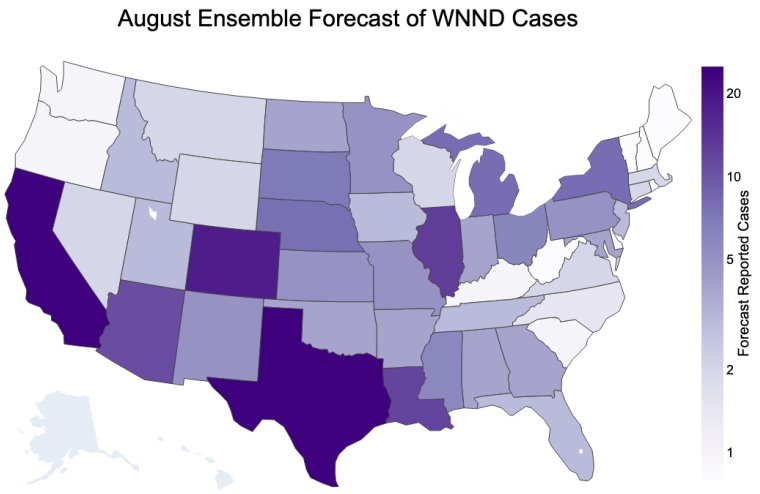
West Nile Virus Forecasts – August 2023

In April 2023, 10 teams submitted 12 forecasts for the monthly number of West Nile Neuroinvasive Disease (WNND) cases for each contiguous US state for May-December 2023. For the most recent submission deadline of July 31, 2023, 10 updated forecasts were submitted. We created an ensemble forecast using the most recent submission for each forecast model and a baseline forecast using only historical WNND data.

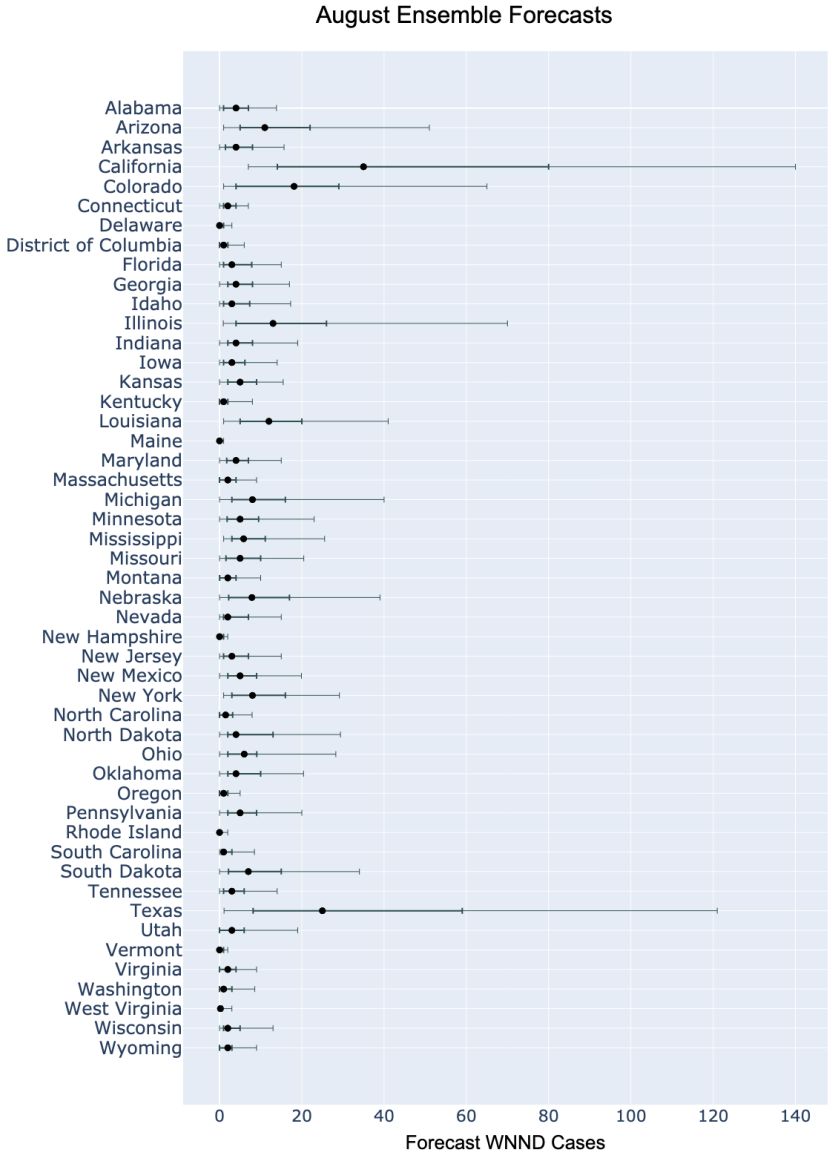
Summary points for the ensemble forecast:

- Rest-of-year incidence of WNND is forecast to peak in the majority of states and districts (41 of 49) in August, with the highest August forecasts and uncertainty in California, Colorado, Illinois, and Texas.
- The eight remaining states are forecast to see rest-of-year peak incidence in September. Regardless of month of occurrence, the rest-of-year peak median forecasts are 10 or more in Arizona, California, Colorado, Illinois, Louisiana, and Texas.
- The number of WNND cases in August 2023 is likely to be below the 10-year median for 33 states and the District of Columbia, above the median for 10 states, and equally likely to be below or above the median for 6 states.

August Ensemble Forecast

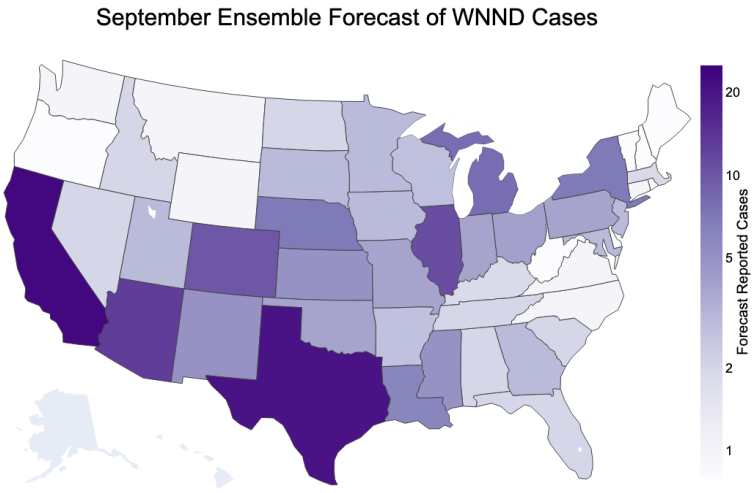


This map shows the ensemble forecast for August. Uncertainty for each state forecast is shown below.

