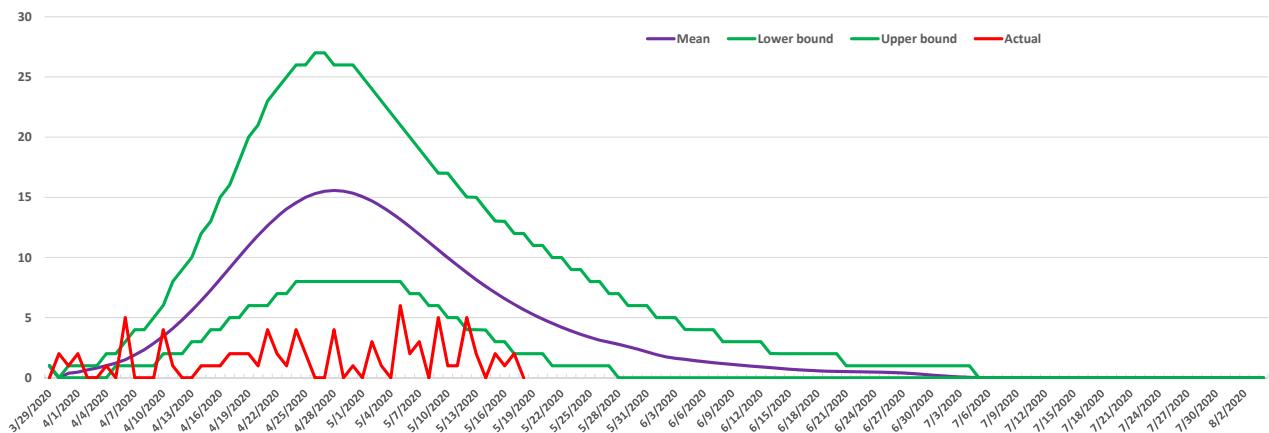
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Wyoming COVID 19 Daily Death Projections March 26



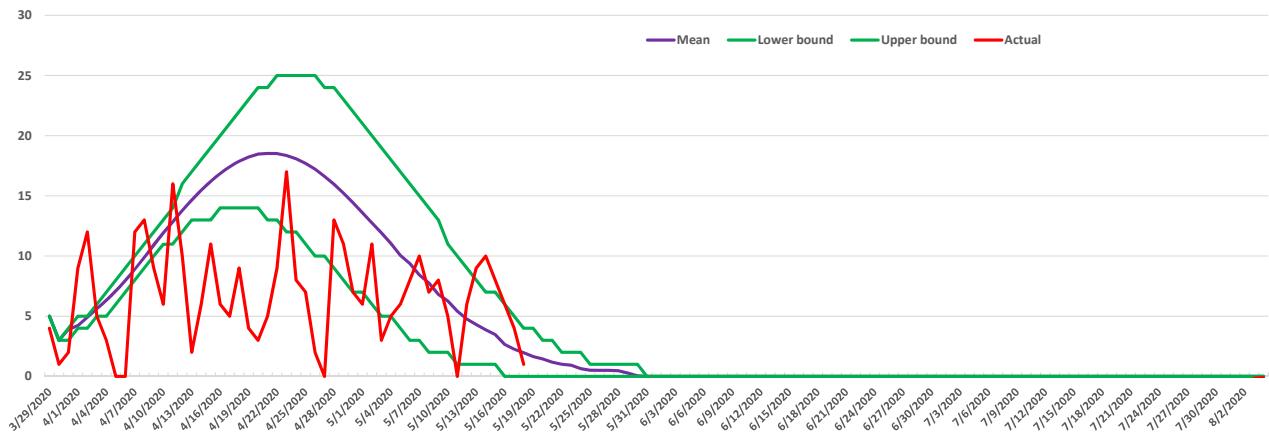
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Utah COVID 19 Daily Death Projections March 26



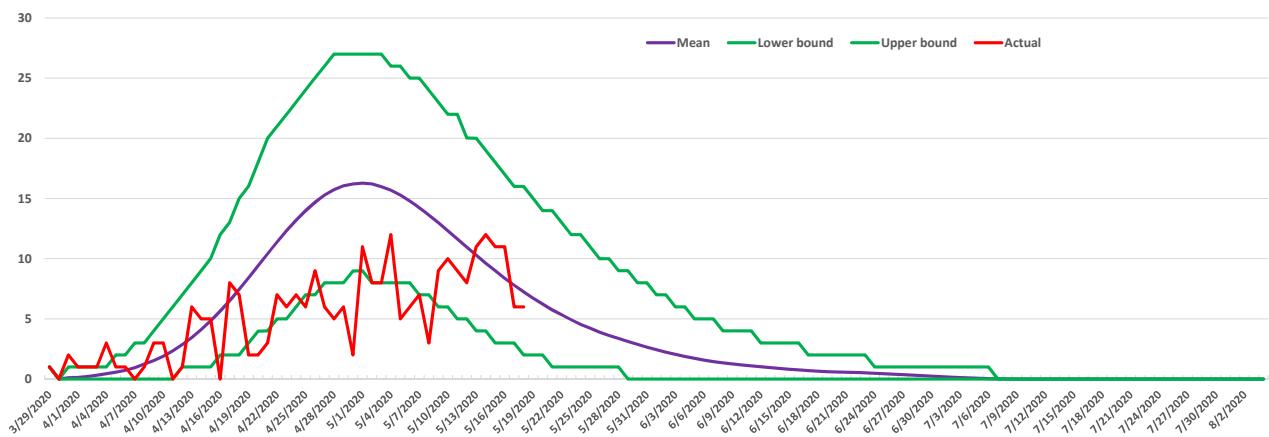
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Nevada COVID 19 Daily Death Projections March 26



