Analysis of the IHME COVID 19 Forecasting Model – June 23rd Update

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Outline

- No IHME revisions since June 16th
- A look at Kansas and United States mortality statistics
- Distribution of daily deaths compared to the March 26th model
- Cumulative deaths compared to the March 26th model

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Introduction

- The COVID 19 virus is having a major effect on the economy with an unemployment rate of 13%
- Since the middle of March, over 45 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 model and the periodic revisions that are made in the predictive model
- This is an update of the June 16th discussion

Changes in the May 29th IHME Modeling Approach

- Revised the death model
- Use a spline function to log cumulative deaths versus log cumulative cases
- Death predictions made based on cases over time
- Unsmoothed daily deaths and the predicted daily deaths used to fit a spline
- Sample standard deviation developed using 1,000 drawn from the residuals
- Argued to be more robust for locations with smaller epidemics
- Paper is still in the peer review process

Kansas COVID Deaths by Age Group

Age Group	Number of Deaths	Percent of COVID Deaths	2018 Mortality Rates
25-34	2	0.8%	1.8%
35-44 years	6	2.3%	2.5%
45-54 years	13	5.0%	4.8%
55-64 years	36	13.9%	12.8%
65-74 years	51	19.7%	18.2%
75-84 years	55	21.2%	23.4%
85+ years	96	37.1%	34.2%
Total	259	100%	97.6%

https://www.coronavirus.kdheks.gov/160/COVID-19-in-Kansas, June 23, 2020
https://www.kdheks.gov/phi/AS_Tables/AS_2018_Tables_and_Figures/general_mortality/Table_E4.pdf, June 23, 2020

U.S. COVID Deaths by Age Group

Age Group	Number of Deaths	Percent of COVID Deaths	2017 Mortality Rates
15-24 years	125	0.1%	0.2%
25-34 years	699	0.7%	1.1%
35-44 years	1,780	1.7%	2.1%
45-54 years	4,976	4.8%	6.0%
55-64 years	12,307	11.9%	13.2%
65-74 years	21,462	20.8%	18.9%
75-84 years	27,529	26.6%	23.4%
85+ years	34,435	33.3%	31.2%
Total	103,339	99.97%	98.87%

https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Sex-Age-and-S/9bhg-hcku, June 23, 2020

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	2	0.01	1.3
35-44 years	6	0.02	1.9
45-54 years	13	0.04	3.9
55-64 years	36	0.10	9.3
65-74 years	51	0.19	18.9
75-84 years	55	0.41	47.5
85+ years	96	1.46	142.1

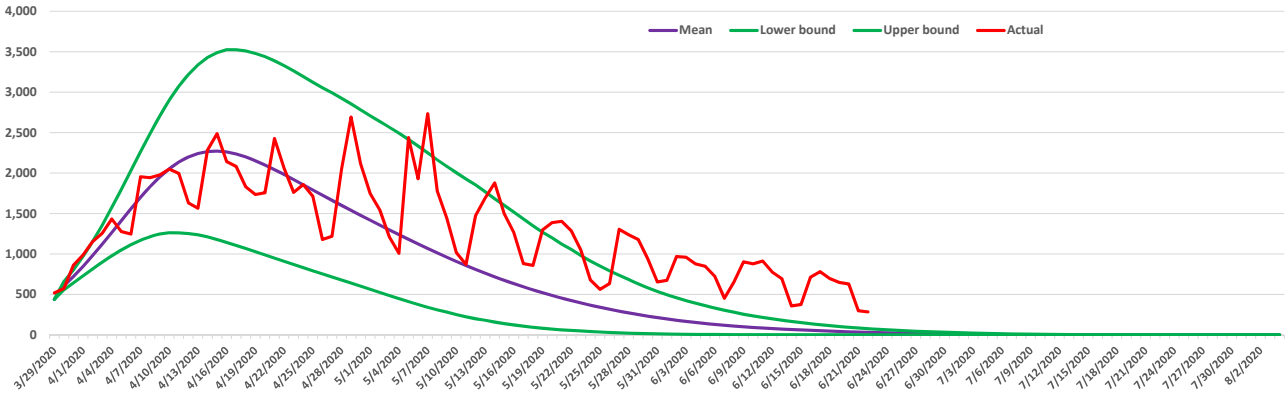
https://www.coronavirus.kdheks.gov/160/COVID-19-in-Kansas, June 23, 2020
https://www.kdheks.gov/phi/AS_Tables/AS_2018_Tables_and_Figures/general_mortality/, June 23, 2020

U.S. COVID and General Mortality by Age Group

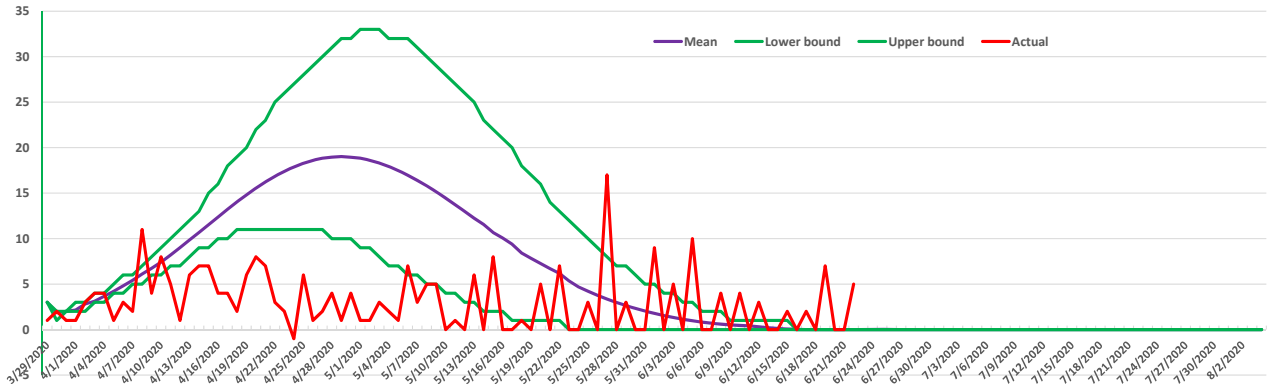
Age Group	COVID Deaths	COVID Deaths per 1000	2018 Mortality Rate per 1000
Under 1 year	8	0.00	5.67
1-14 years	18	0.00	0.17
15-24 years	125	0.00	0.74
25-34 years	699	0.02	1.33
35-44 years	1,780	0.04	1.95
45-54 years	4,976	0.12	4.02
55-64 years	12,307	0.29	8.86
65-74 years	21,462	0.72	17.91
75-84 years	27,529	1.87	44.73
85+ years	34,435	5.32	135.74

https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Sex-Age-and-S/9bhg-hcku, June 23, 2020

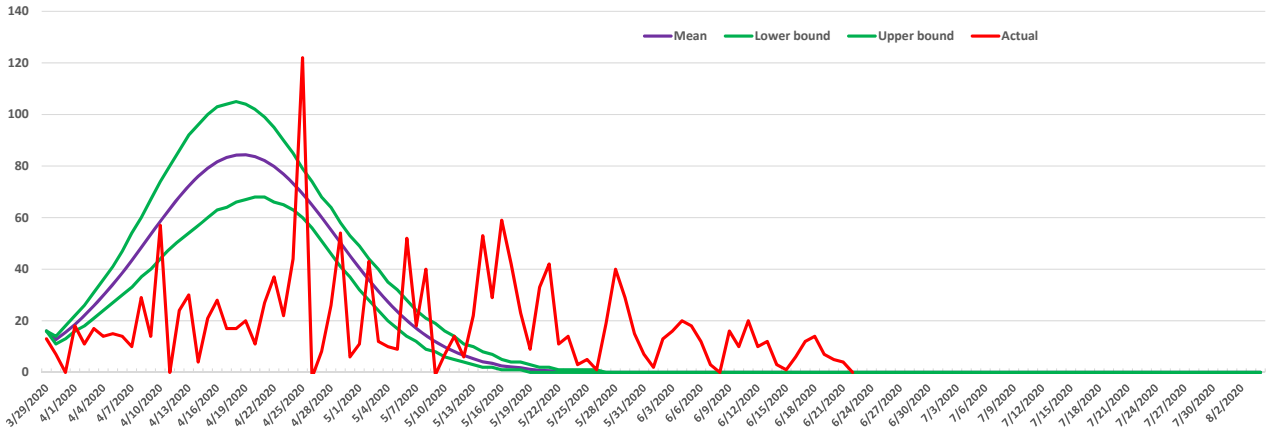
U.S. COVID 19 Daily Death Projections March 26



Kansas COVID 19 Daily Death Projections March 26



Colorado COVID 19 Daily Death Projections March 26



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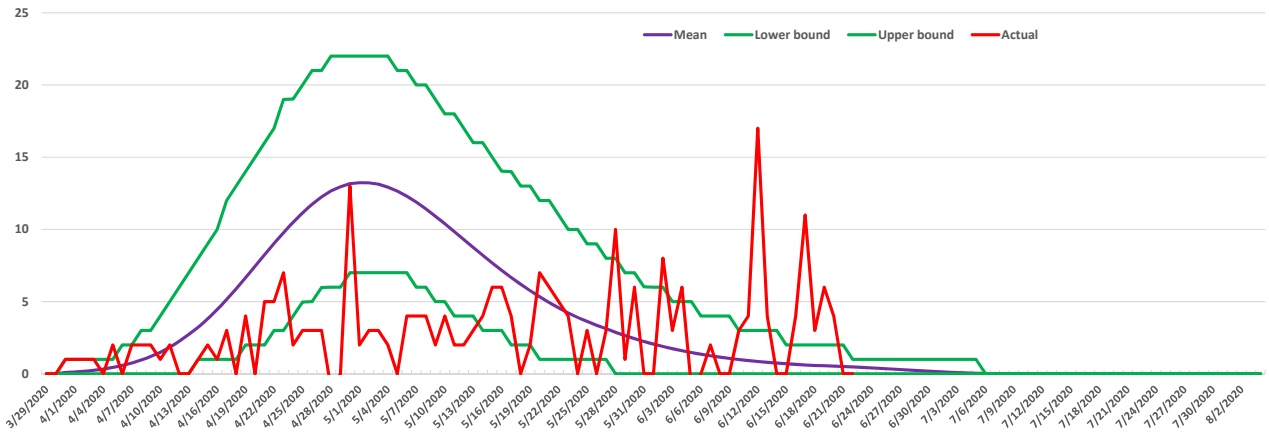
Nebraska COVID 19 Daily Death Projections March 26



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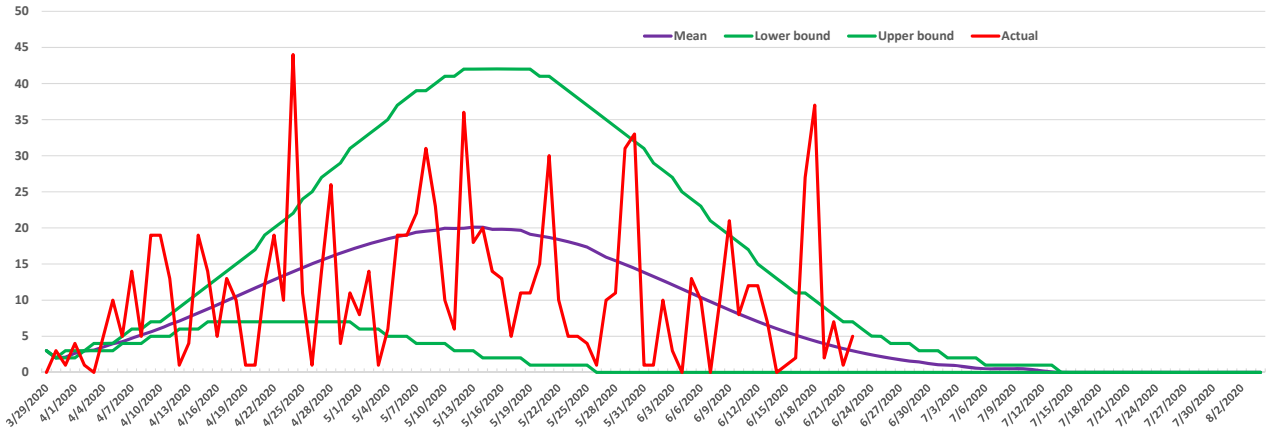
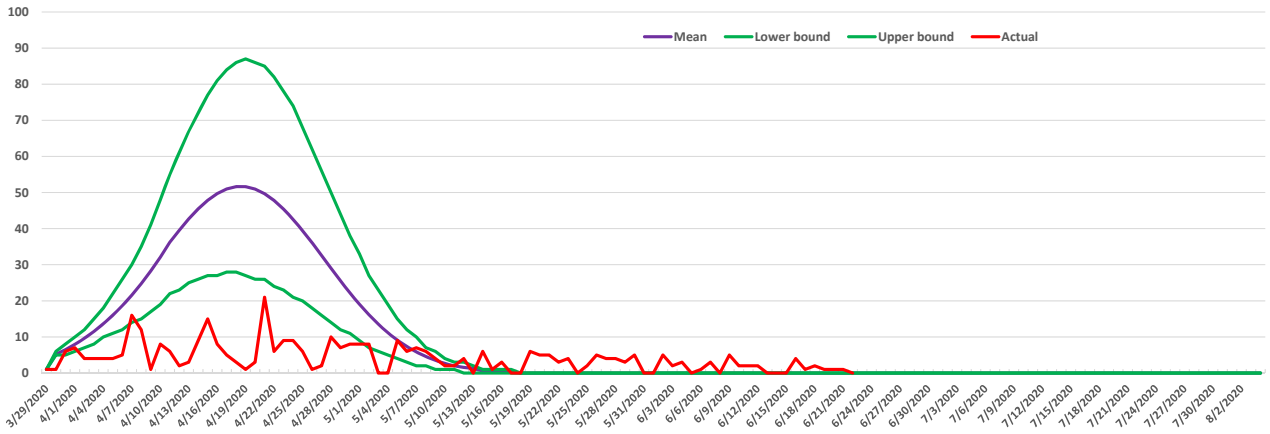
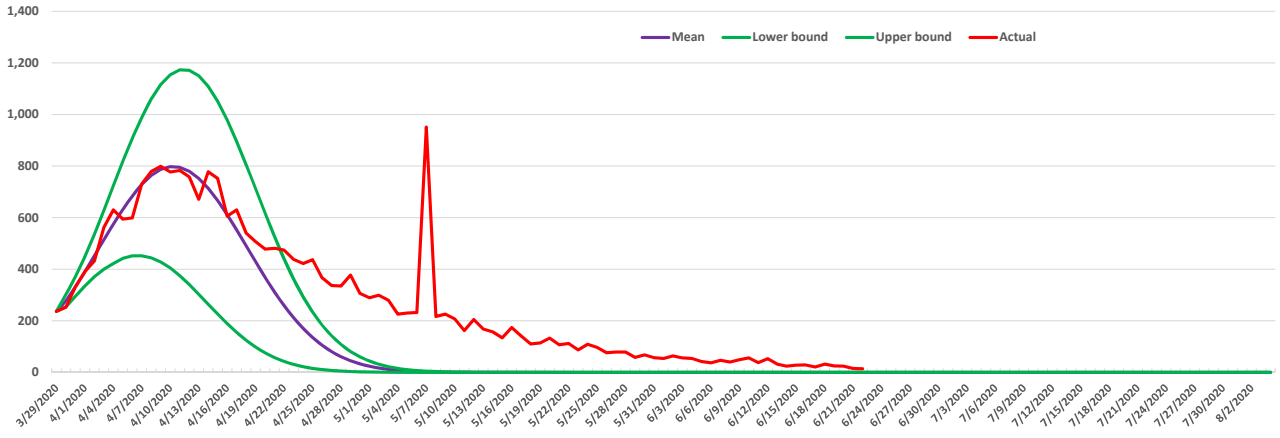
Missouri COVID 19 Daily Death Projections March 26



Oklahoma COVID 19 Daily Death Projections March 26



New York COVID 19 Daily Death Projections March 26



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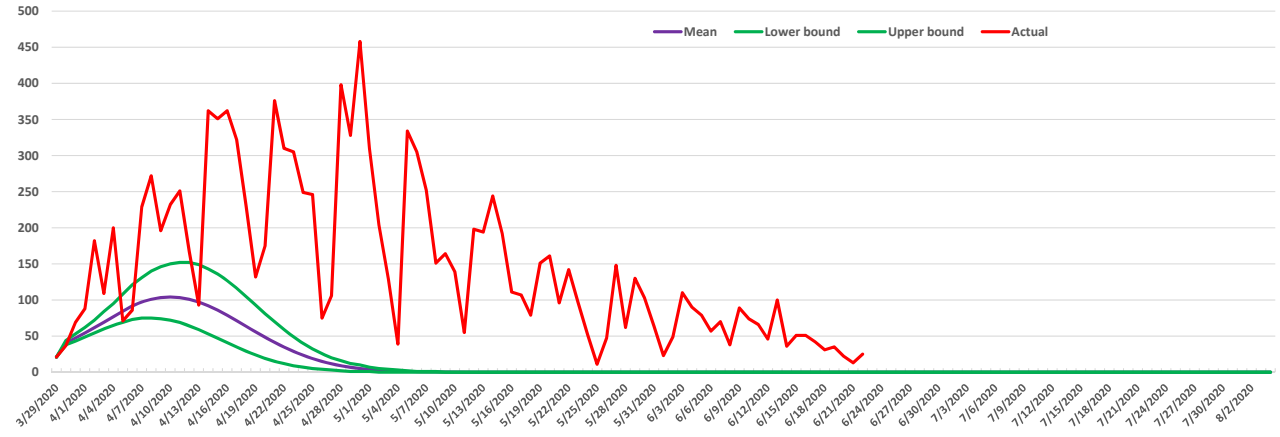
New Jersey COVID 19 Daily Death Projections March 26



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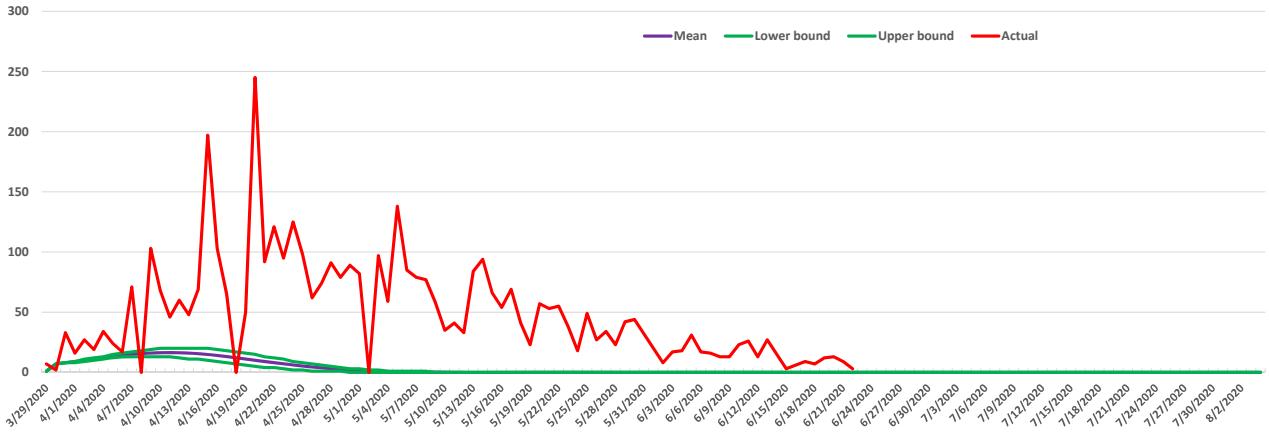
Connecticut COVID 19 Daily Death Projections March 26



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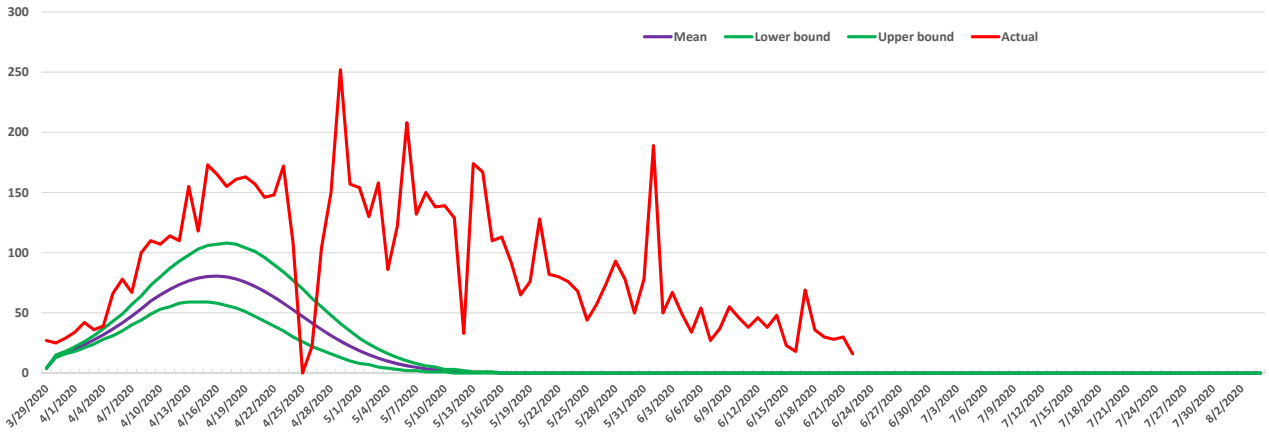

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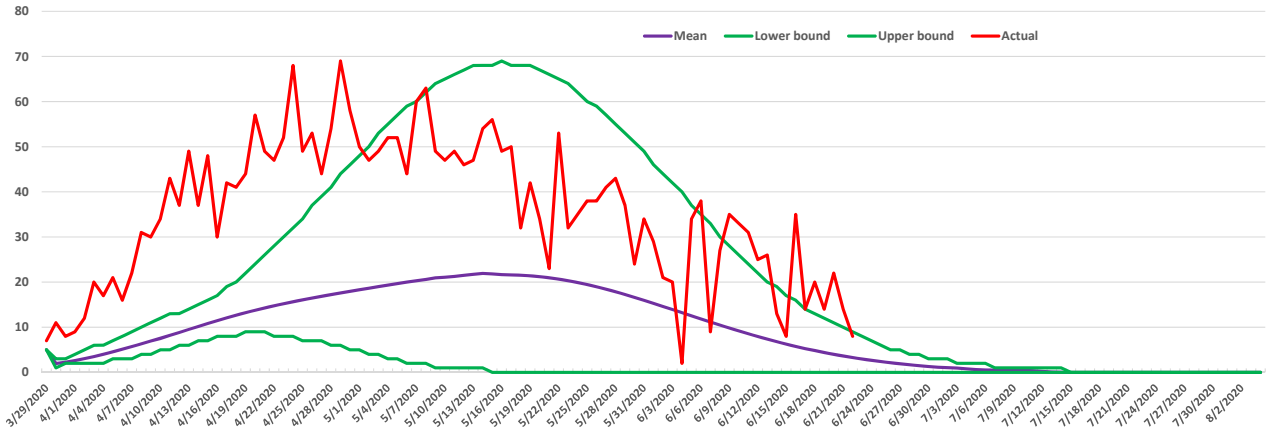