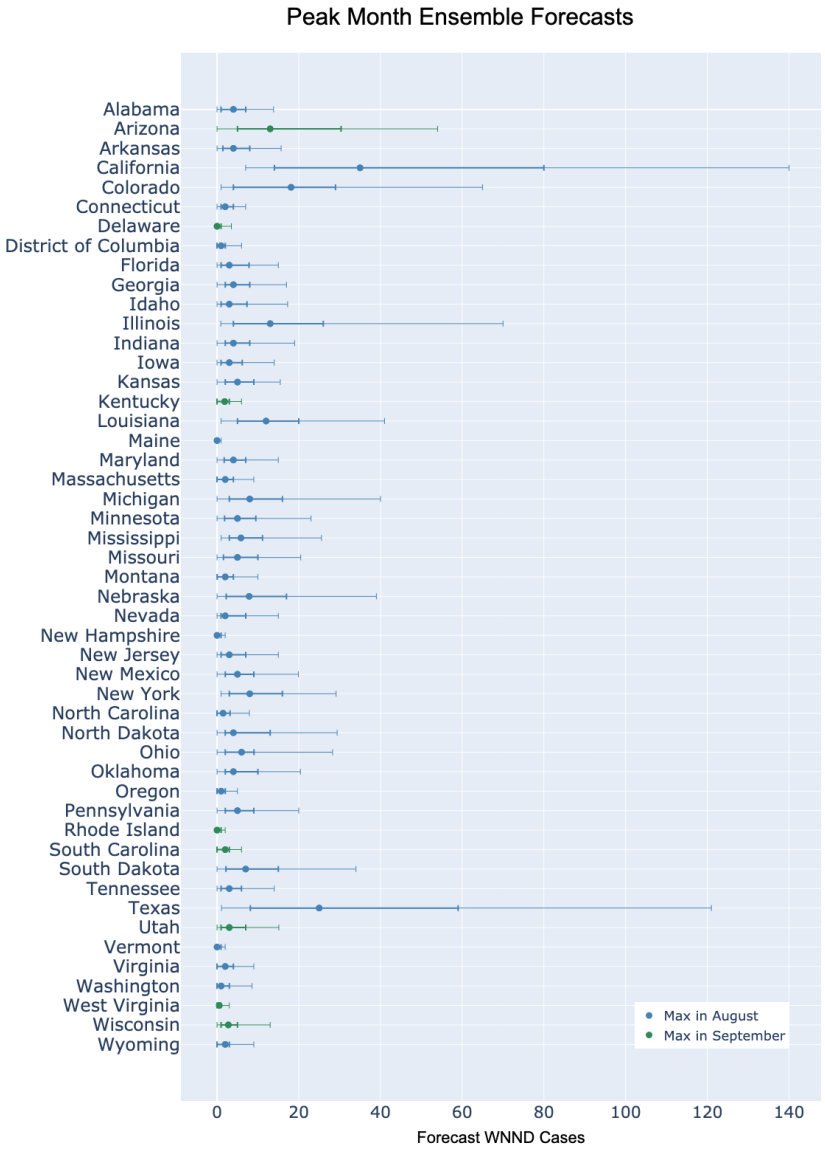


This figure shows state-level ensemble forecasts for August. Points represent the median forecasts with thick and thin lines representing the 50% and 90% prediction intervals, respectively.

Peak Incidence Ensemble Forecast

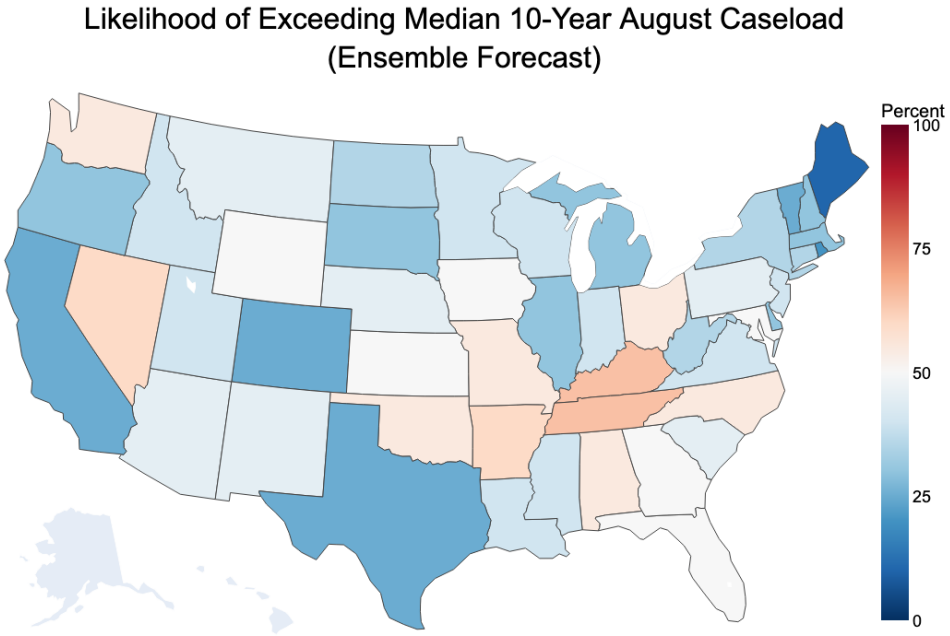


This map shows the ensemble forecast for September, one of two peak months of historical incidence in the US. Individual state peak forecasts with uncertainty are shown below.