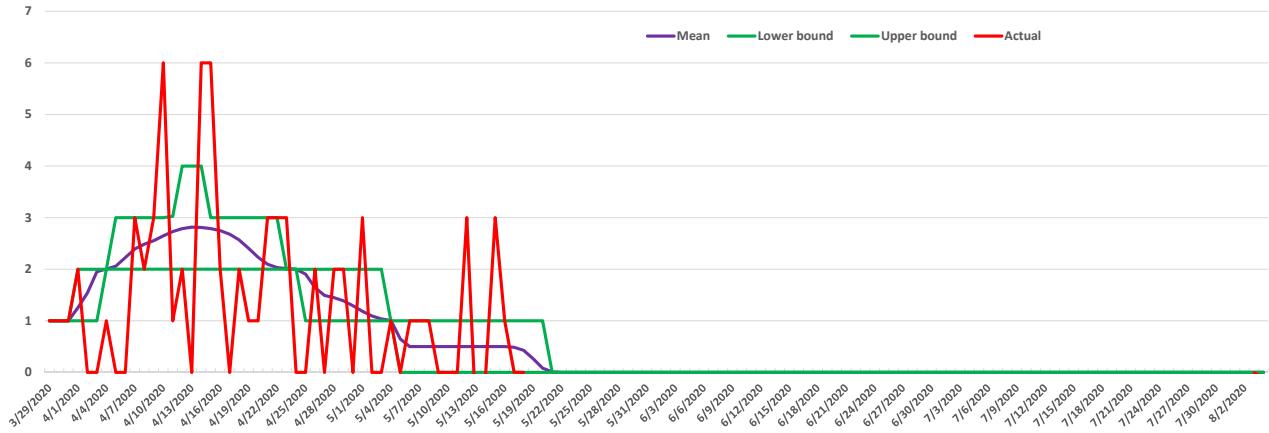
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New Mexico COVID 19 Daily Death Projections March 26



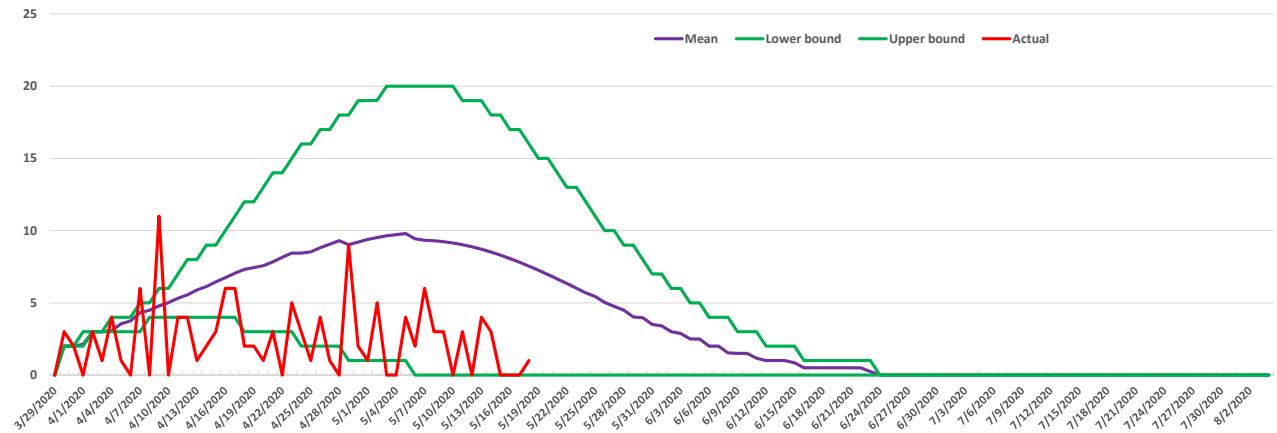
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Idaho COVID 19 Daily Death Projections March 26