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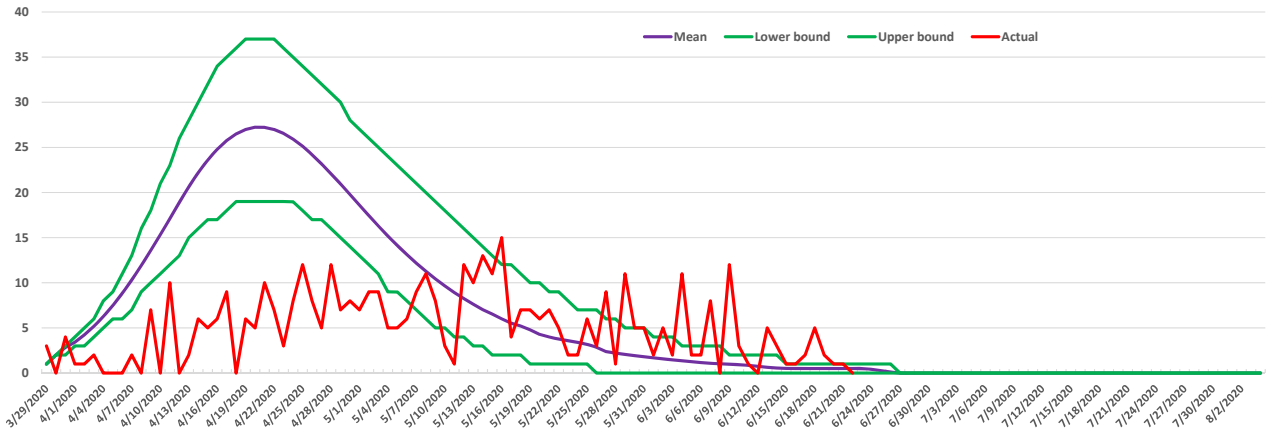
Delaware COVID 19 Daily Death Projections March 26



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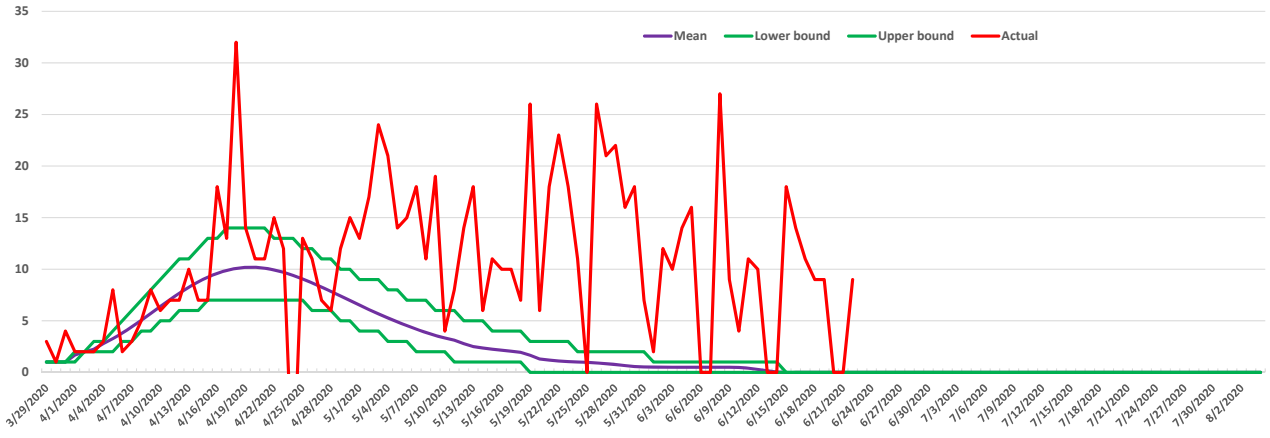
Rhode Island COVID 19 Daily Death Projections March 26



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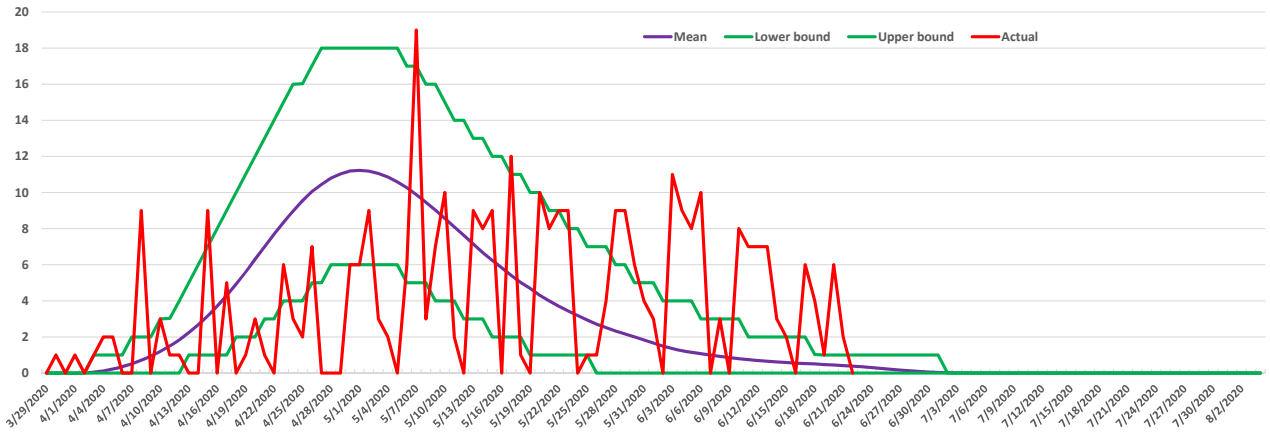
New Hampshire COVID 19 Daily Death Projections March 26



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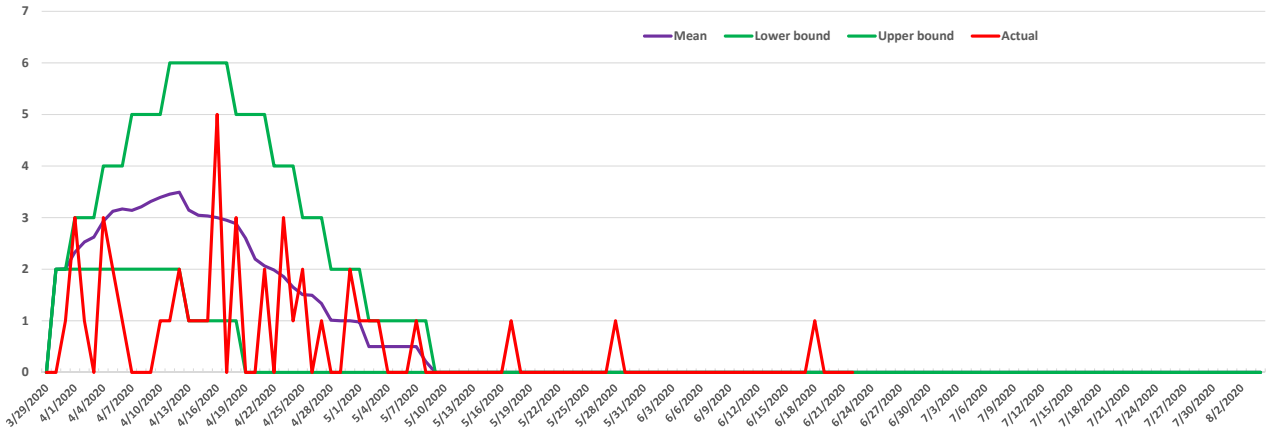
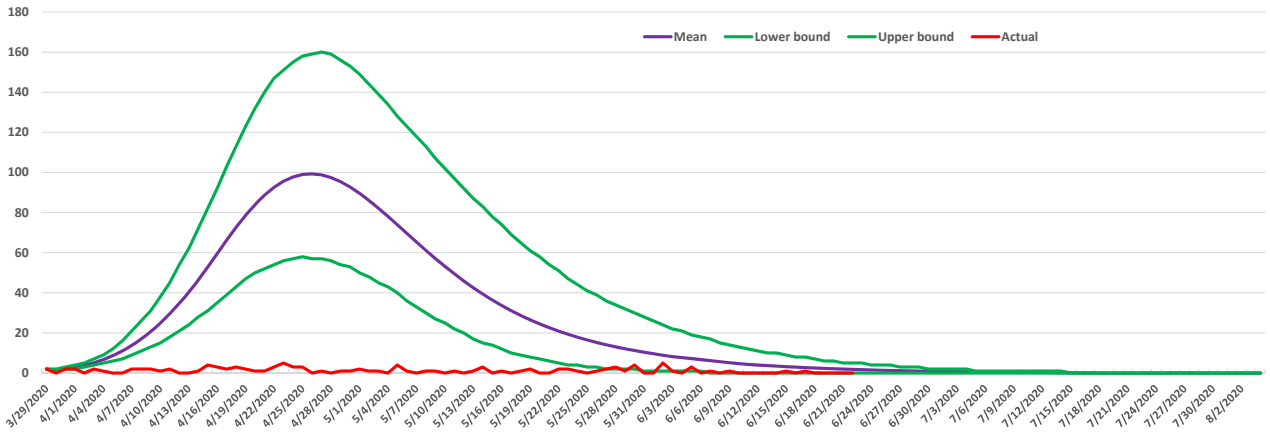
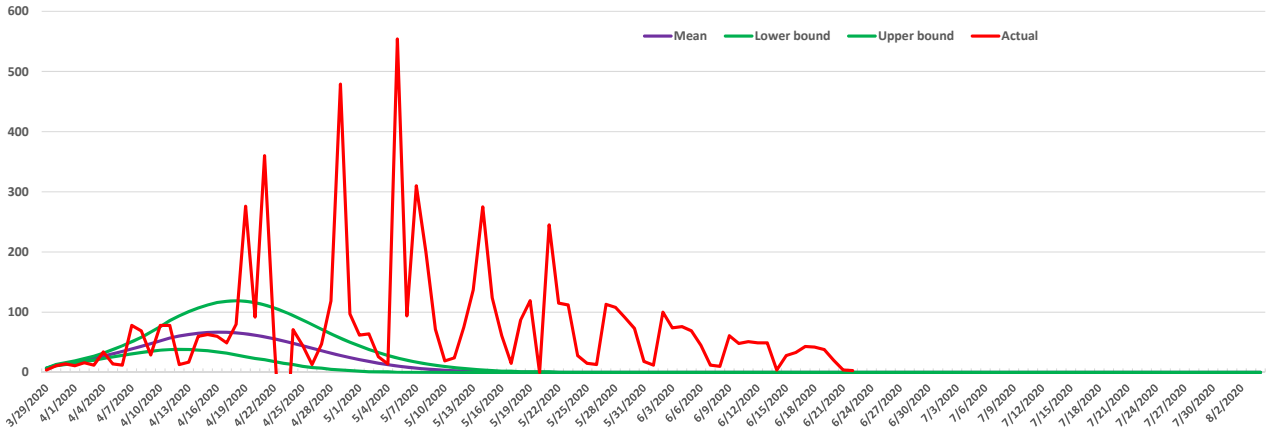
Vermont COVID 19 Daily Death Projections March 26



Maine COVID 19 Daily Death Projections March 26



Pennsylvania COVID 19 Daily Death Projections March 26



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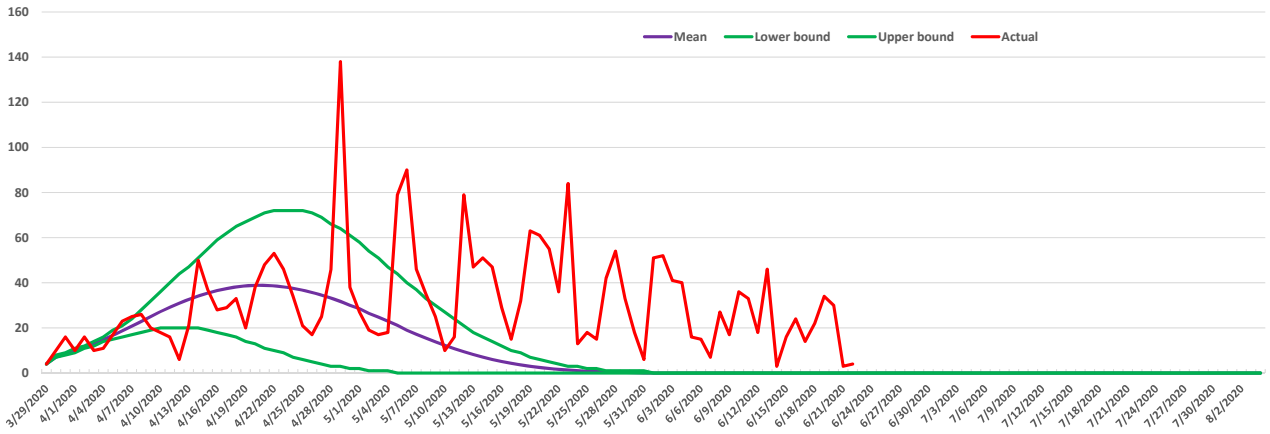
Ohio COVID 19 Daily Death Projections March 26



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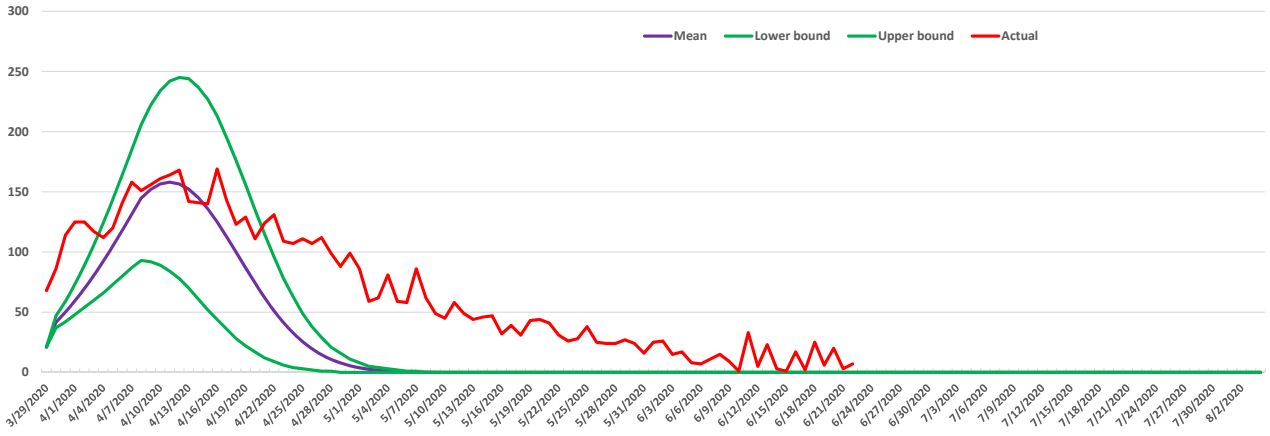
Michigan COVID 19 Daily Death Projections March 26



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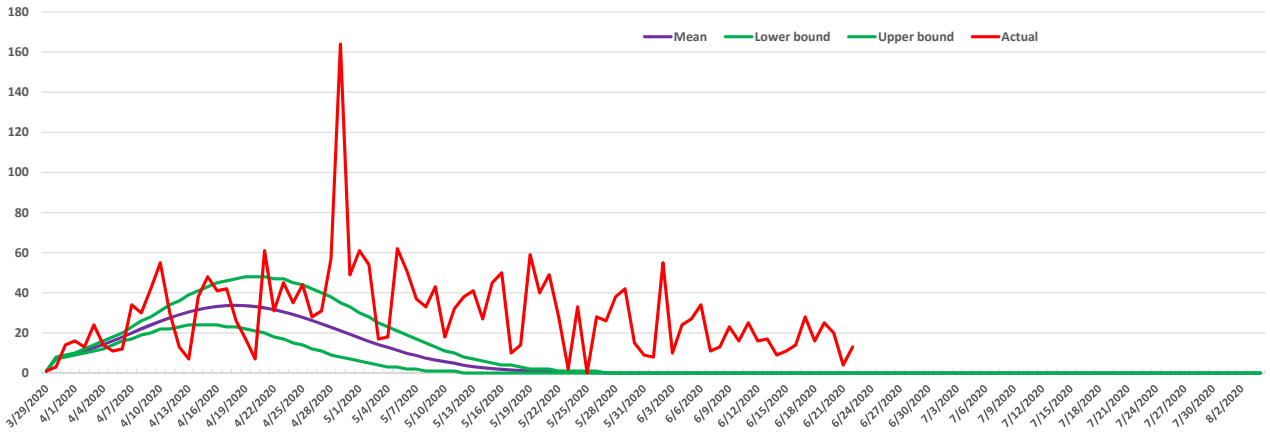
Indiana COVID 19 Daily Death Projections March 26



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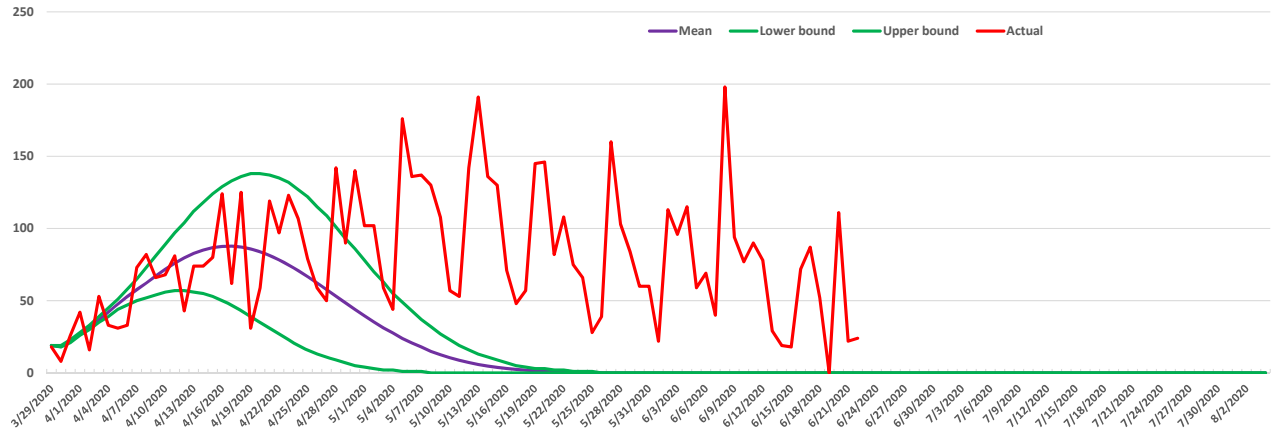
Illinois COVID 19 Daily Death Projections March 26



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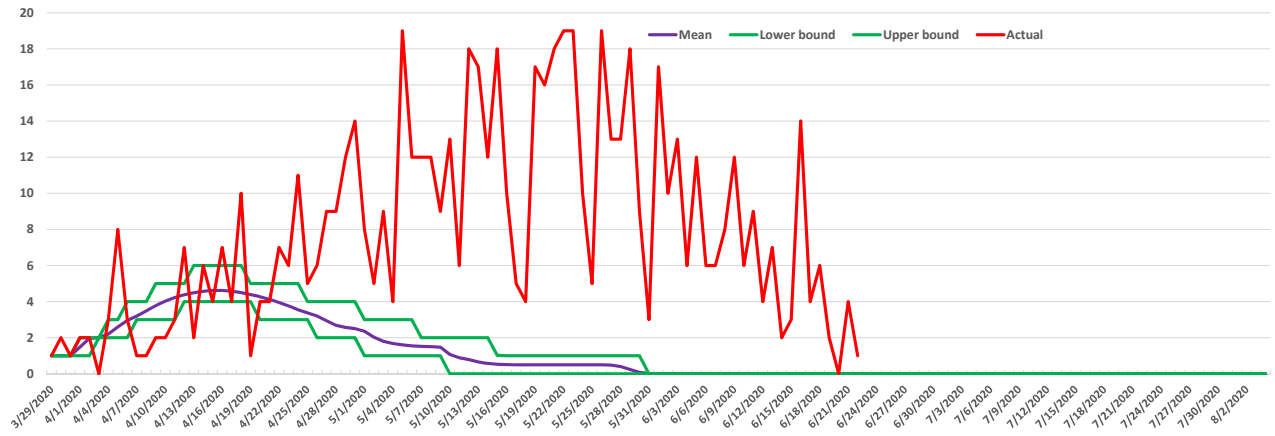
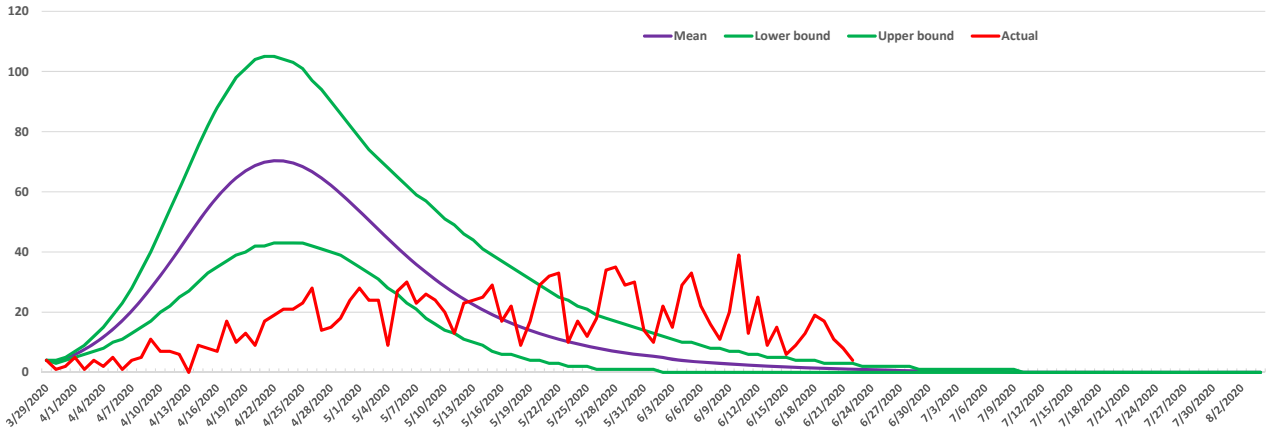


Minnesota COVID 19 Daily Death Projections March 26



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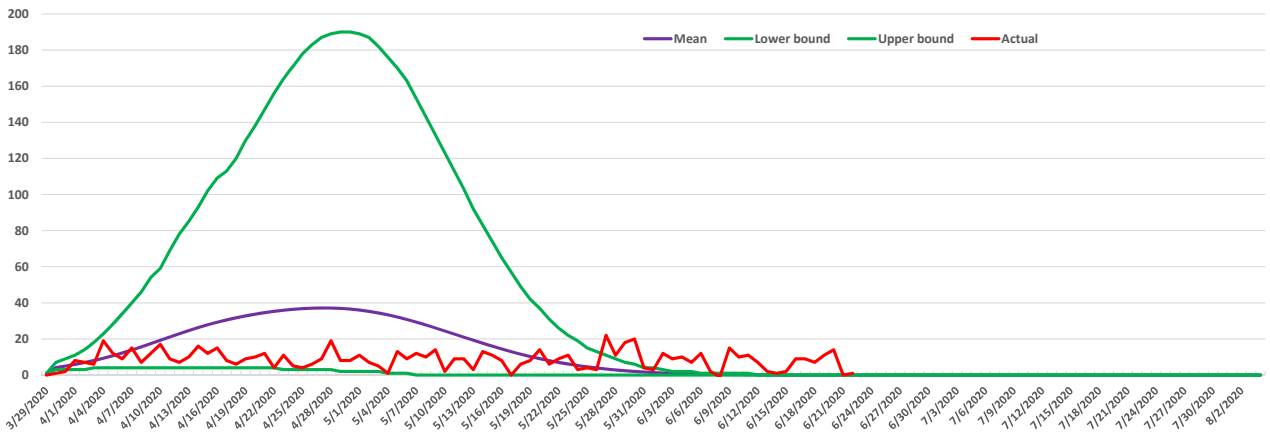
Wisconsin COVID 19 Daily Death Projections March 26