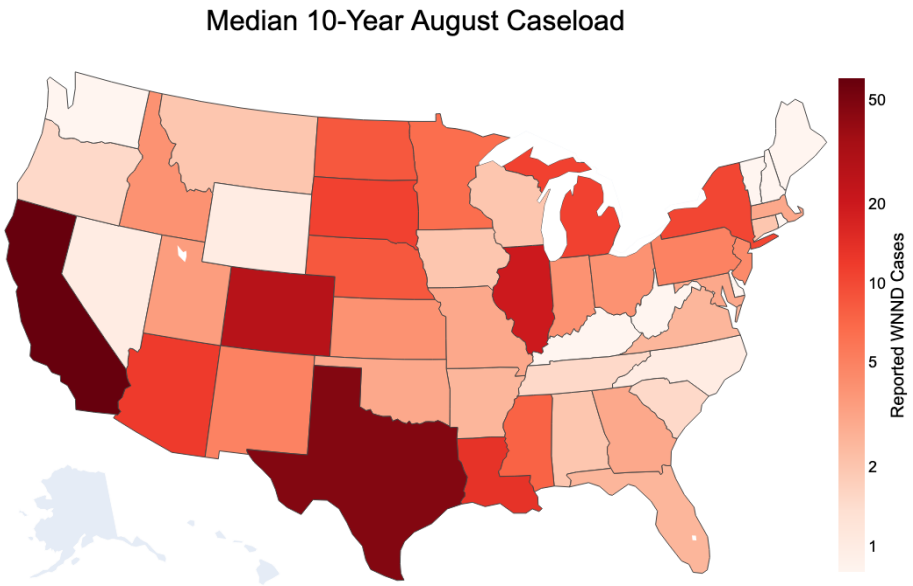


This figure shows the peak number of monthly WNND cases predicted for each state in the ensemble forecast. The month of the maximum forecast is shown by the color of the points (blue equates to a forecast maximum in August; green in September). The points represent the median ensemble forecasts and the thick and thin lines represent the 50% and 90% prediction intervals, respectively.

Likelihood of Exceeding Median 10-Year Caseload in August

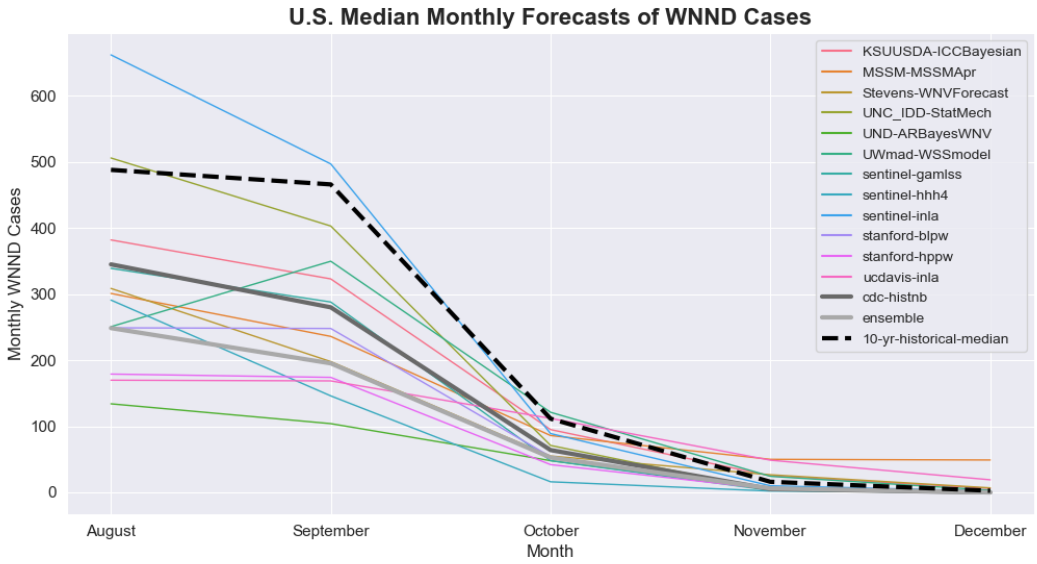


This figure shows the state-specific likelihood of exceeding the median 10-year (2013-2022) reported caseload of West Nile virus neuroinvasive disease.



This figure shows the state-specific median 10-year (2013-2022) reported caseload of West Nile virus neuroinvasive disease.