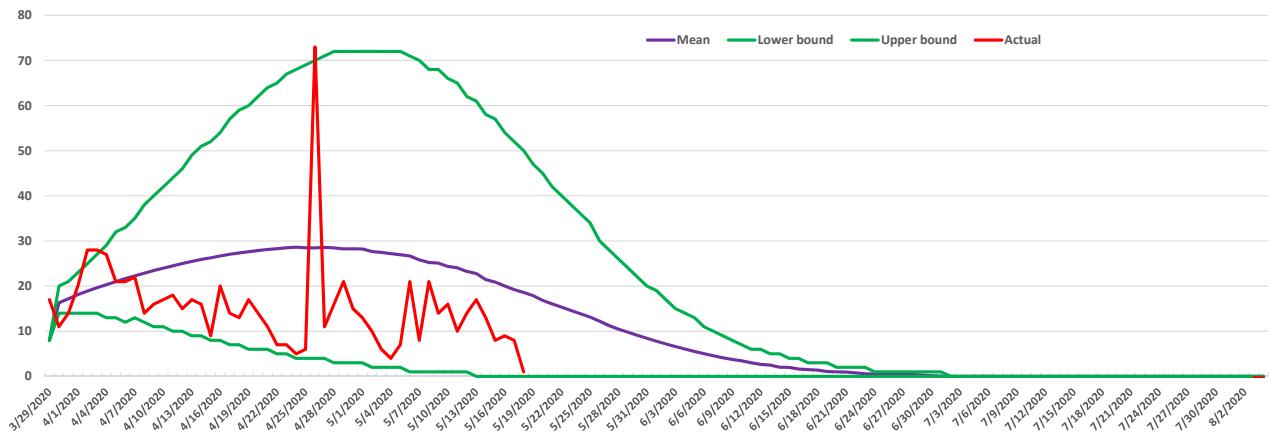
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Oregon COVID 19 Daily Death Projections March 26



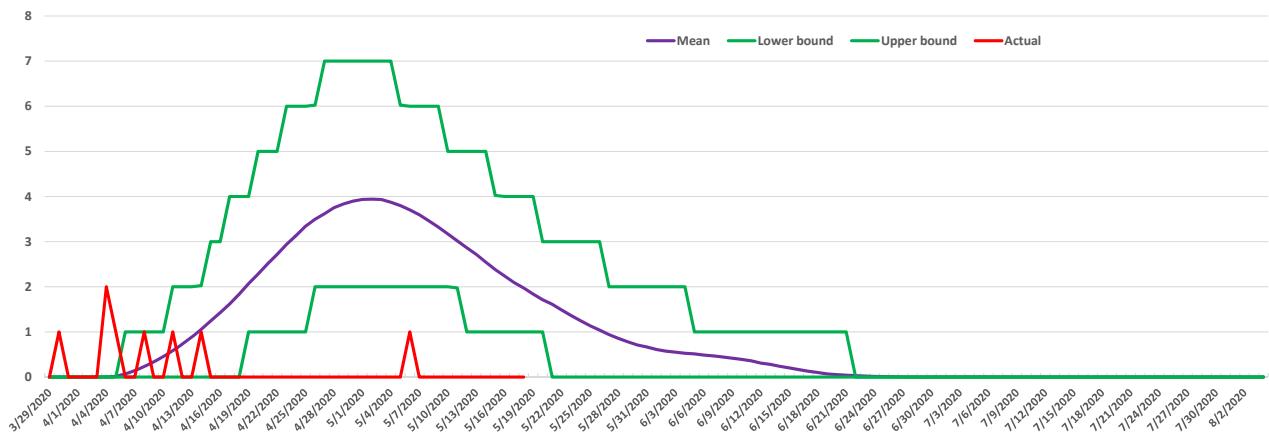
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Washington COVID 19 Daily Death Projections March 26



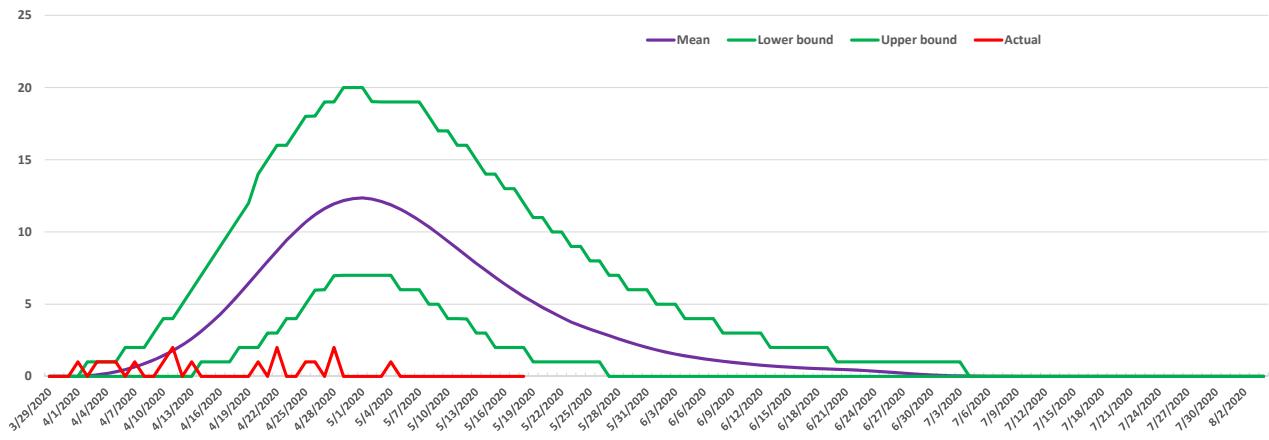
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Alaska COVID 19 Daily Death Projections March 26



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Hawaii COVID 19 Daily Death Projections March 26



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