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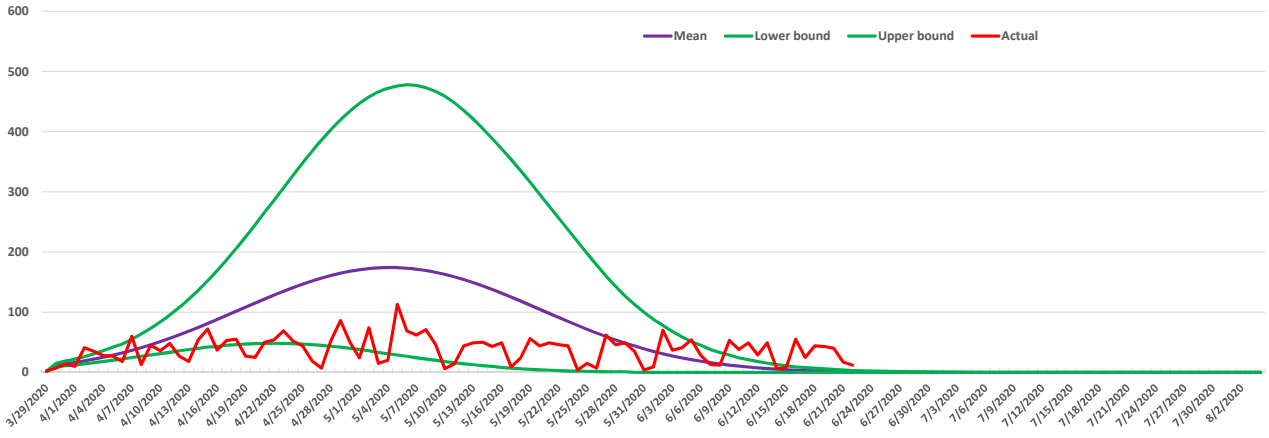
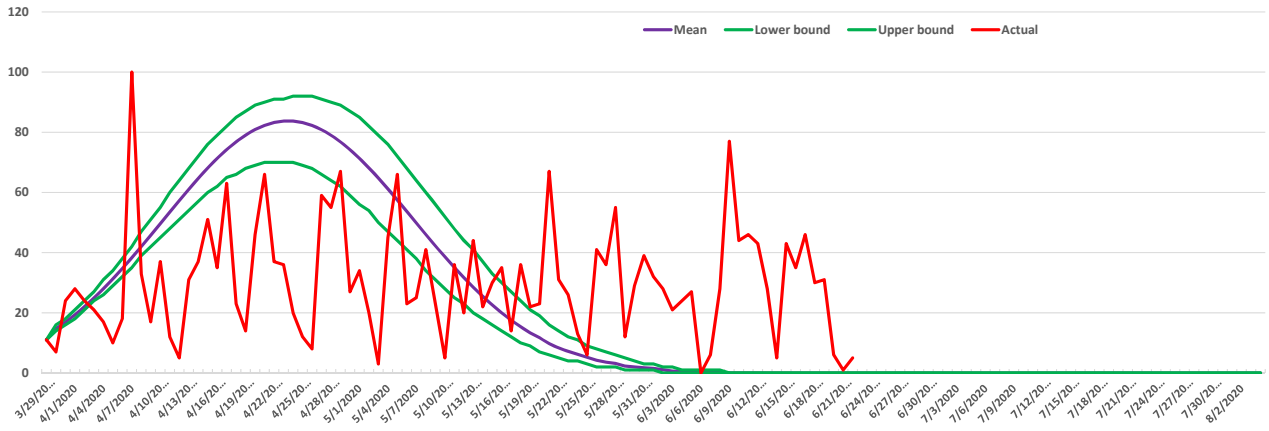
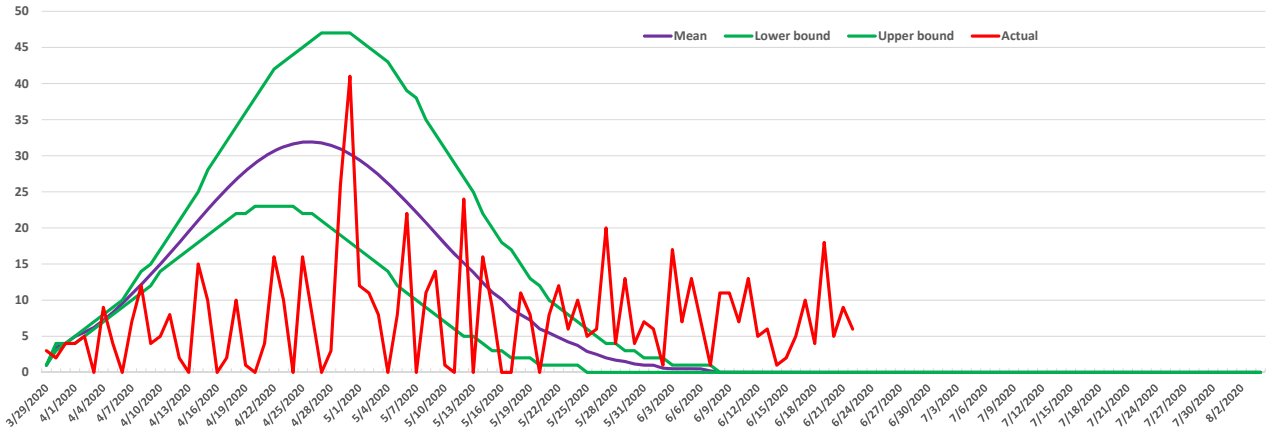
Florida COVID 19 Daily Death Projections March 26



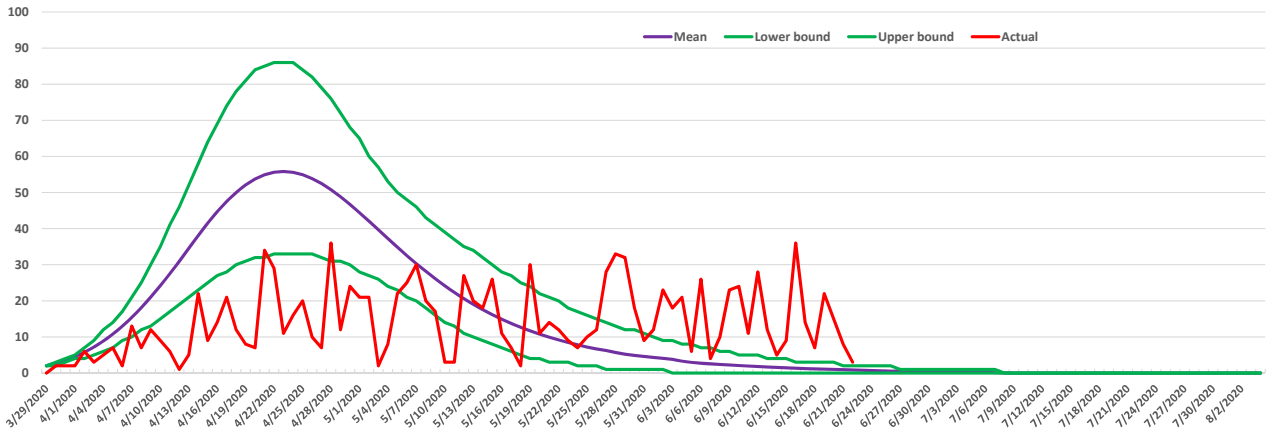
Georgia COVID 19 Daily Death Projections March 26



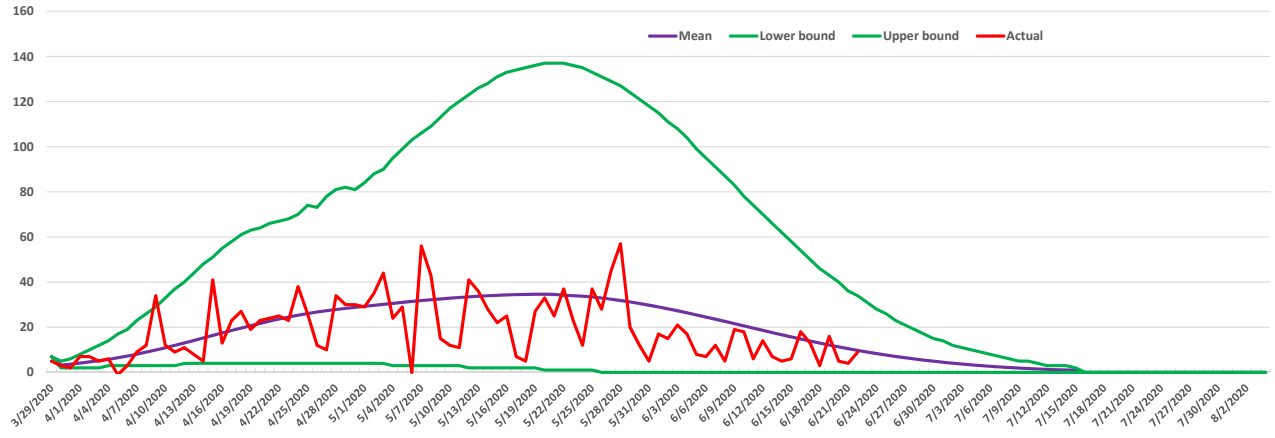
South Carolina COVID 19 Daily Death Projections March 26



North Carolina COVID 19 Daily Death Projections March 26



Virginia COVID 19 Daily Death Projections March 26



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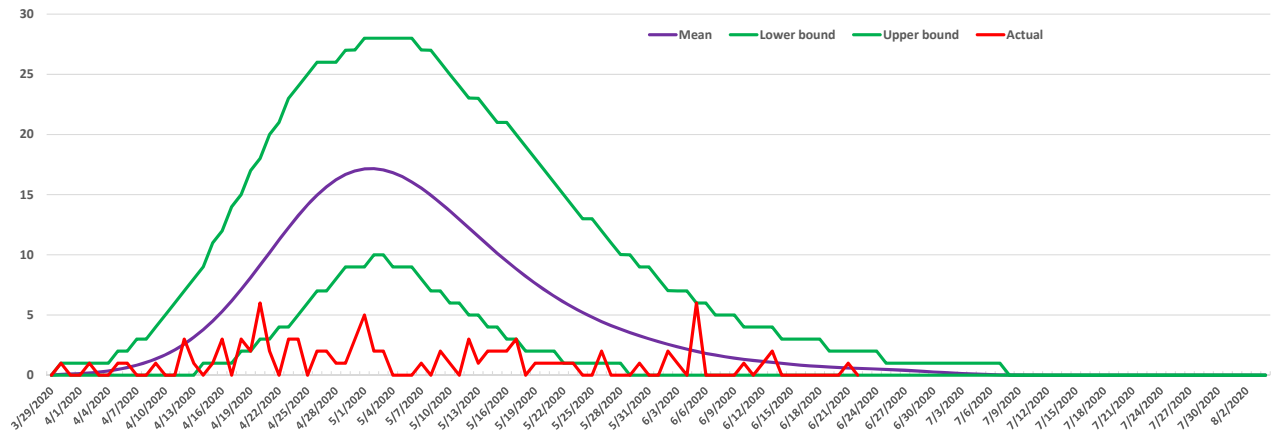
West Virginia COVID 19 Daily Death Projections March 26



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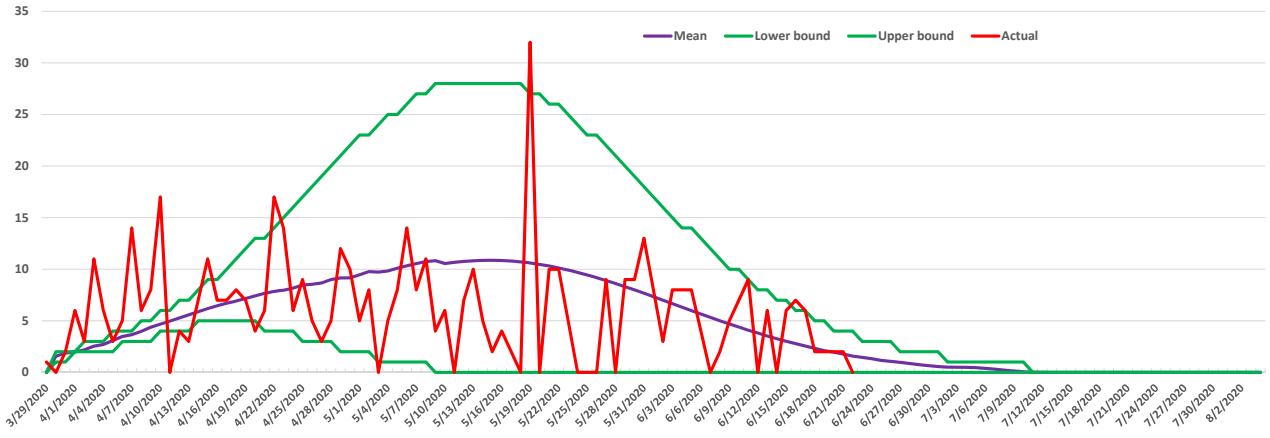
Kentucky COVID 19 Daily Death Projections March 26



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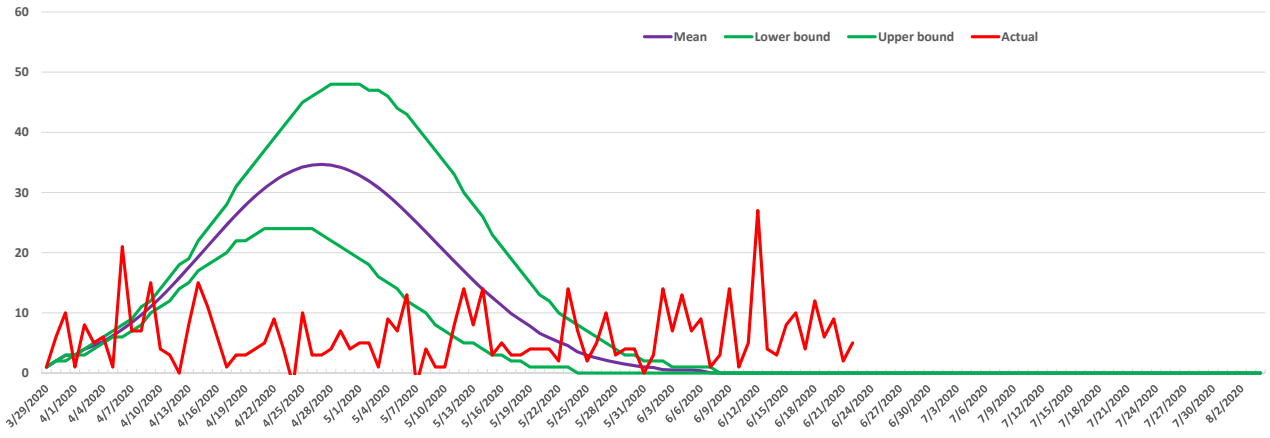
Tennessee COVID 19 Daily Death Projections March 26



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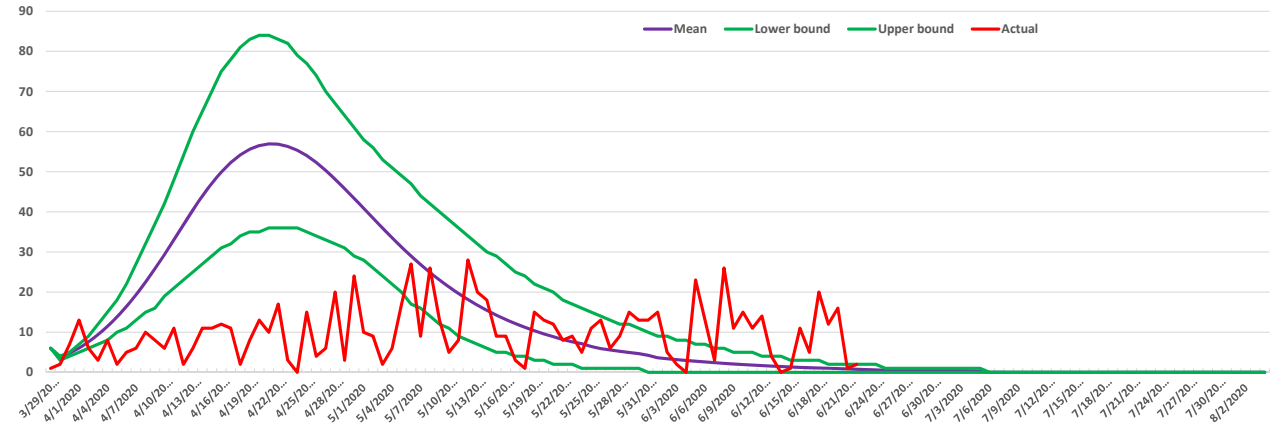
Alabama COVID 19 Daily Death Projections March 26



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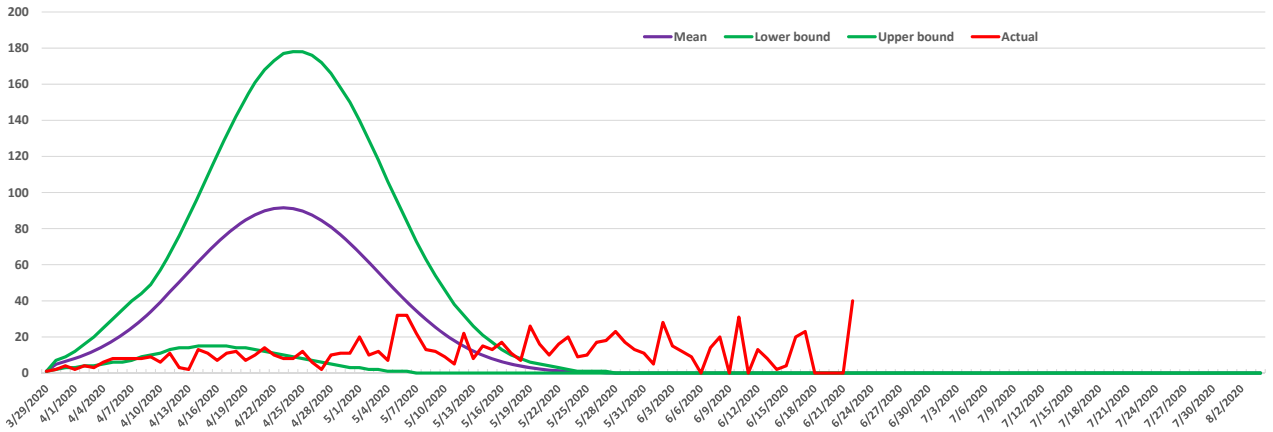
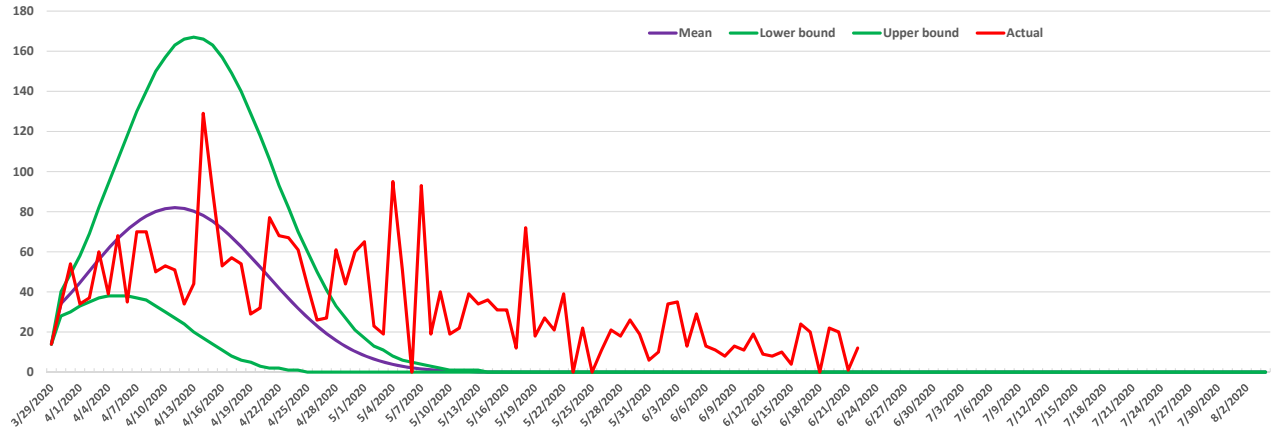


Louisiana COVID 19 Daily Death Projections March 26



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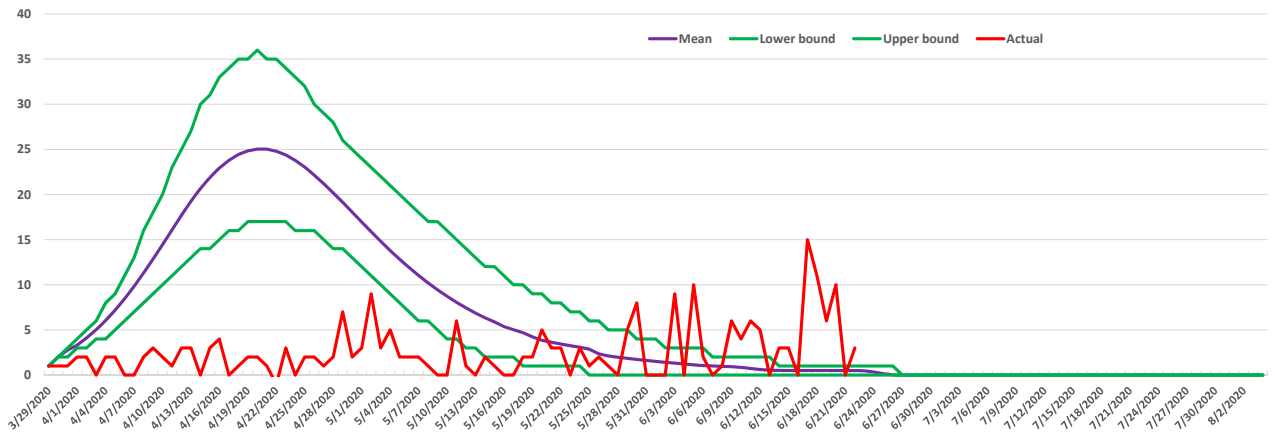
Arkansas COVID 19 Daily Death Projections March 26



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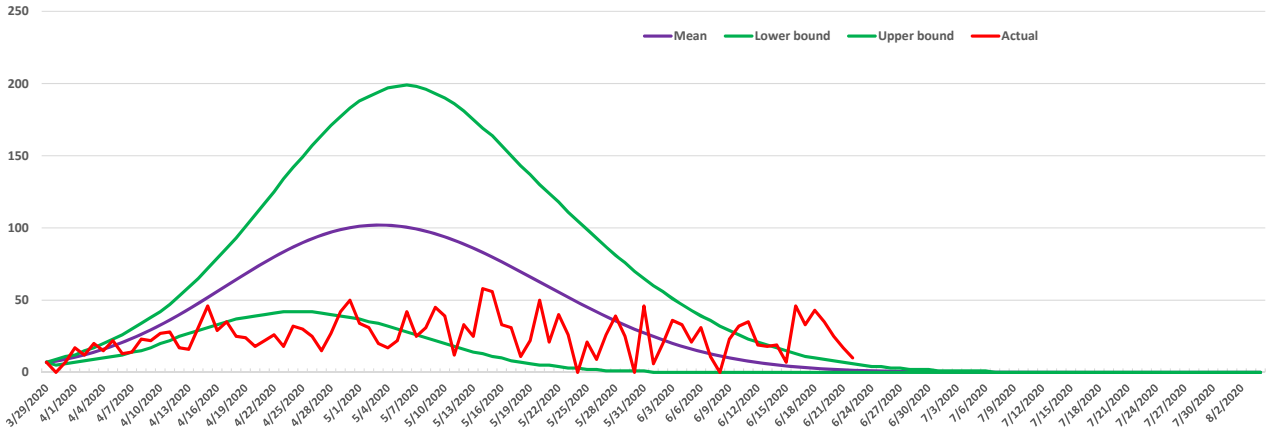
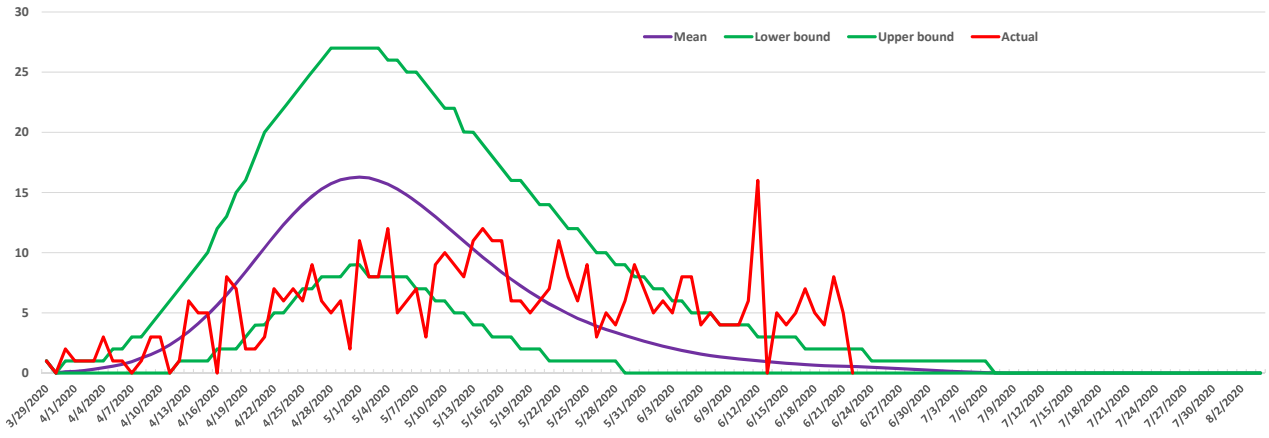
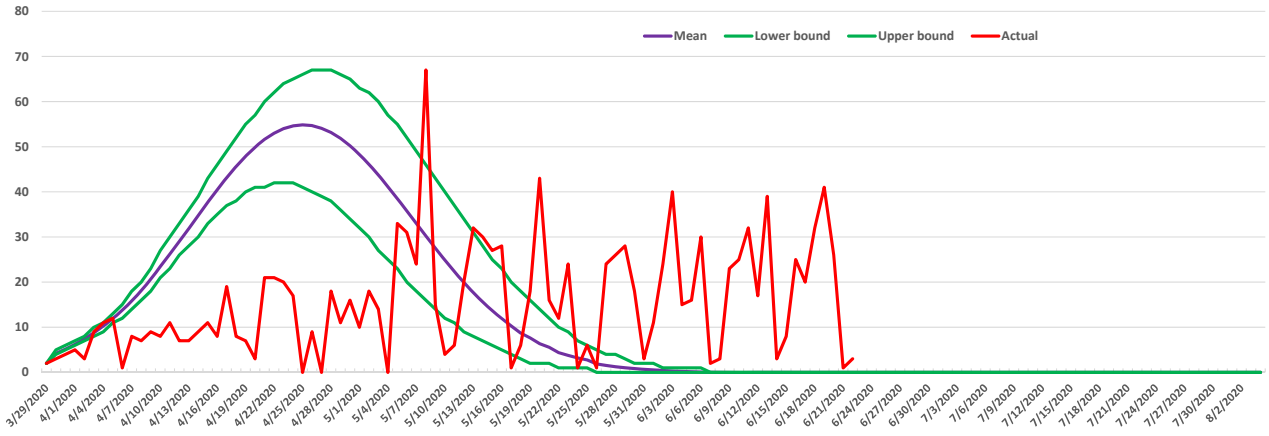
Texas COVID 19 Daily Death Projections March 26



New Mexico COVID 19 Daily Death Projections March 26



Arizona COVID 19 Daily Death Projections March 26



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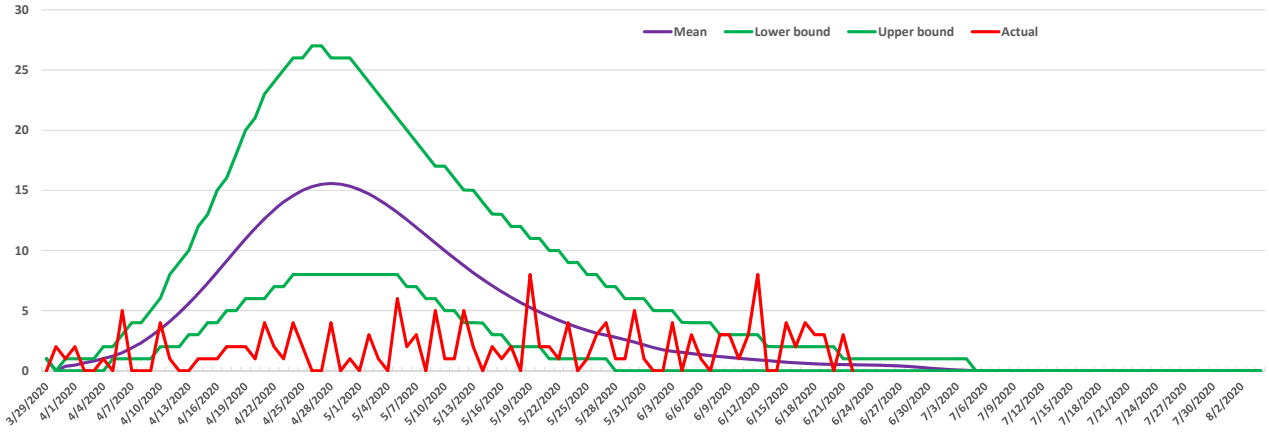
Utah COVID 19 Daily Death Projections March 26



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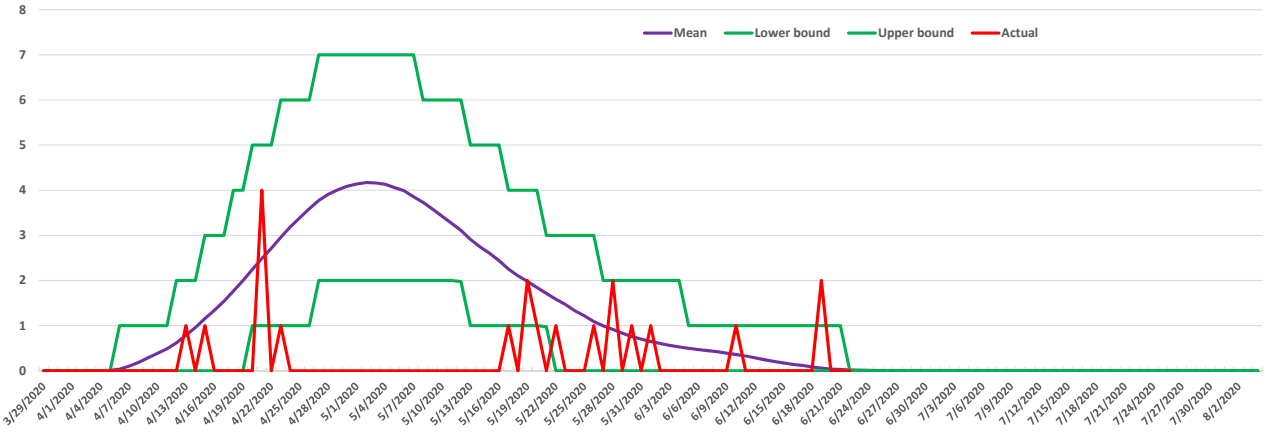
Wyoming COVID 19 Daily Death Projections March 26



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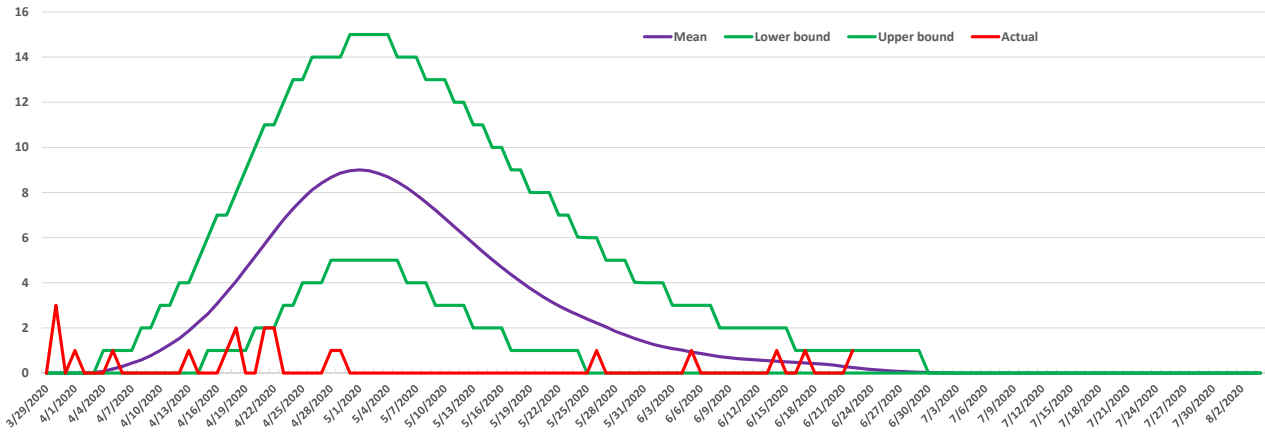
Montana COVID 19 Daily Death Projections March 26



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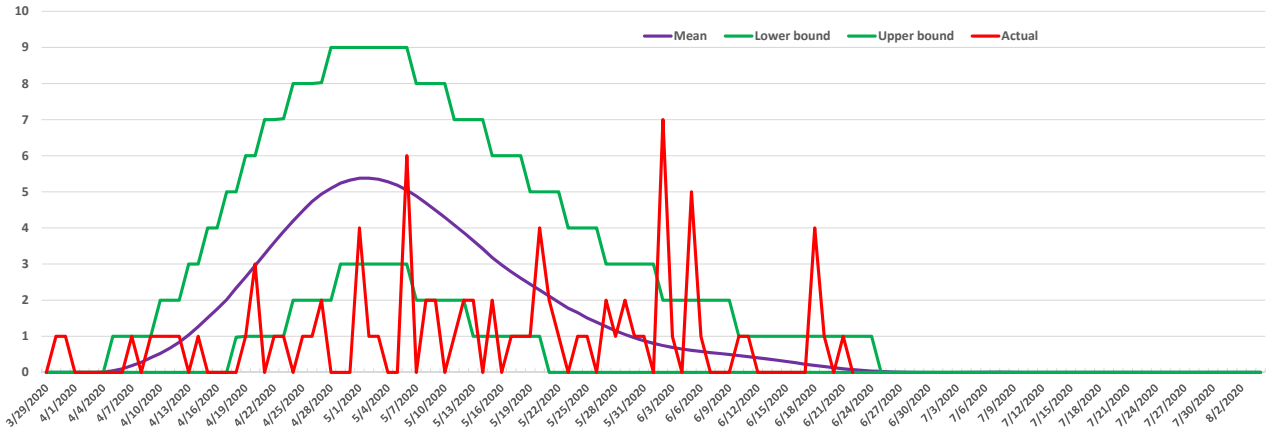
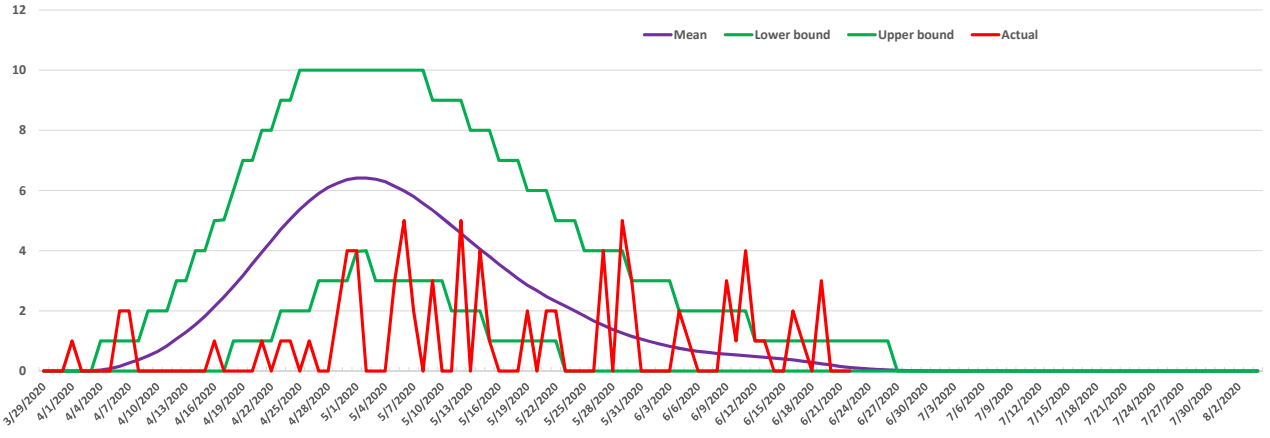
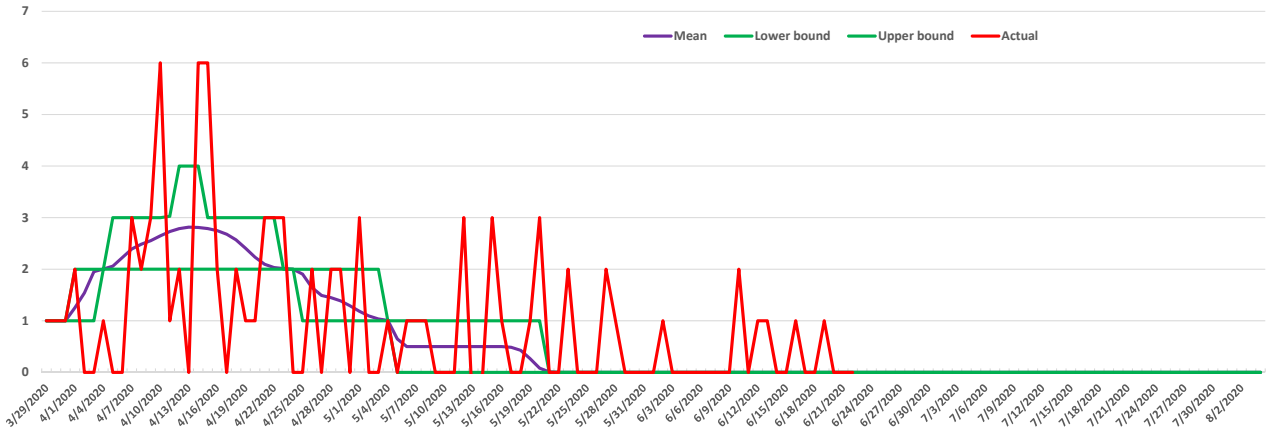
North Dakota COVID 19 Daily Death Projections March 26



South Dakota COVID 19 Daily Death Projections March 26



Idaho COVID 19 Daily Death Projections March 26



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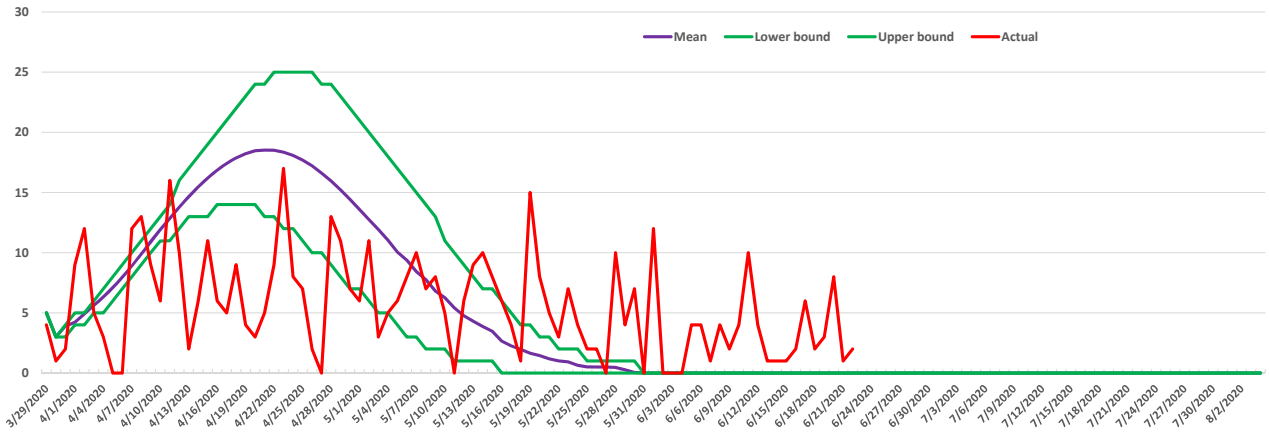
Nevada COVID 19 Daily Death Projections March 26



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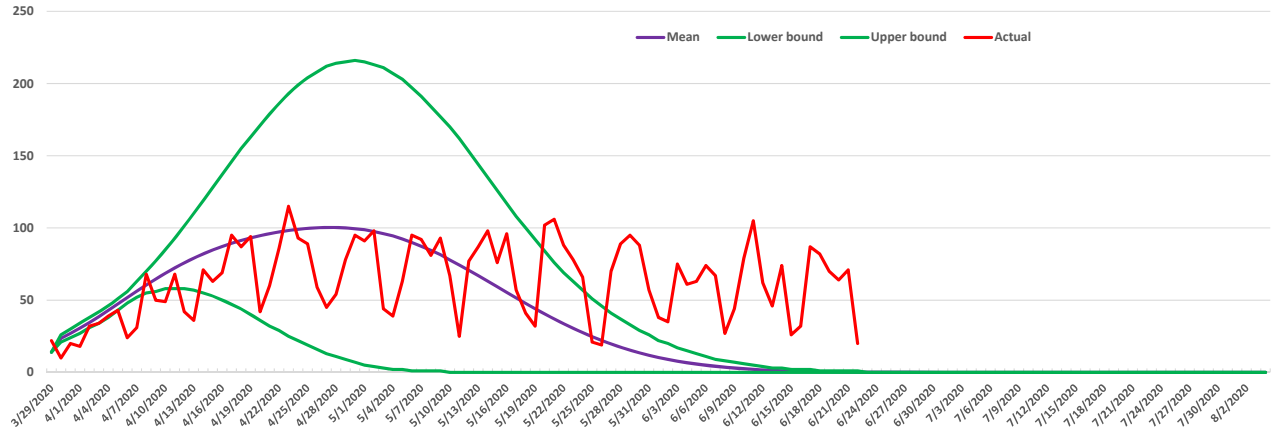
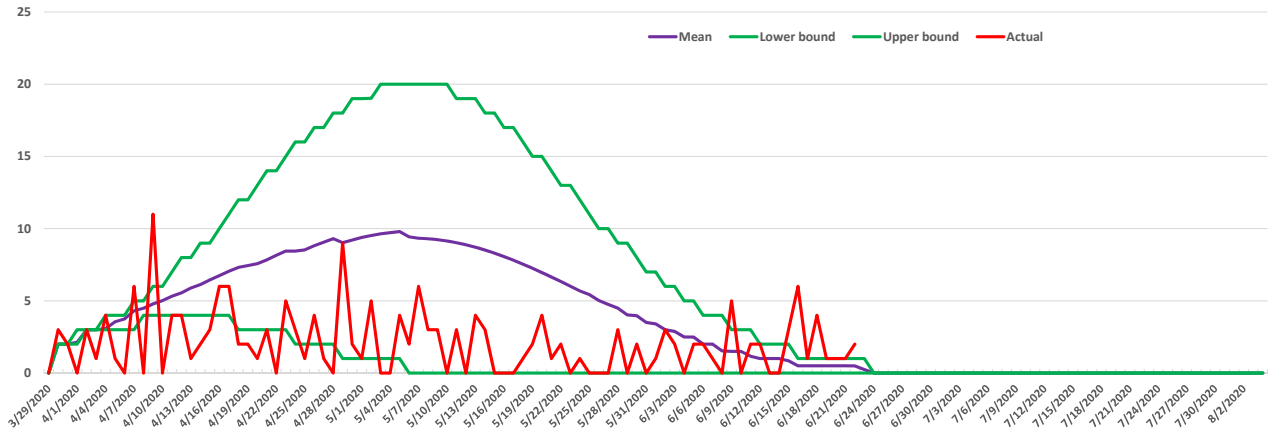
California COVID 19 Daily Death Projections March 26



Oregon COVID 19 Daily Death Projections March 26



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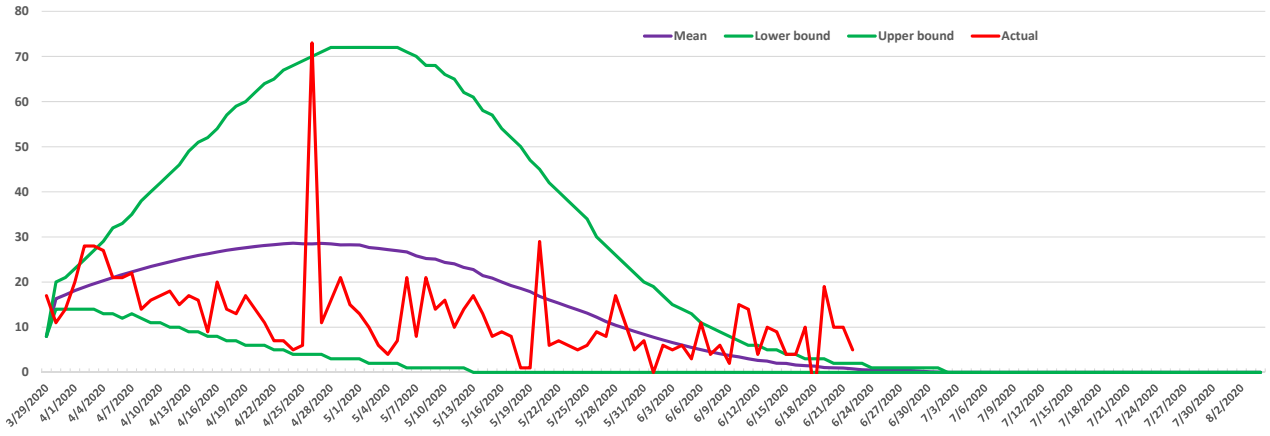

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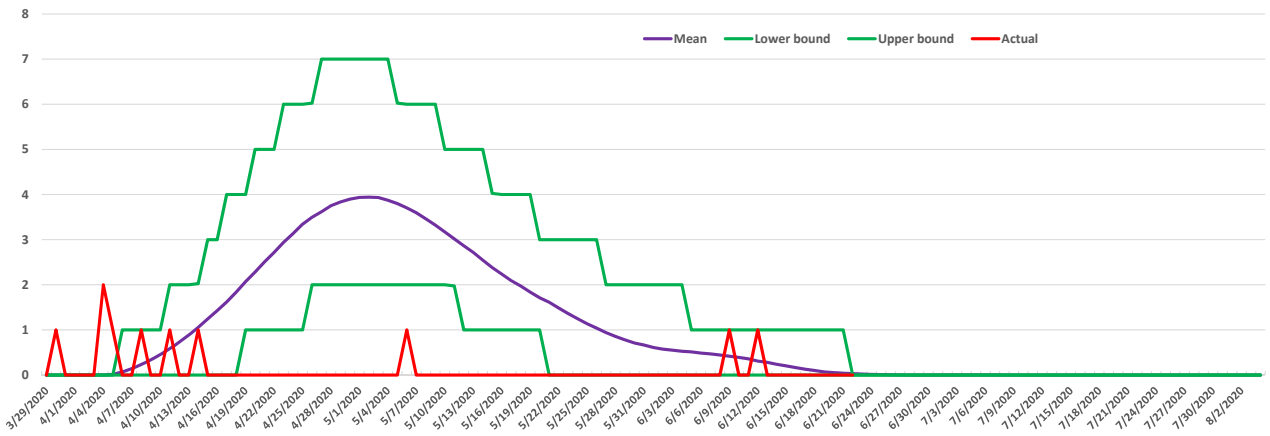
Alaska COVID 19 Daily Death Projections March 26



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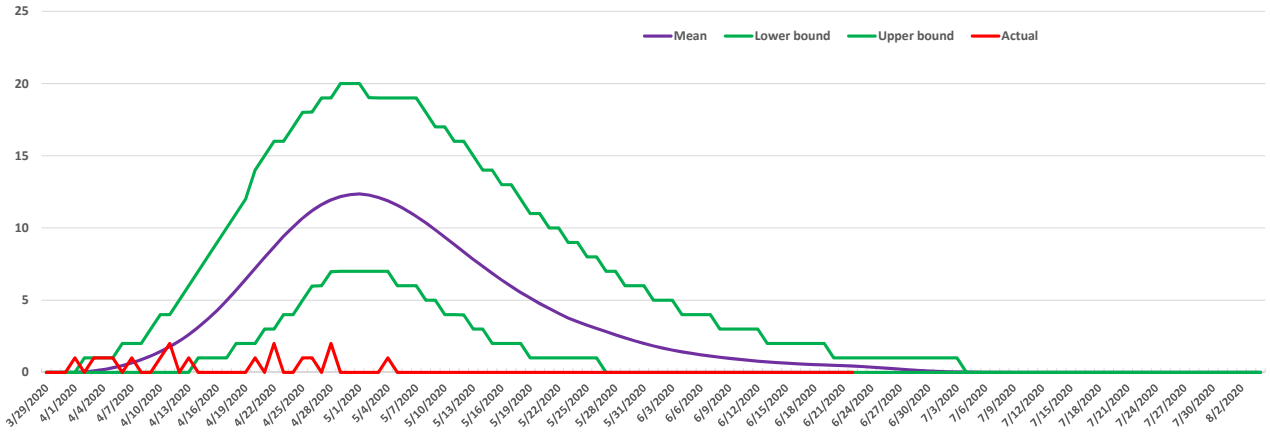
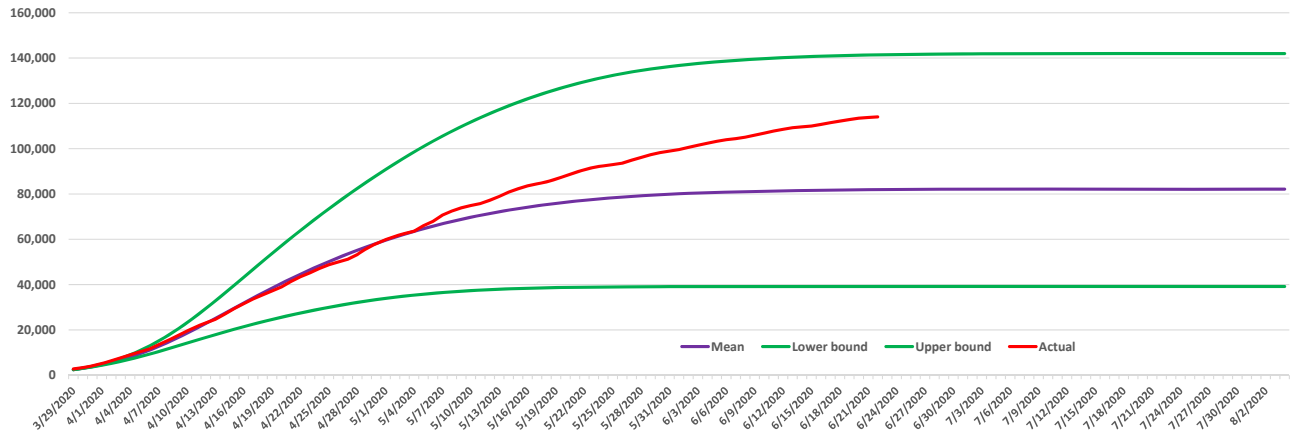
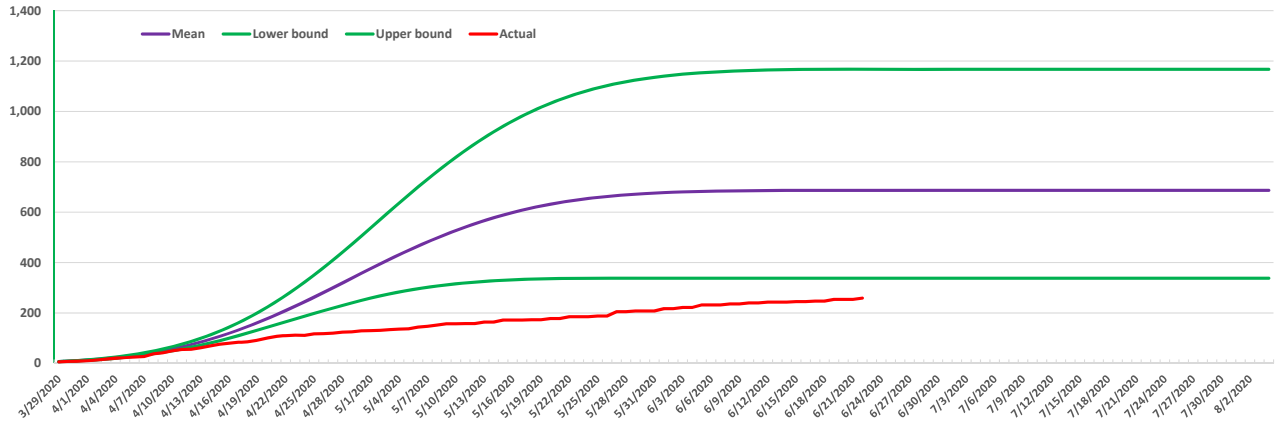
Hawaii COVID 19 Daily Death Projections March 26



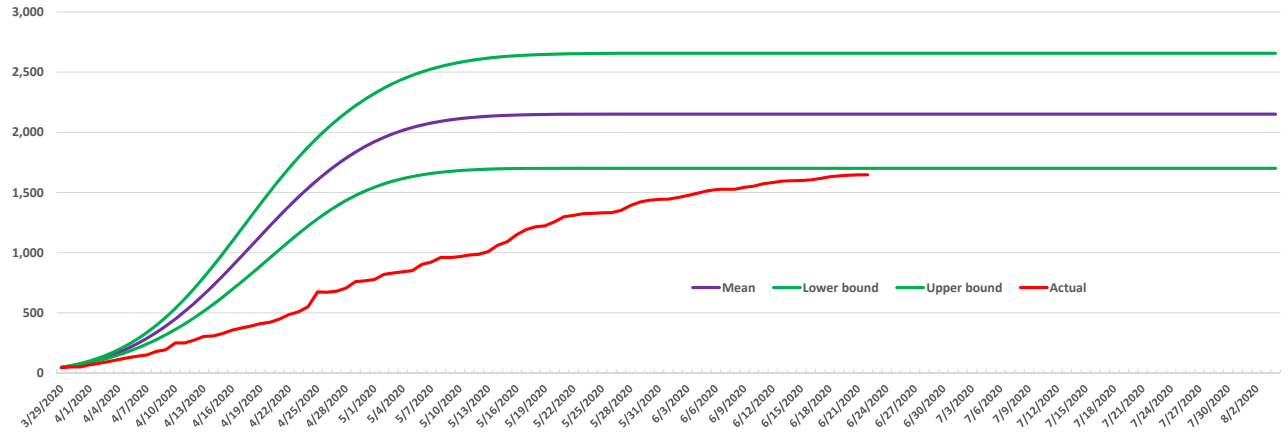
U.S. COVID 19 Cumulative Death Projections



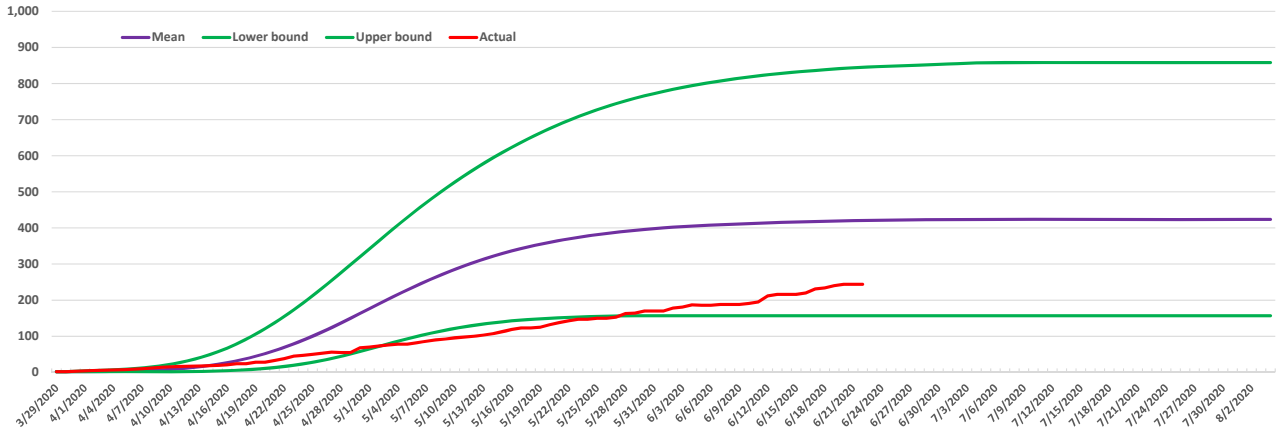
Kansas COVID 19 Cumulative Death Projections



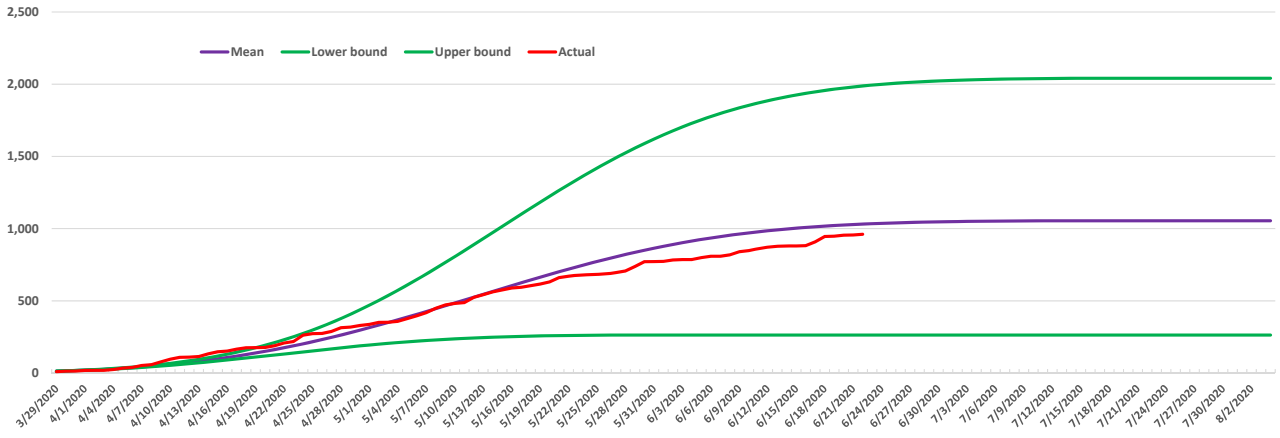
Colorado COVID 19 Cumulative Death Projections March 26



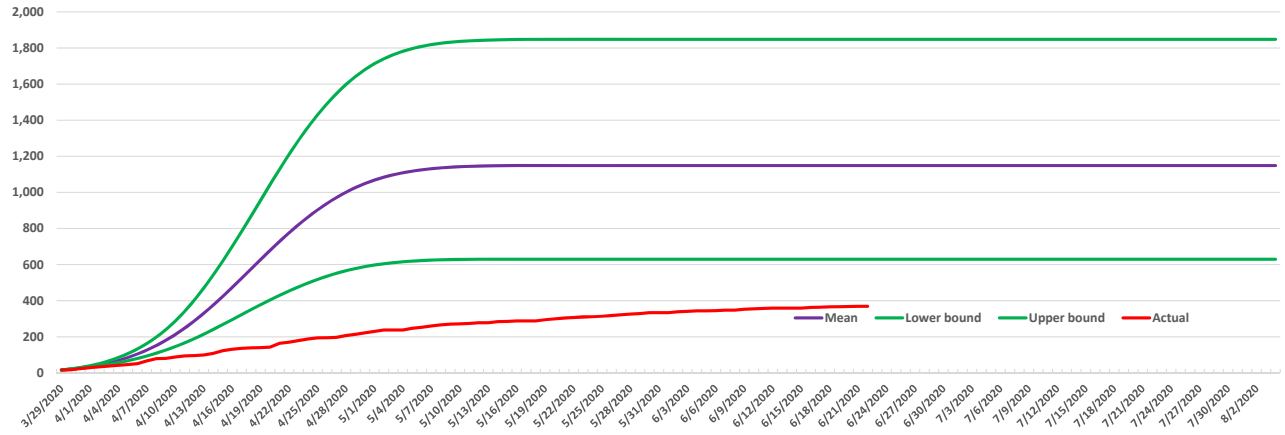
Nebraska COVID 19 Daily Death Projections March 26



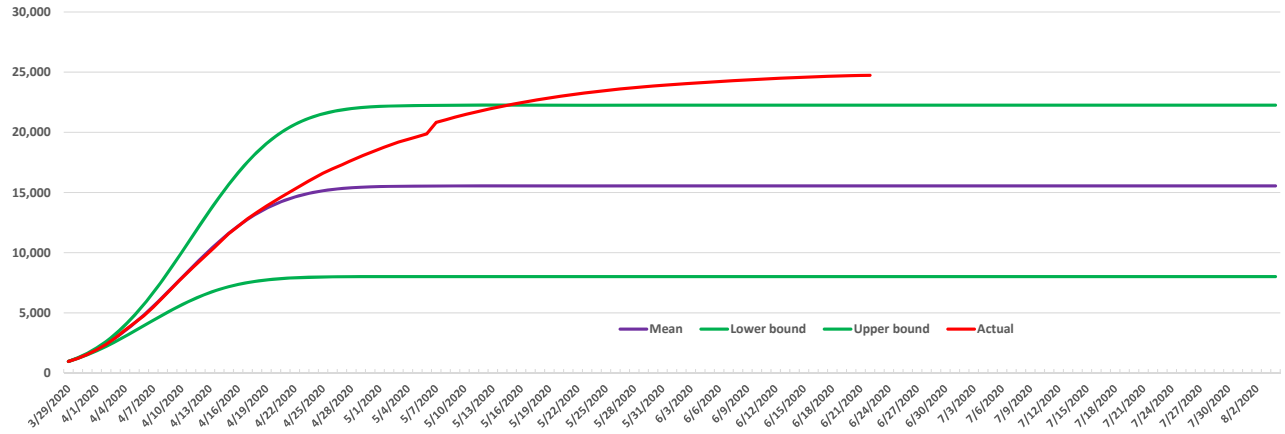
Missouri COVID 19 Cumulative Death Projections March 26



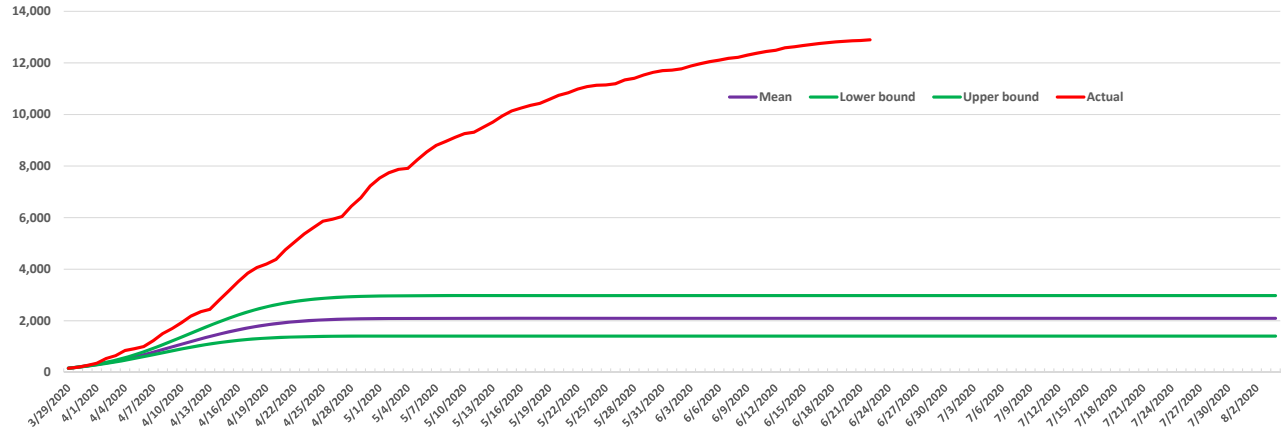
Oklahoma COVID 19 Daily Death Projections March 26



New York COVID 19 Cumulative Death Projections



New Jersey COVID 19 Cumulative Death Projections



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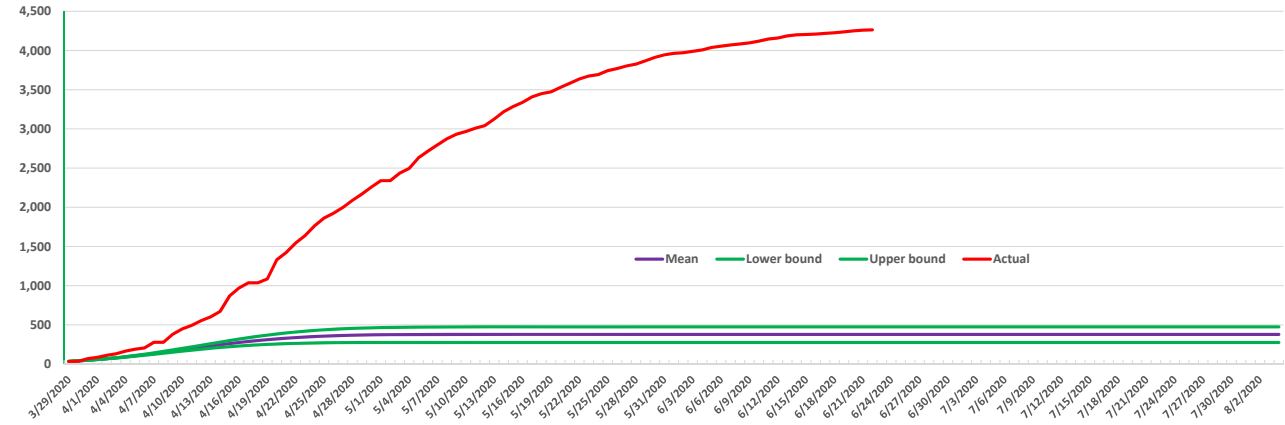
Connecticut COVID 19 Cumulative Death Projections



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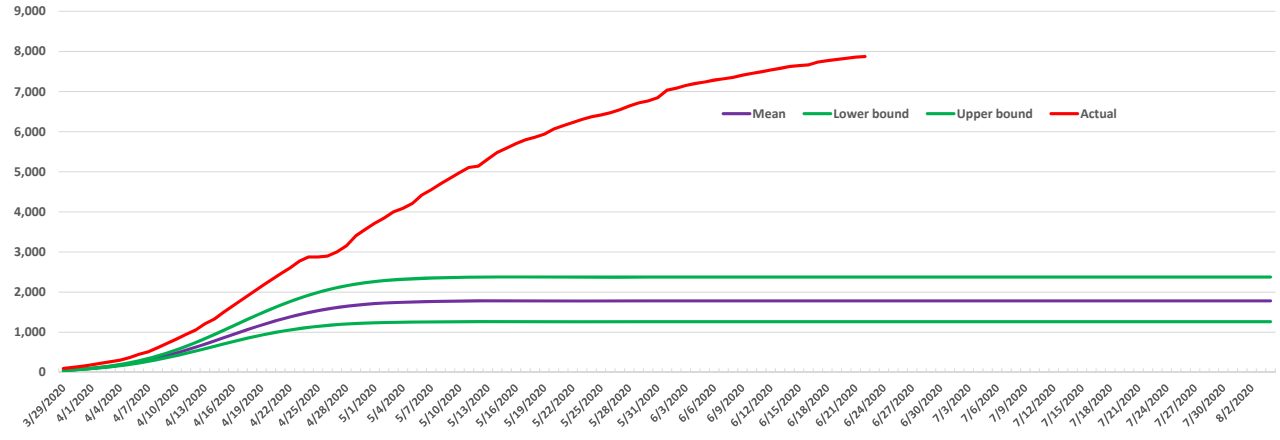
Massachusetts COVID 19 Cumulative Death Projections



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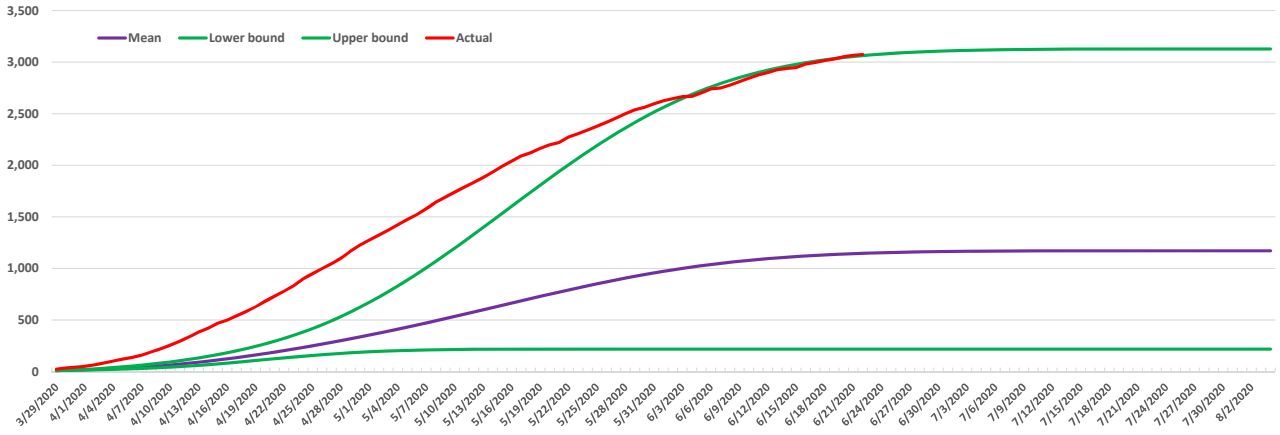
Maryland COVID 19 Daily Death Projections March 26



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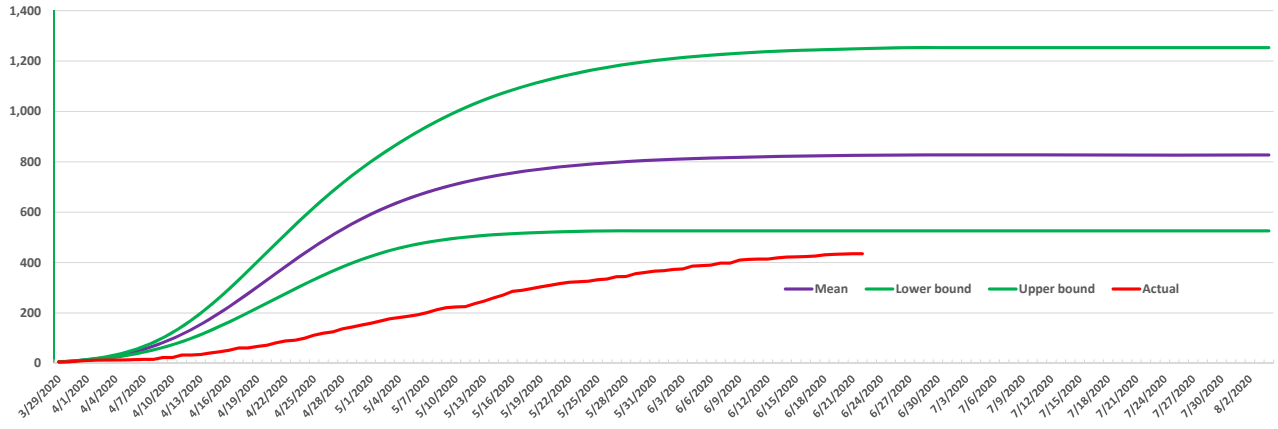
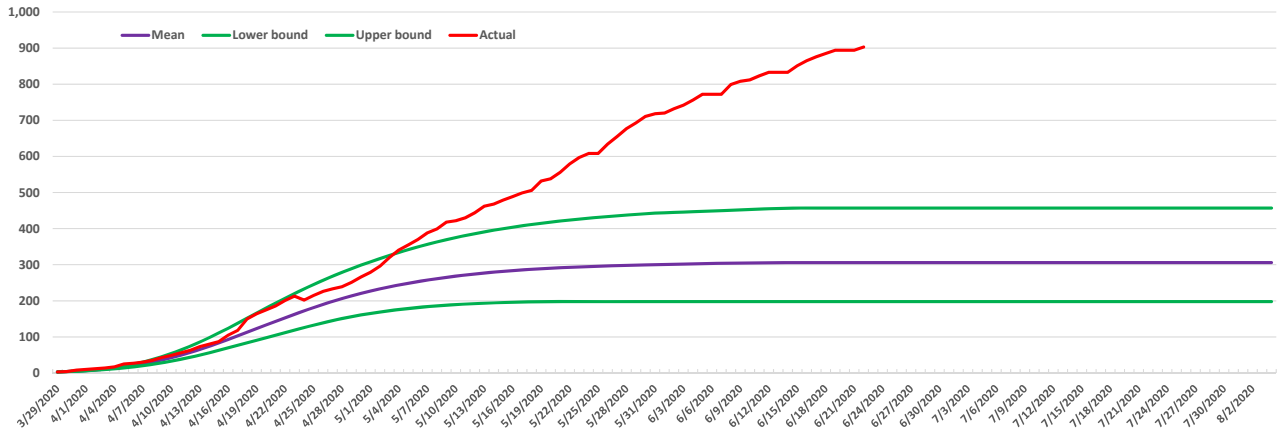
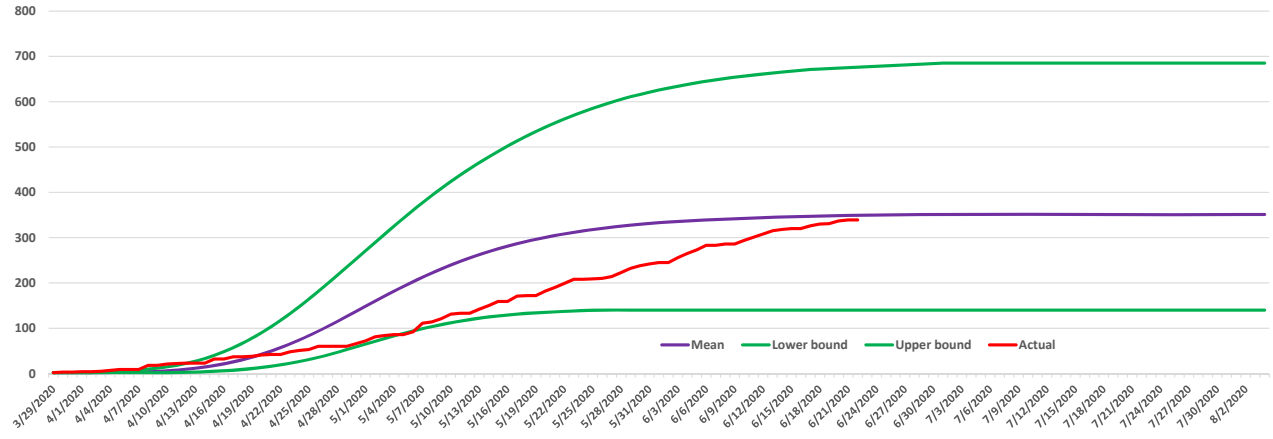
Delaware COVID 19 Cumulative Death Projections



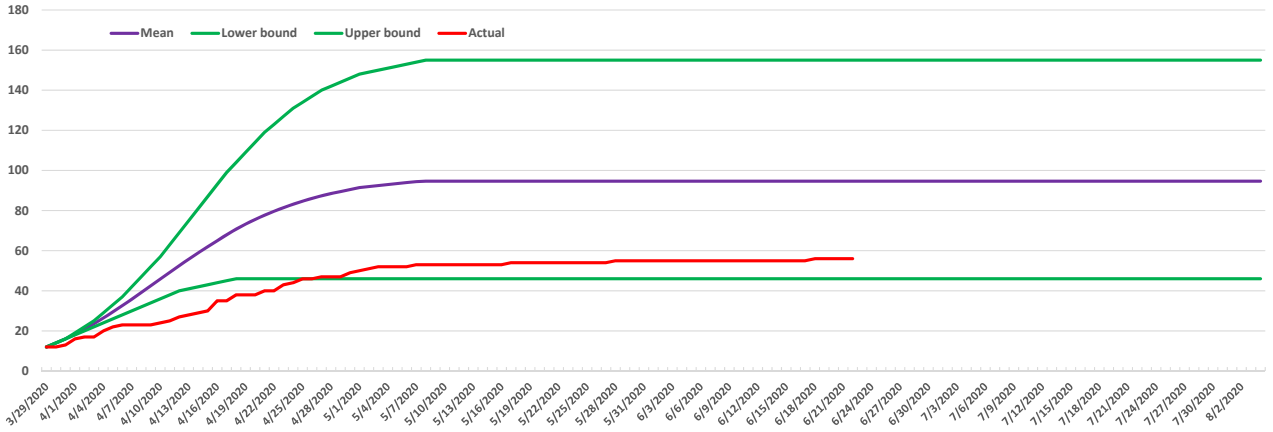
Rhode Island COVID 19 Cumulative Death Projections March 26



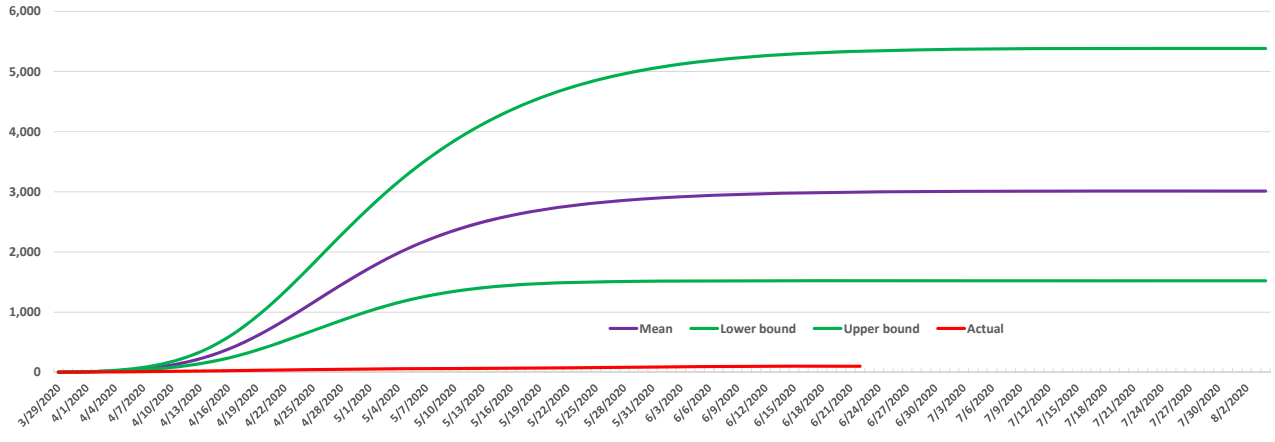
New Hampshire COVID 19 Cumulative Death Projections



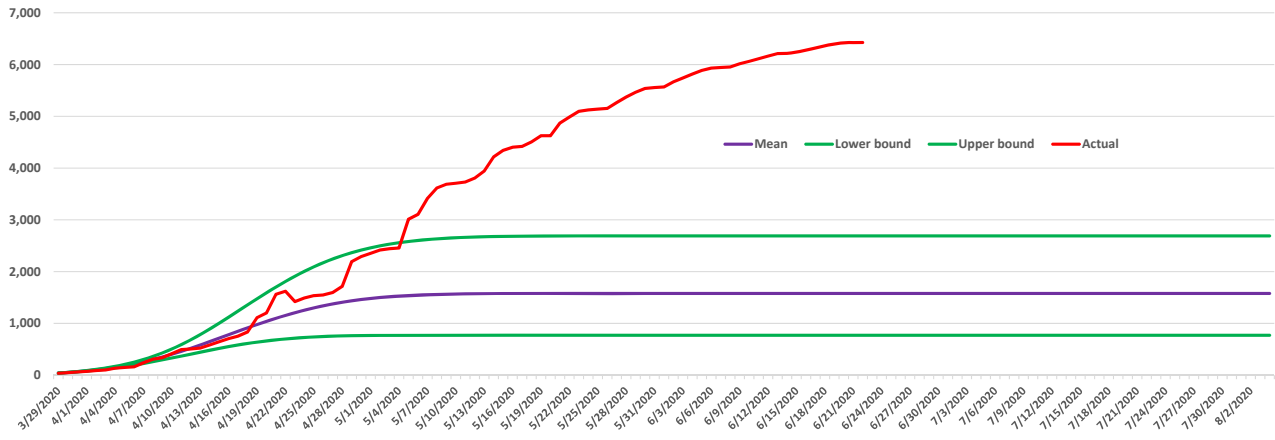
Vermont COVID 19 Cumulative Death Projections March 26



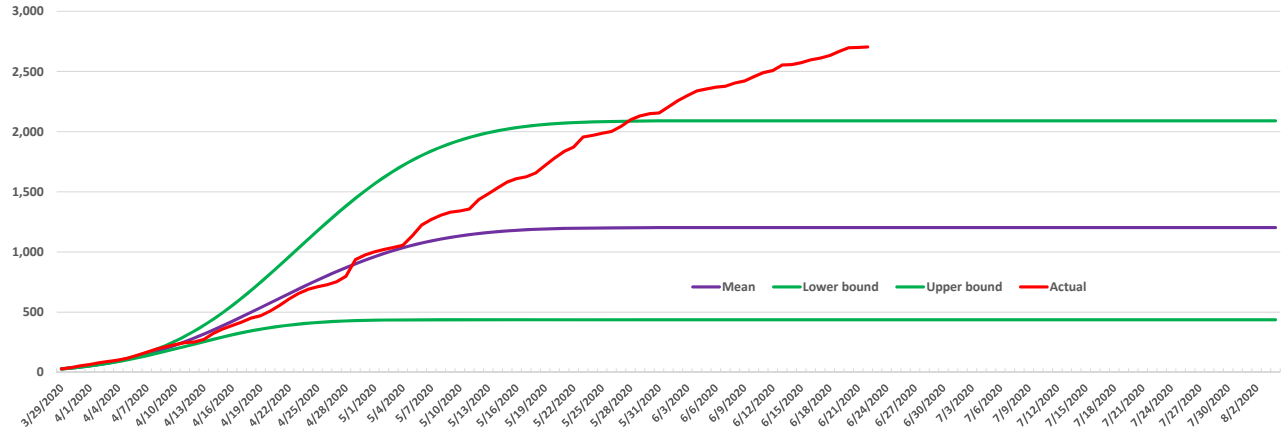
Maine COVID 19 Cumulative Death Projections



Pennsylvania COVID 19 Cumulative Death Projections



Ohio COVID 19 Cumulative Death Projections March 26



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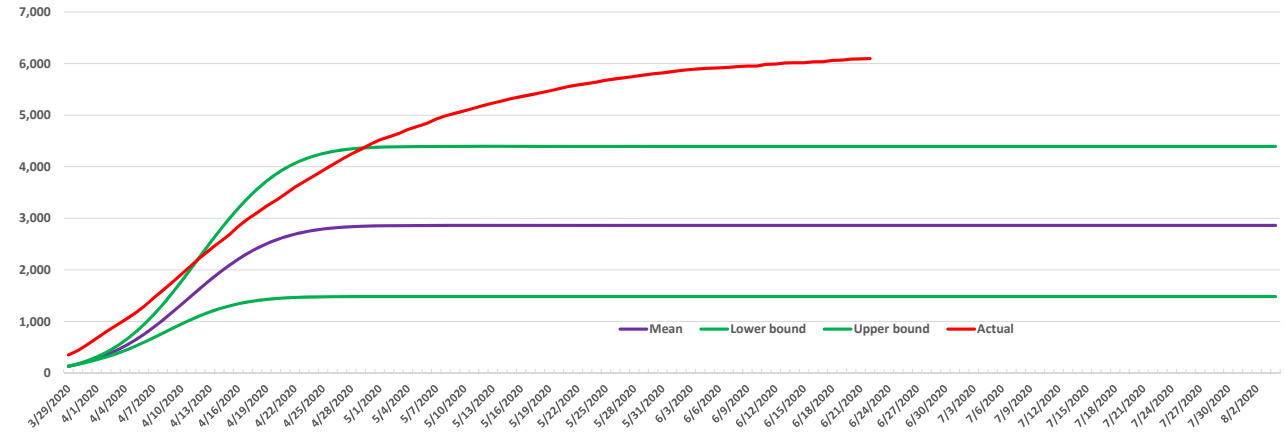
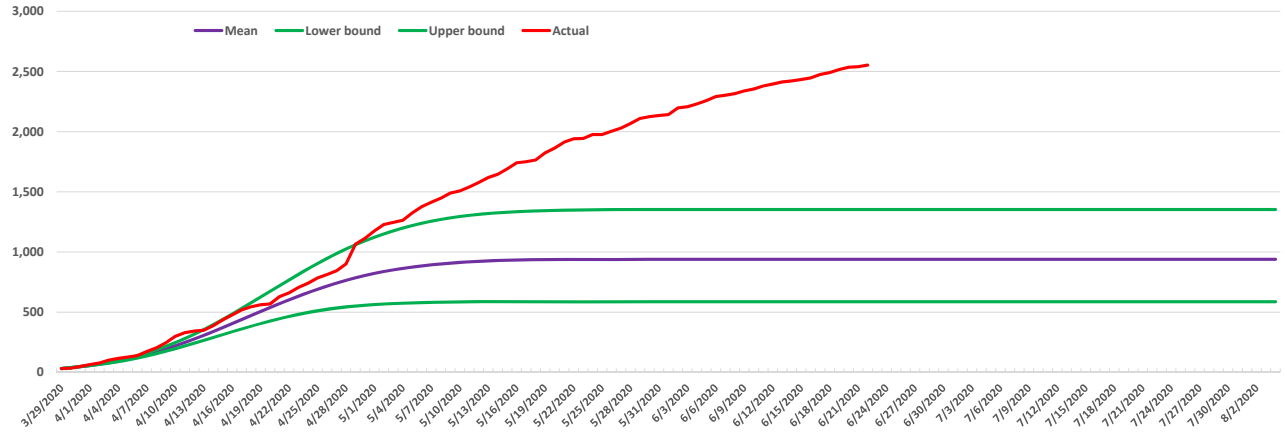


Indiana COVID 19 Cumulative Death Projections March 26



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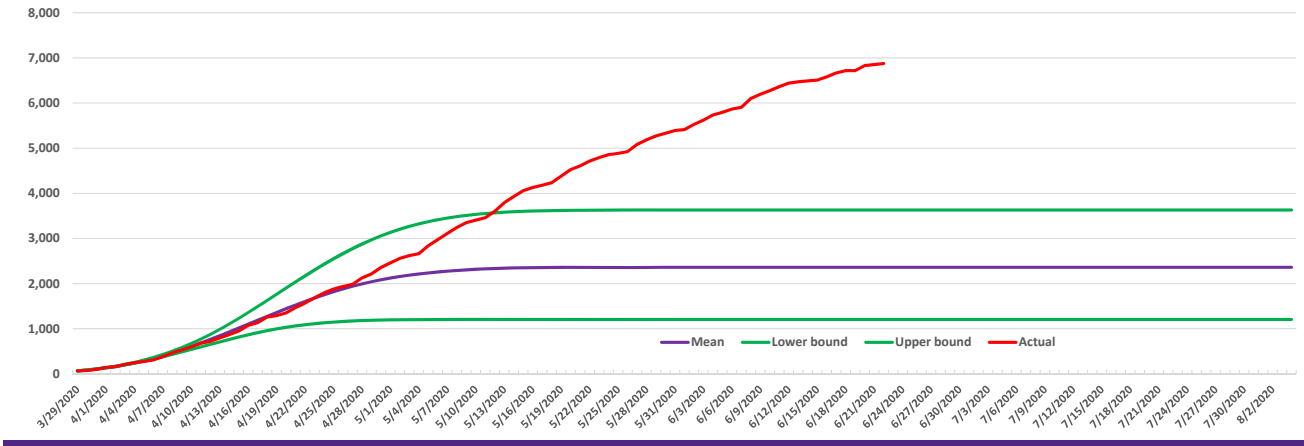
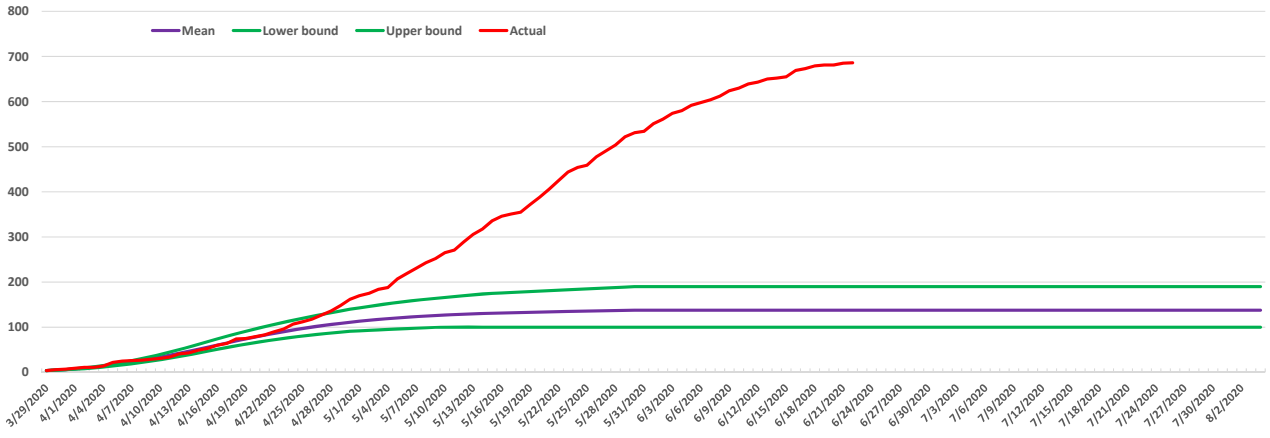


Iowa COVID 19 Daily Death Projections March 26



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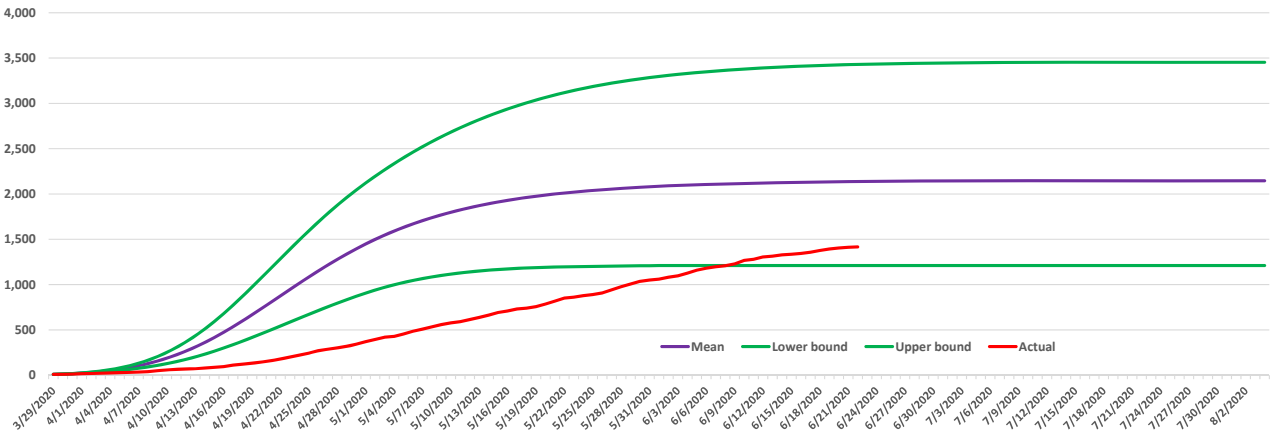
Minnesota COVID 19 Cumulative Death Projections



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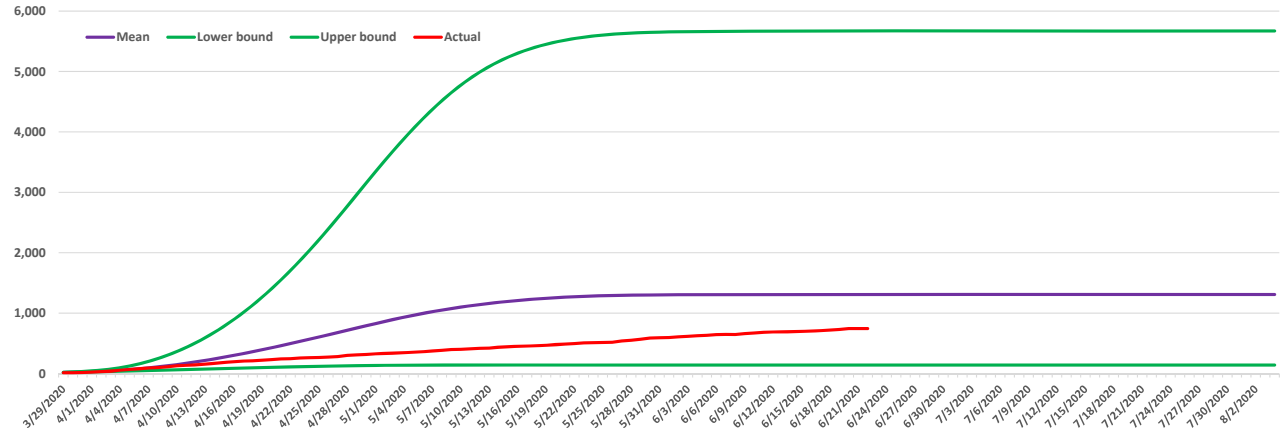
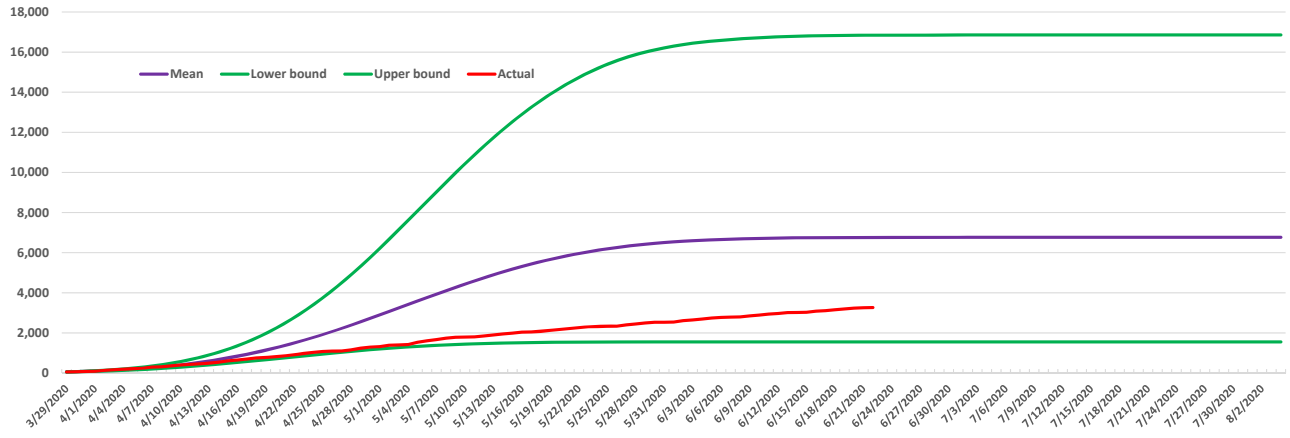
Wisconsin COVID 19 Cumulative Death Projections



Florida COVID 19 Cumulative Death Projections March 26



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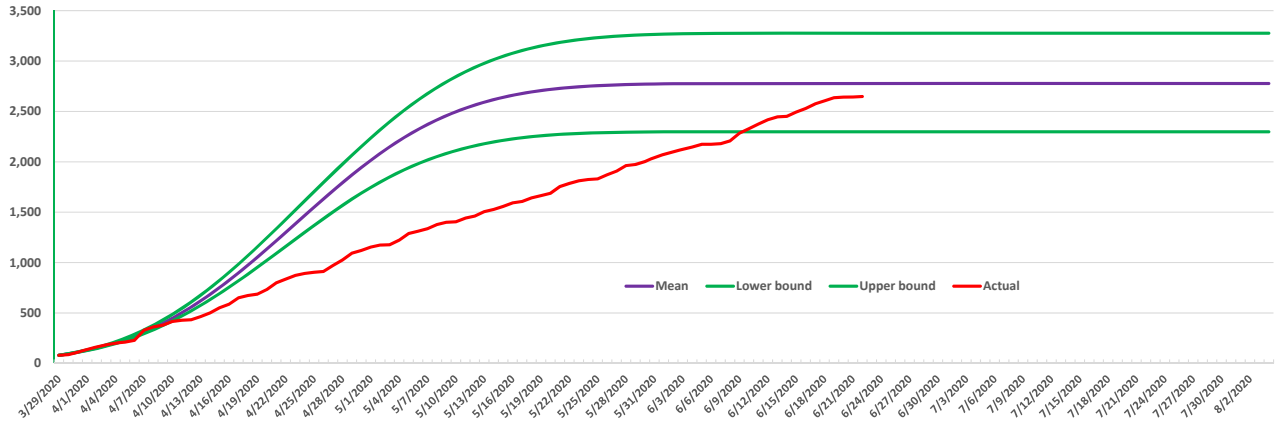

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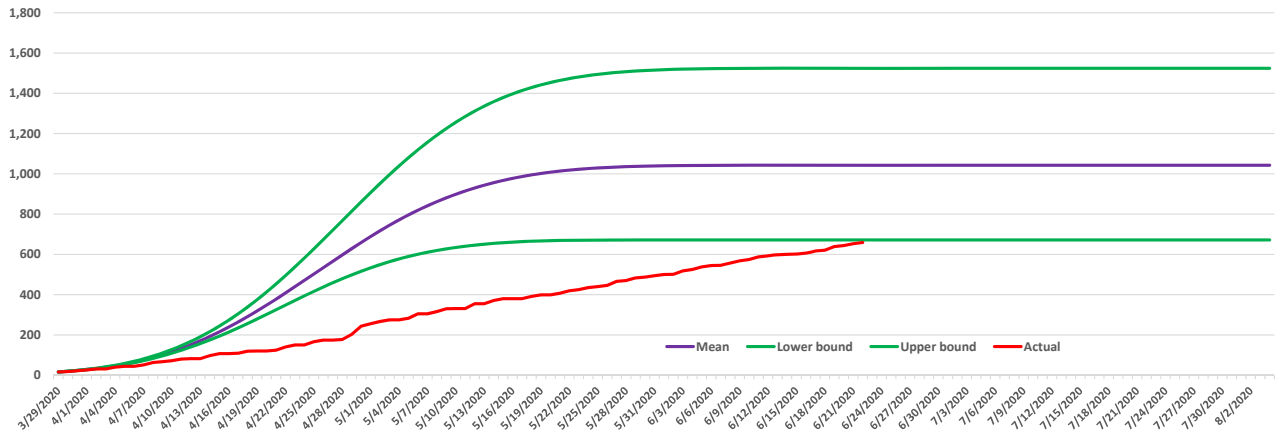
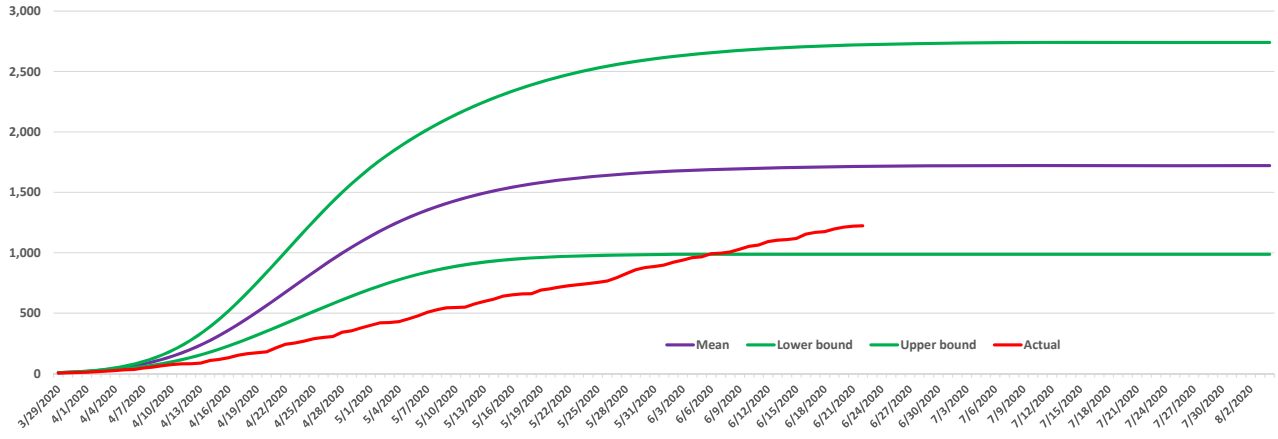


North Carolina COVID 19 Cumulative Death Projections



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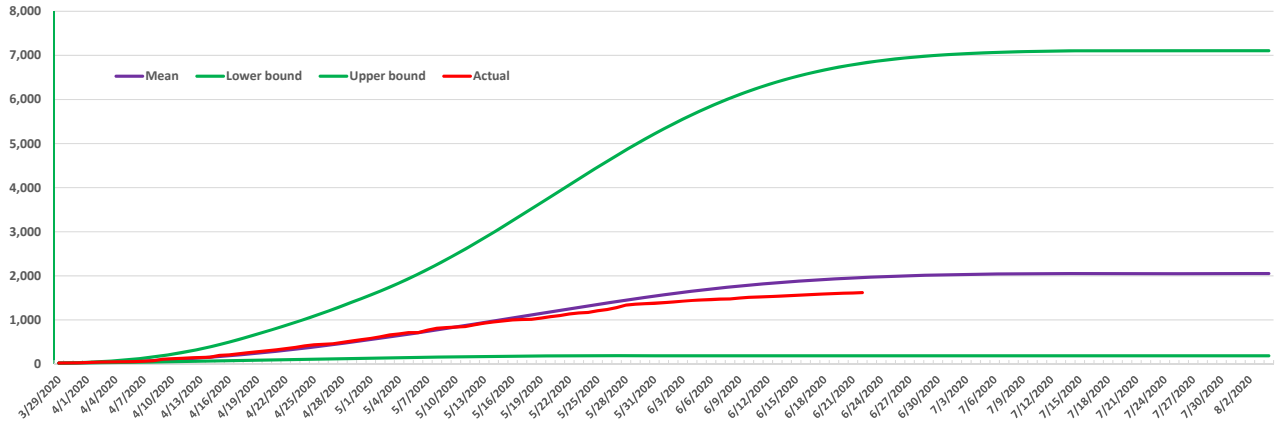

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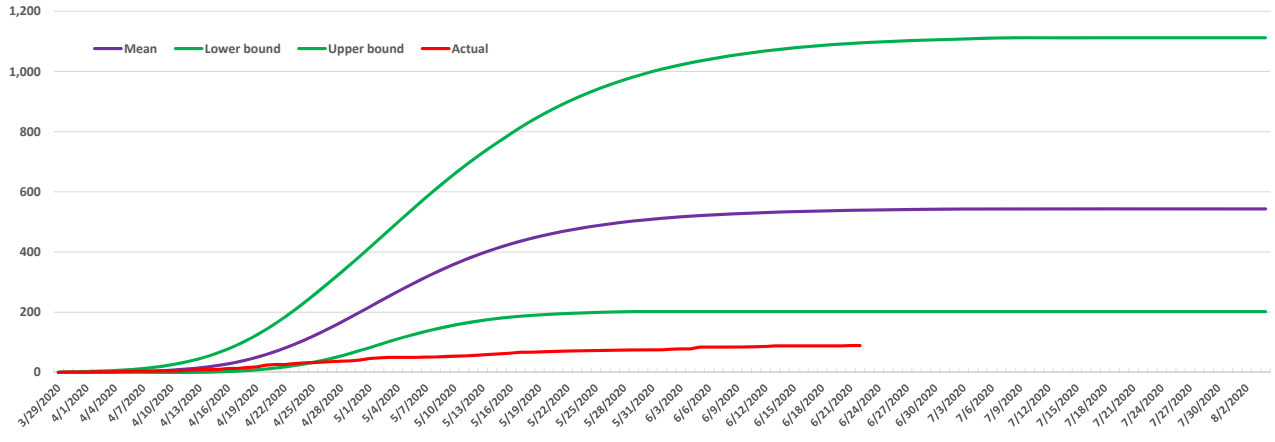
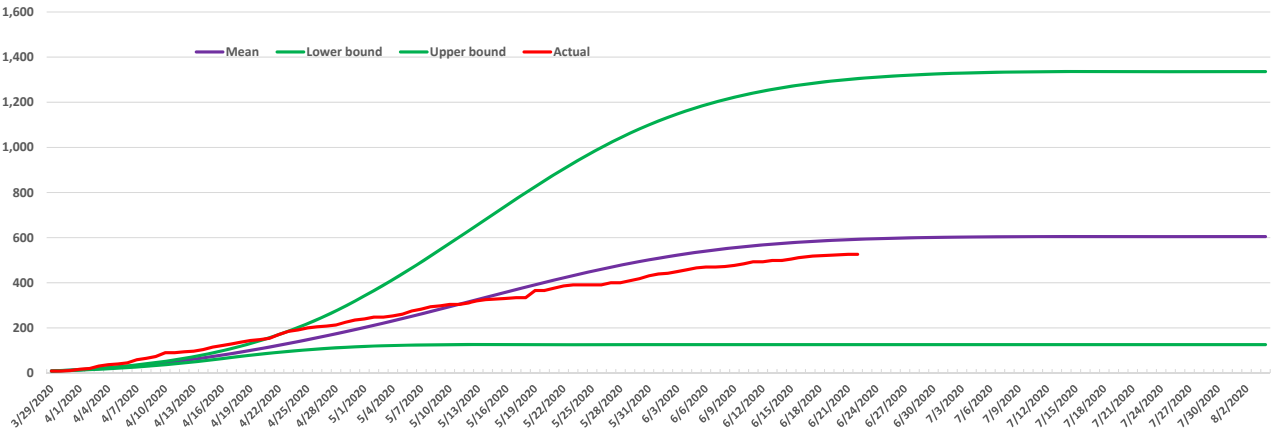
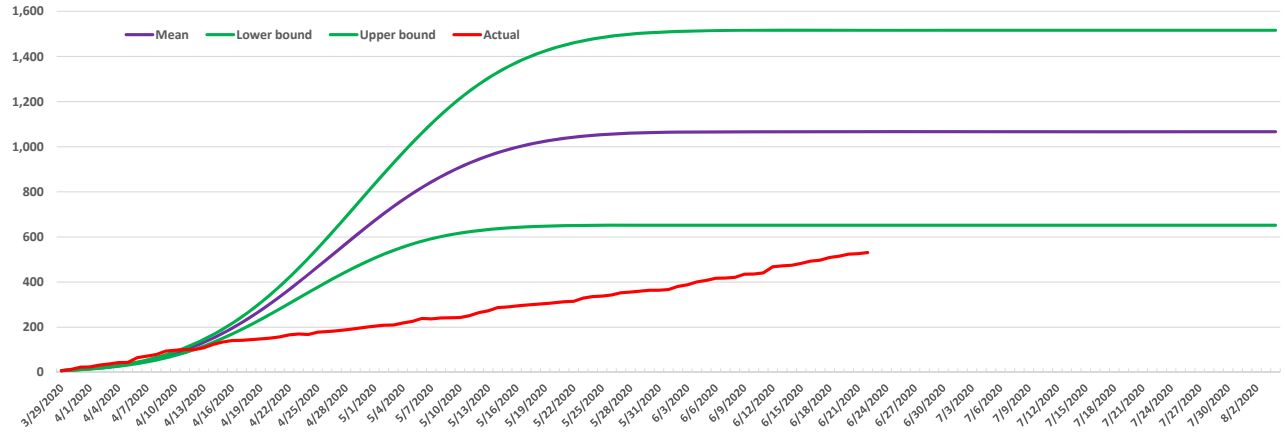


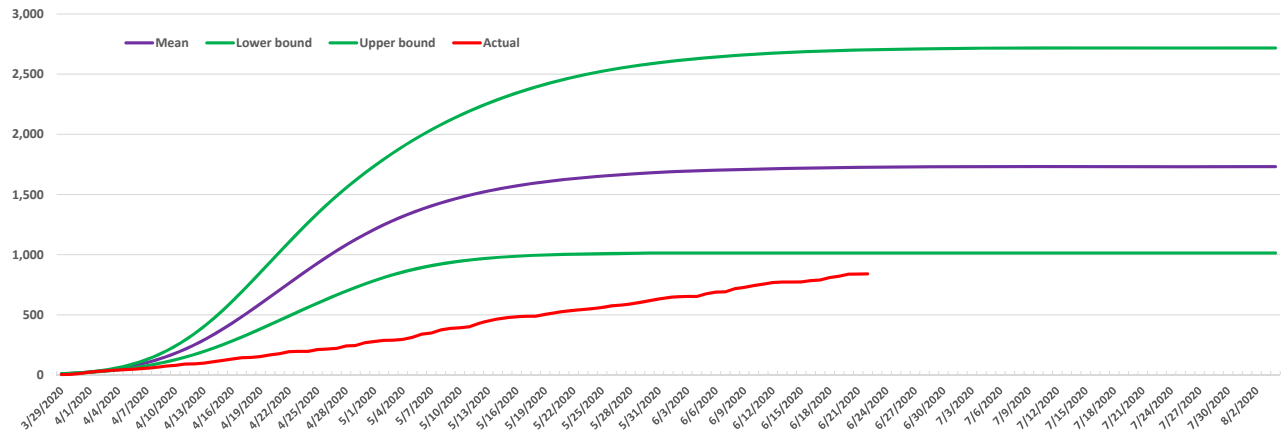
Kentucky COVID 19 Cumulative Death Projections March 26



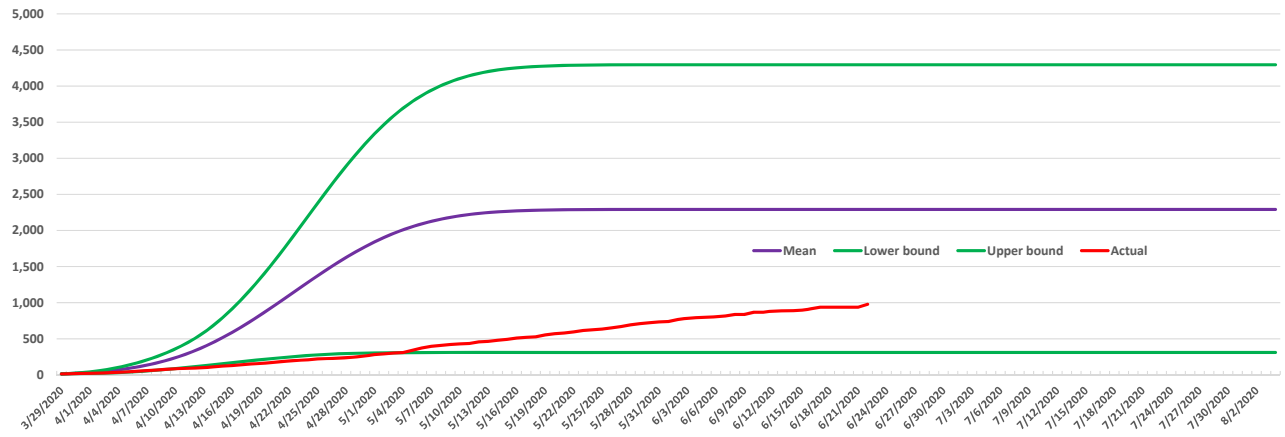
Tennessee COVID 19 Cumulative Death Projections March 26



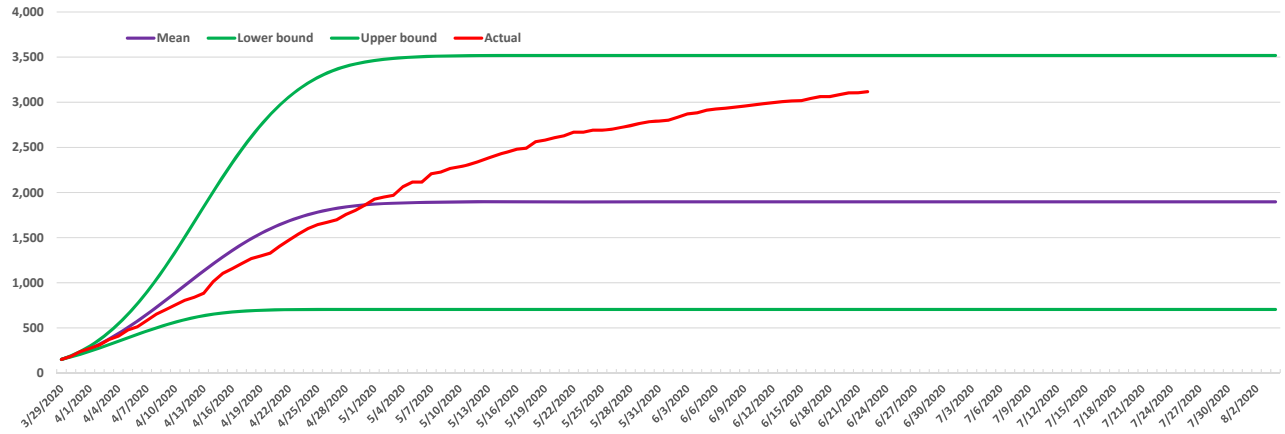
Alabama COVID 19 Cumulative Death Projections March 26



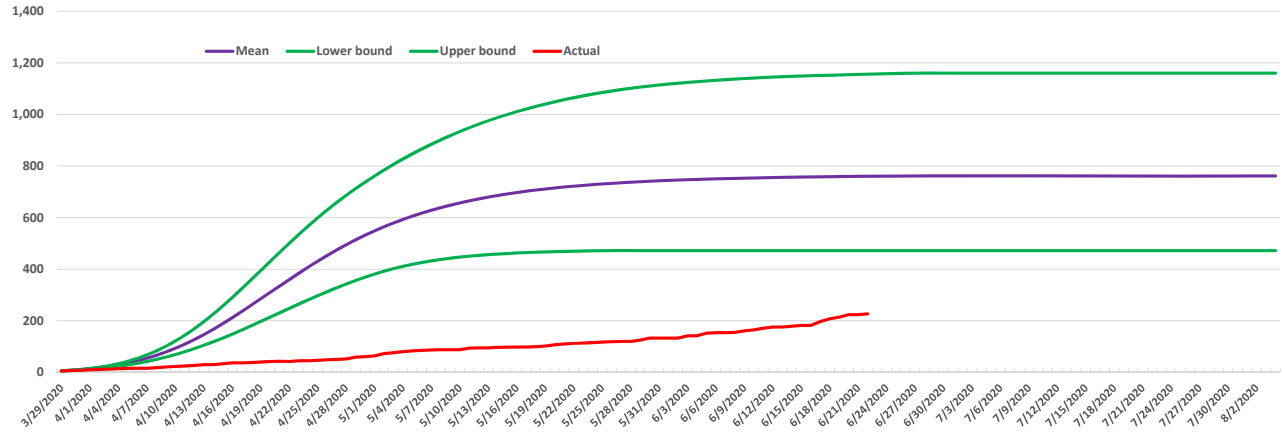
Mississippi COVID 19 Daily Death Projections March 26



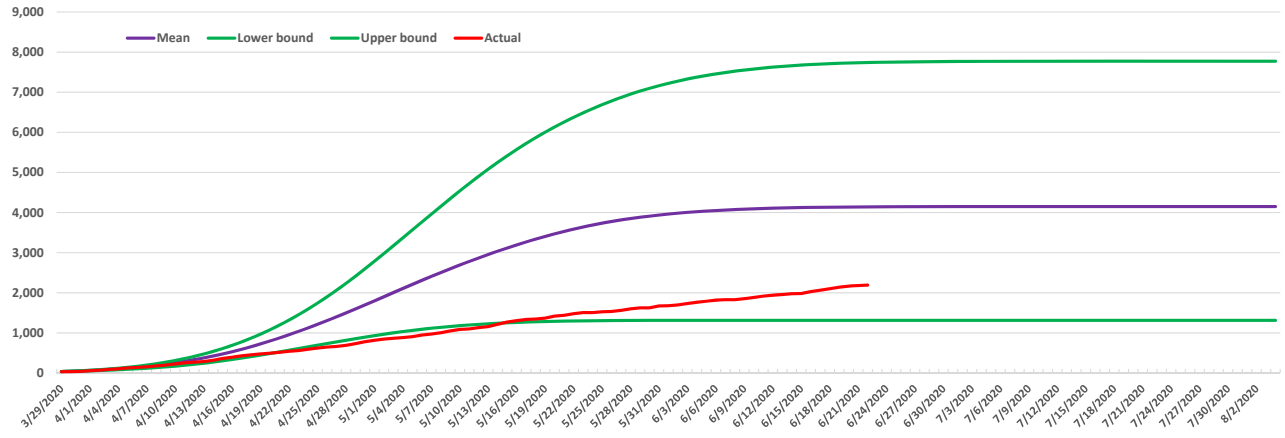
Louisiana COVID 19 Daily Death Projections March 26



Arkansas COVID 19 Cumulative Death Projections March 26



Texas COVID 19 Daily Death Projections March 26



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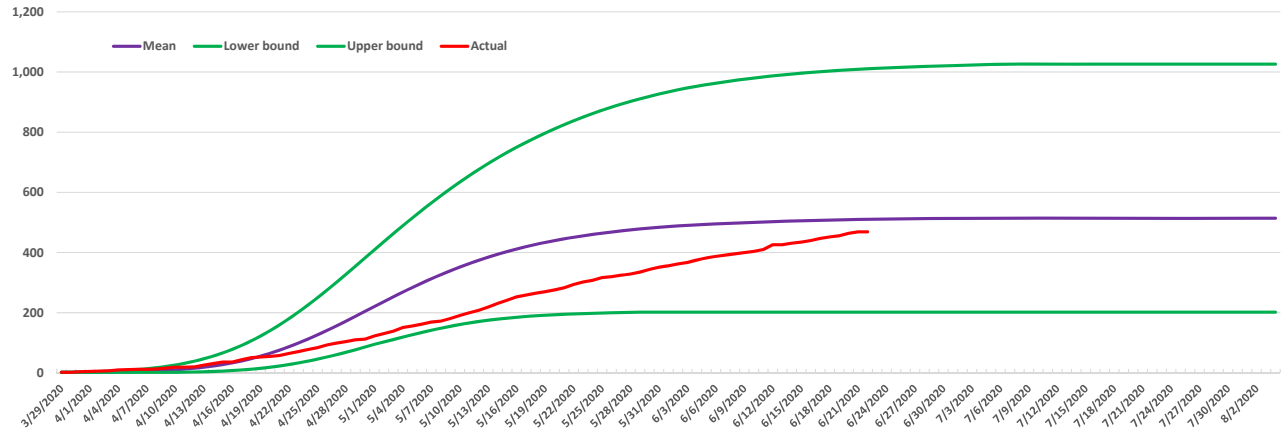
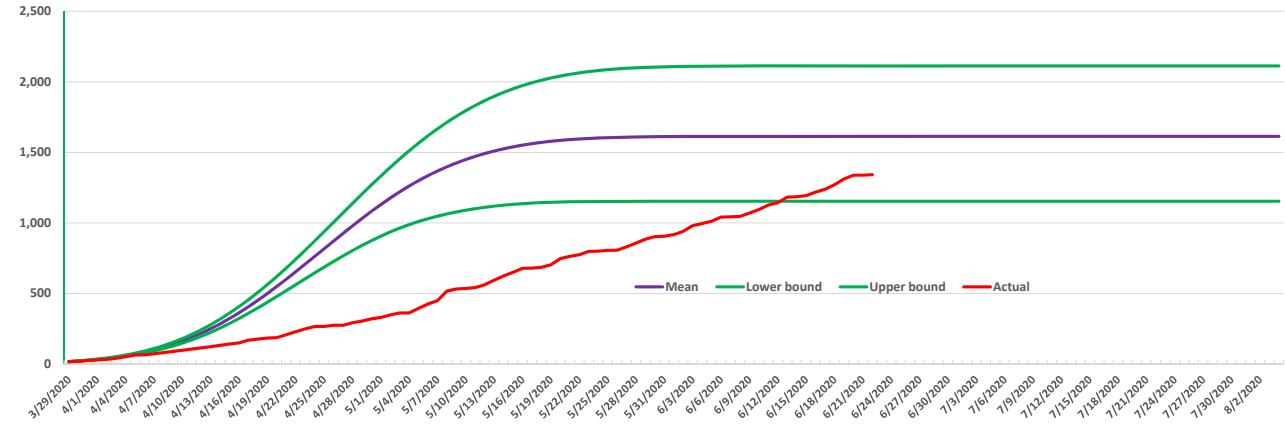
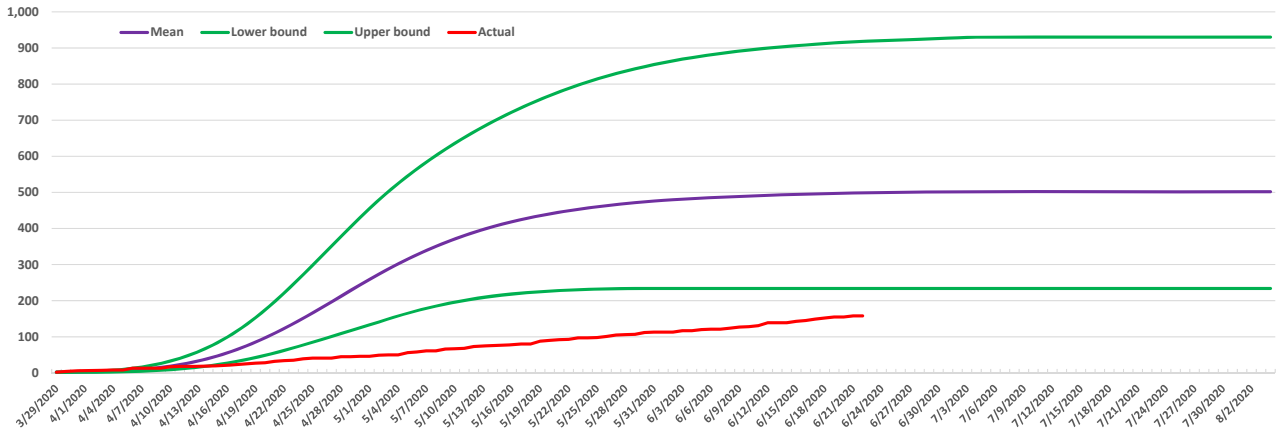


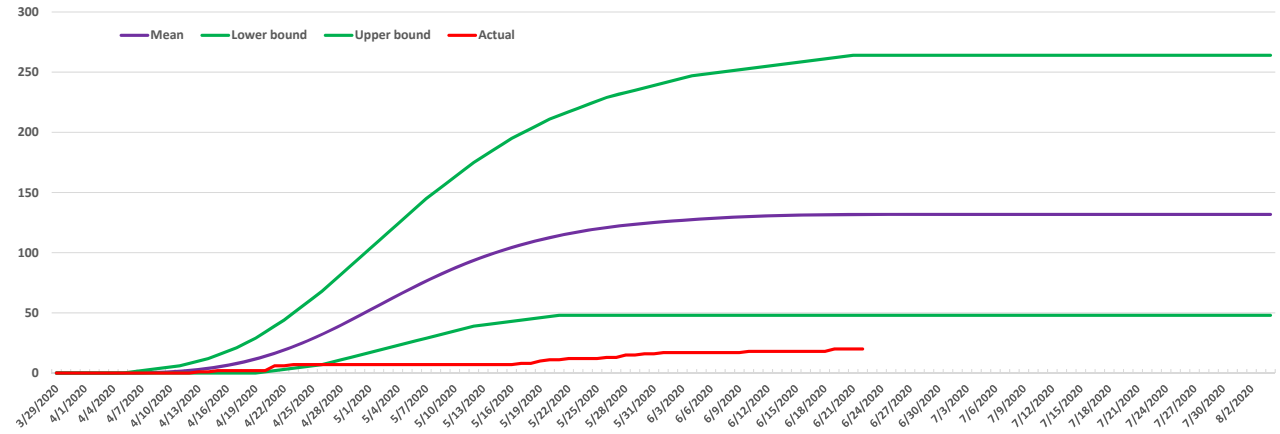
Arizona COVID 19 Cumulative Death Projections



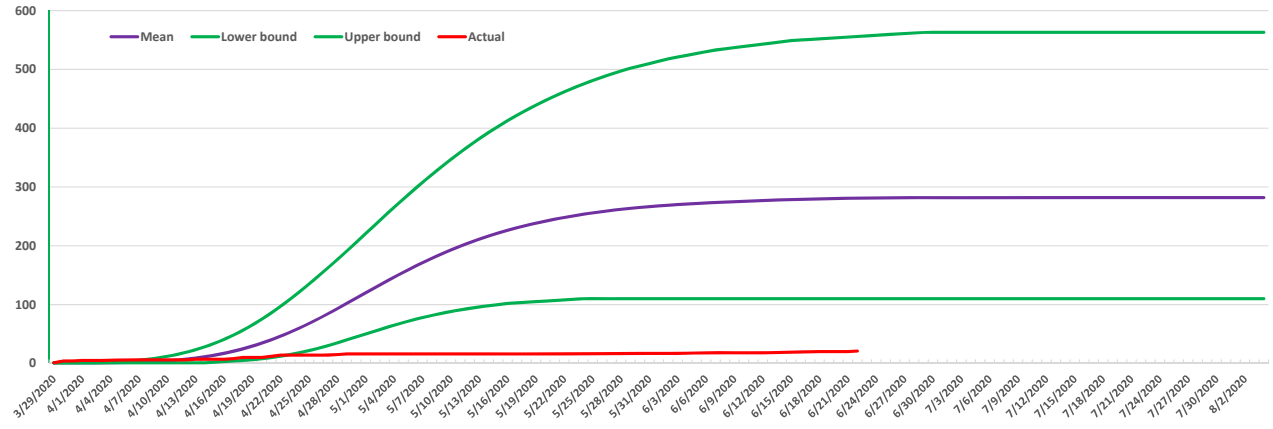
Utah COVID 19 Daily Death Projections March 26



Wyoming COVID 19 Cumulative Death Projections March 26



Montana COVID 19 Cumulative Death Projections



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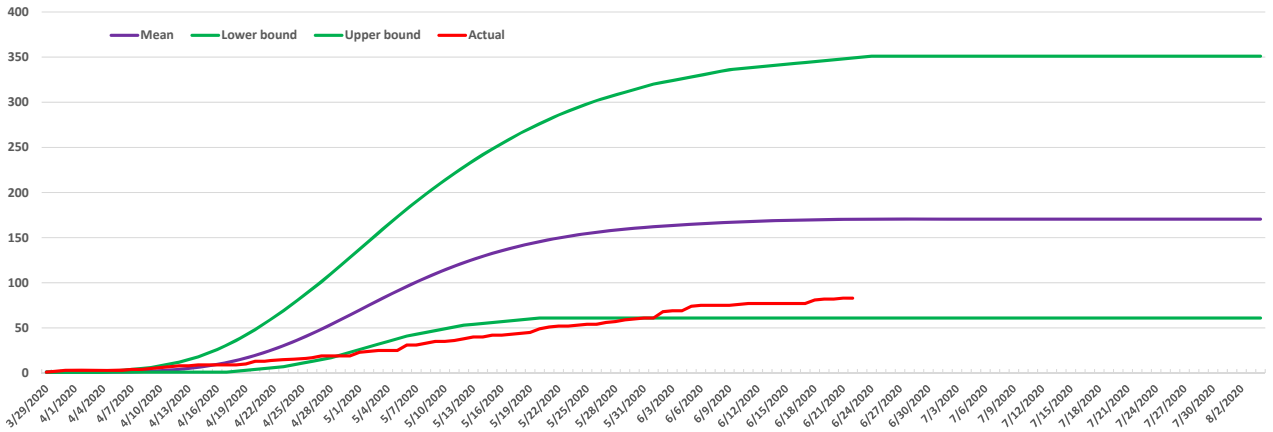
North Dakota COVID 19 Cumulative Death Projections March 26



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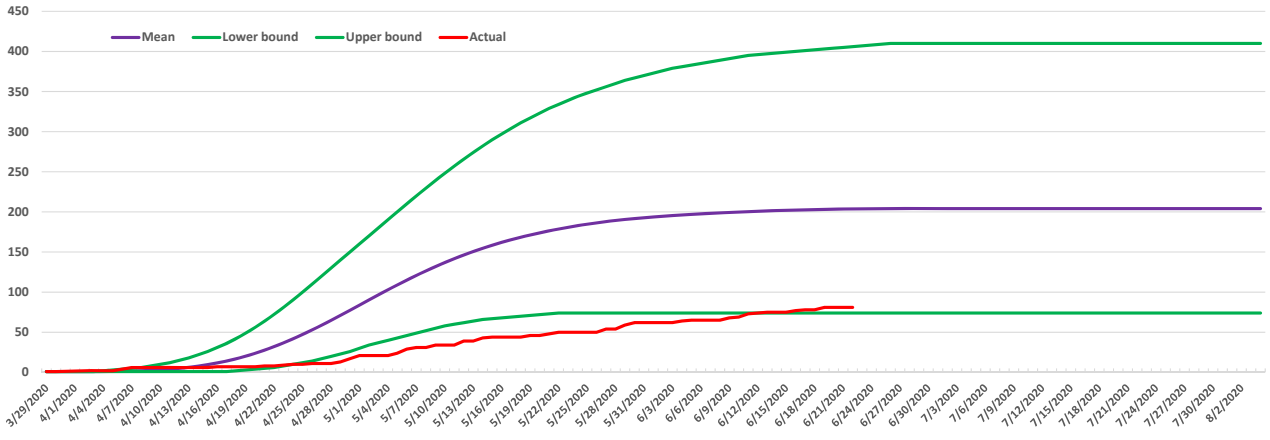
South Dakota COVID 19 Daily Death Projections March 26



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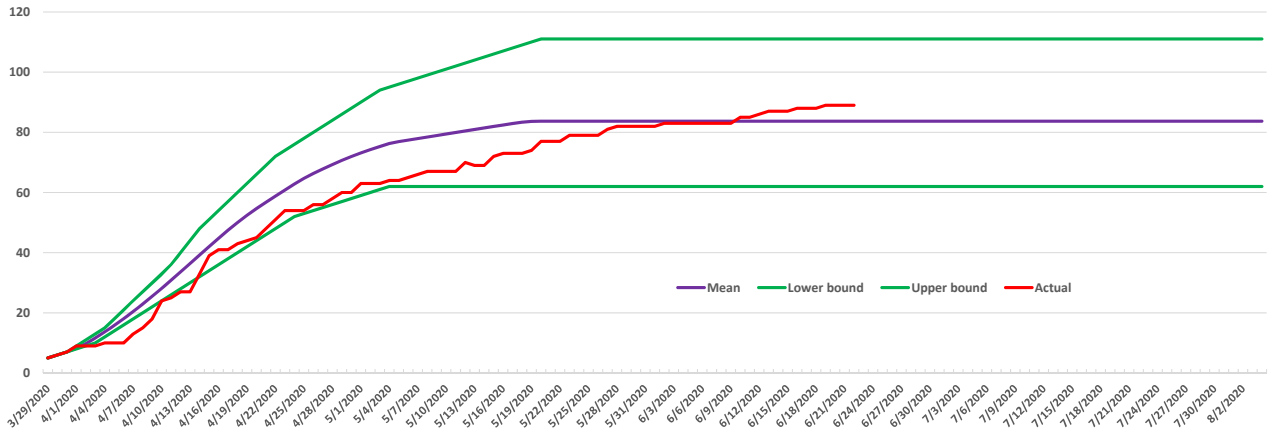
Idaho COVID 19 Cumulative Death Projections March 26



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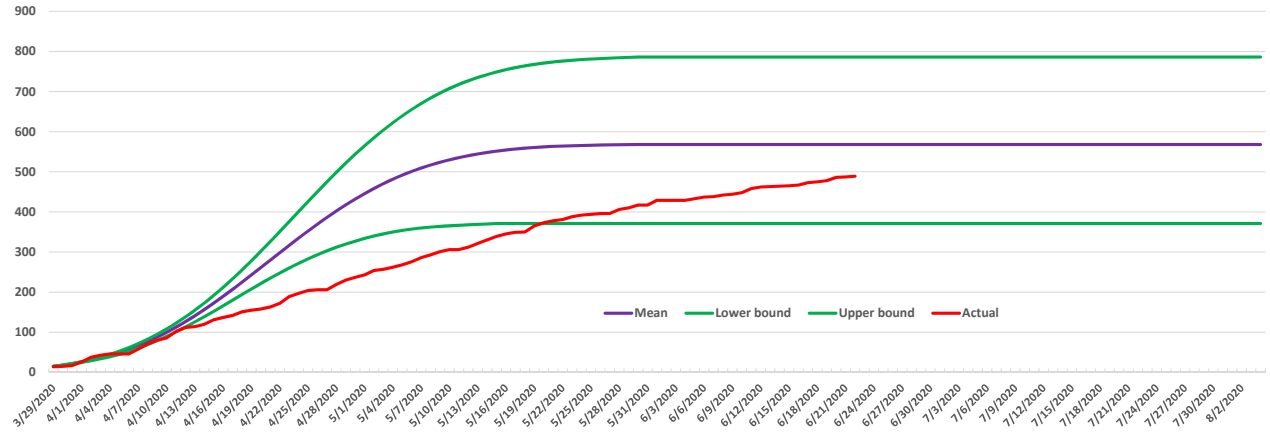
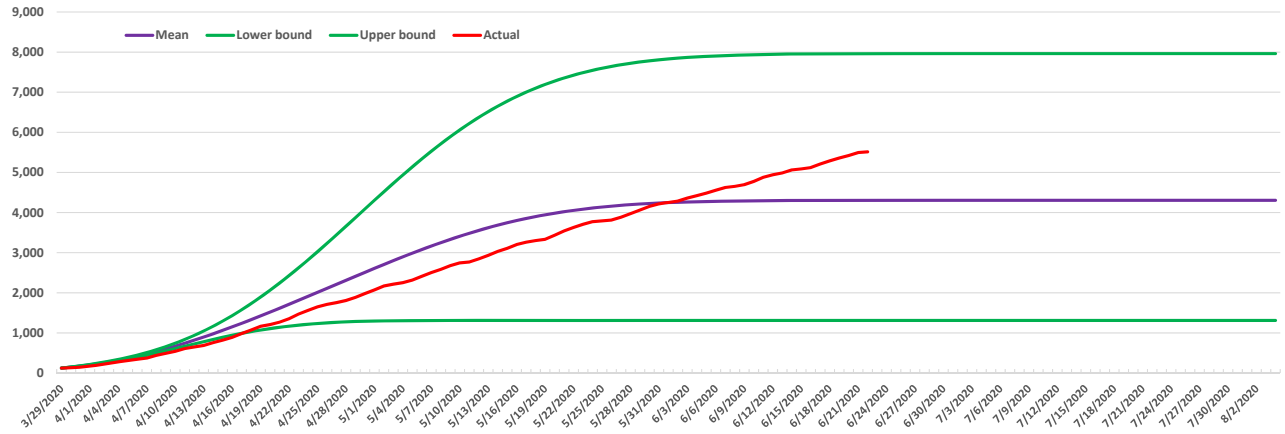
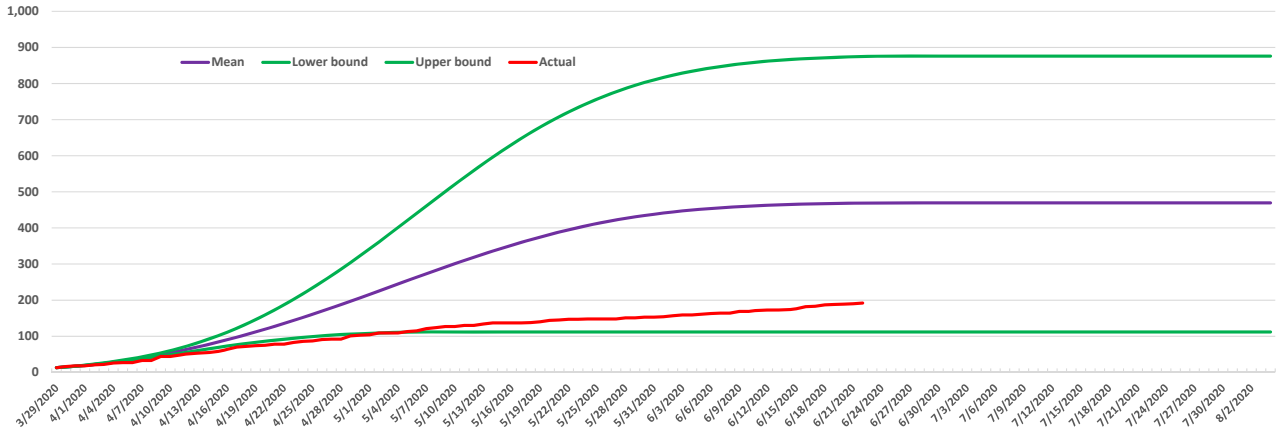
Nevada COVID 19 Cumulative Death Projections



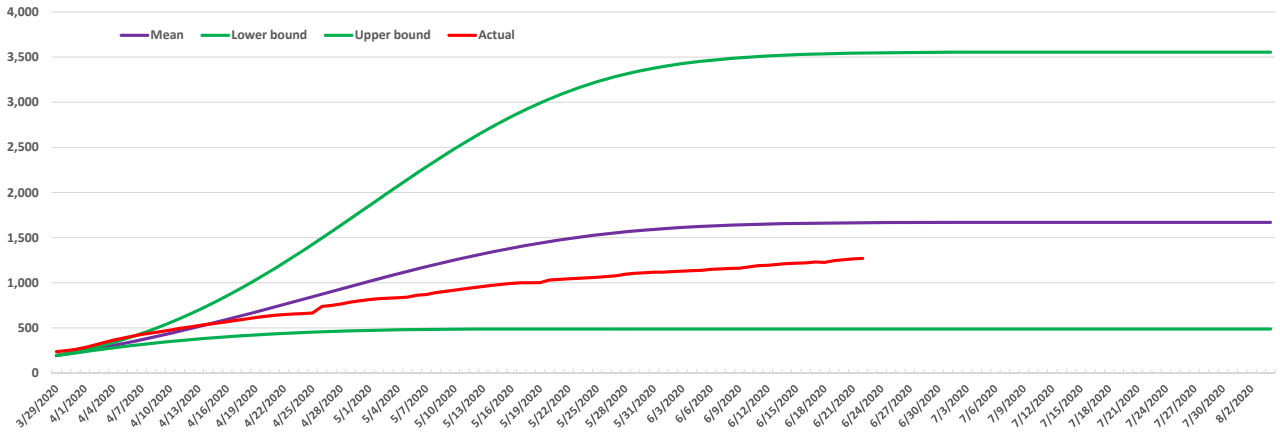
California COVID 19 Cumulative Death Projections March 26



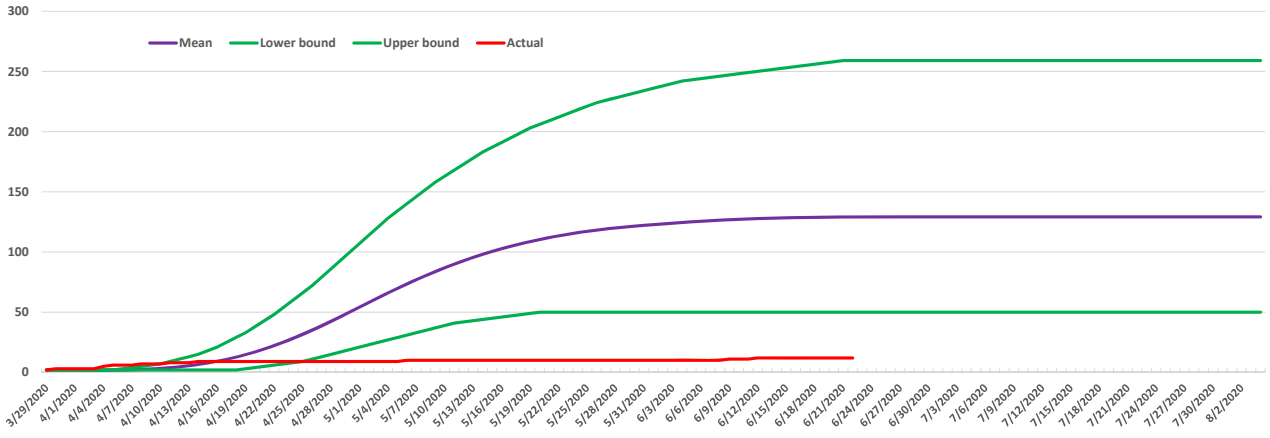
Oregon COVID 19 Cumulative Death Projections March 26



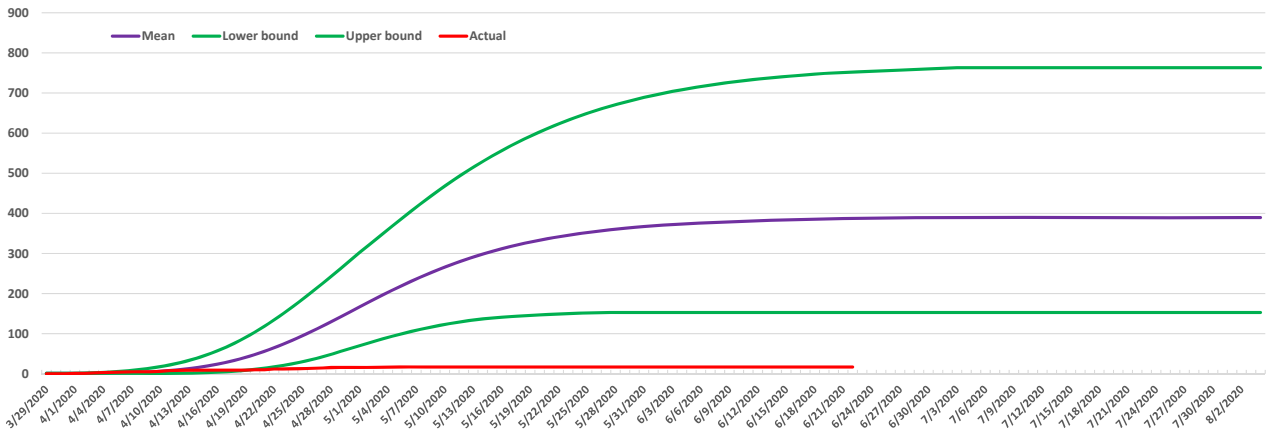
Washington COVID 19 Cumulative Death Projections March 26



Alaska COVID 19 Cumulative Death Projections March 26



Hawaii COVID 19 Daily Death Projections March 26



Concluding Thoughts

- The IMHE model continues to be revised
- It continues to be used to drive policy decisions that have resulted in large negative economic effects for the agricultural economy
- The distribution of death by age group for COVID 19 is not substantially different than death from all causes
- The U.S. Cumulative Death Total through June 22nd is above the mean but within the 95% confidence band

Concluding Thoughts

- Comparing June 22nd Cumulative deaths with the original IMHE projections
- Twelve states are above the mean and above the 95% confidence interval
  - Connecticut, Illinois, Indiana, Iowa, Maryland, Massachusetts, Michigan, New Jersey, New York, Ohio, Pennsylvania, Rhode Island
- Three states are above the mean but within the 95% confidence interval
  - California, Idaho, Louisiana
- Twenty states are below the mean but within the 95% confidence interval
  - Arizona, Florida, Georgia, Kentucky, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Mexico, North Carolina, North Dakota, Oregon, South Dakota, Texas, Vermont, Virginia, Washington, Wisconsin
- Fifteen states are below the mean and below the 95% confidence interval
  - Alabama, Alaska, Arkansas, Colorado, Delaware, Hawaii, Kansas, Maine, Montana, Oklahoma, South Carolina, Tennessee, Utah, West Virginia, Wyoming