National Summary of Median Forecasts



This figure shows model-specific nationwide forecasts across all months. These national summaries were created by adding all state-level median forecasts for each month and do not reflect the uncertainty in each forecast.

Supplemental Table with August Ensemble Forecast

	Ensemble Forecast (percentiles)					10-Year Historical Values		
	5th	25th	50th	75th	95th	minimum	median	maximum
Alabama	0	1	4	7	13.8	0	2	20
Arizona	1	5	11	22	51	0	12	121
Arkansas	0	1.4	4	8	15.7	0	2.5	8
California	7	14	35	80	140	31	68.5	222
Colorado	1	4	18.1	29	65	9	27	63
Connecticut	0	1	2	4	7	0	2	7
Delaware	0	0	0	1	3	0	0	2
District of Columbia	0	0	1	2	6	0	1	3
Florida	0	1	3	7.8	15	0	2.5	7
Georgia	0	2	4	8	17	0	3	15
Idaho	0	1	3	7.3	17.3	1	4	8
Illinois	0.9	4	13	26	70	8	20	77
Indiana	0	2	4	8	19	0	4	12
Iowa	0	1	3	6.2	14	0	2	37
Kansas	0	2	5	9	15.5	1	4	7
Kentucky	0	0	1	2	8	0	0.5	3
Louisiana	1	5	12	20	41	1	13.5	24
Maine	0	0	0	0	1	0	0	1
Maryland	0	1.8	4	7	15	1	3	20
Massachusetts	0	0	2	4	9	0	3	14
Michigan	0	3	8	16	40	0	11	33
Minnesota	0	1.8	5	9.5	23	0	6.5	22
Mississippi	1	3	5.9	11.1	25.5	1	7.5	14
Missouri	0	1.5	5	10	20.5	0	3	12
Montana	0	0	2	4	10	0	2	17
Nebraska	0	2.2	7.9	17	39	0	8.5	64
Nevada	0	1	2	7	15	0	1	19
New Hampshire	0	0	0	1	2	0	0	1
New Jersey	0	1	3	7	15	0	4.5	24
New Mexico	0	2	5	9	19.9	1	5	15
New York	1	3	8	16	29.1	3	10.5	36
North Carolina	0	0	1.5	3.2	7.9	0	1	4
North Dakota	0	2	4	13	29.4	0	8.5	37
Ohio	0	2	6	9	28.3	0	4	22
Oklahoma	0	2	4	10	20.4	0	3	21
Oregon	0	0	1	2	5	0	1.5	5
Pennsylvania	0	2	5	9	20	0	5	33
Rhode Island	0	0	0	0	2	0	0	2
South Carolina	0	0.4	1	3	8.5	0	1.5	5
South Dakota	0	2.2	7	15	34	0	11	28
Tennessee	0	1	3	6	14	0	1.5	11
Texas	1.1	8.2	25	59	121	6	47	112
Utah	0	0	3	6	19	0	3.5	14
Vermont	0	0	0	1	2	0	0	0
Virginia	0	0	2	4	9	0	2.5	11
Washington	0	0	1	3	8.6	0	0.5	6
West Virginia	0	0	0.2	0.7	3	0	0	1
Wisconsin	0	1	2	5	13	0	2	27
Wyoming	0	0	2	3	9	0	1	7

This table provides state-level ensemble forecasts for August. Ensemble forecast values for the 5th, 25th, median, 75th, and 95th percentiles are shown, as well as 10-year historical minimum, median, and maximum values.

Supplemental Table with Peak Incidence Ensemble Forecast

	Ensemble Forecast (percentiles)						10-Year Historical Values		
	month	5th	25th	50th	75th	95th	minimum	median	maximum
Alabama	8	0	1	4	7	13.8	0	2	20
Arizona	9	0	5	13	30.4	54	1	14	588
Arkansas	8	0	1.4	4	8	15.7	0	2.5	8
California	8	7	14	35	80	140	31	68.5	222
Colorado	8	1	4	18.1	29	65	9	27	63
Connecticut	8	0	1	2	4	7	0	2	7
Delaware	9	0	0	0	1	3.5	0	0	3
District of Columbia	8	0	0	1	2	6	0	1	3
Florida	8	0	1	3	7.8	15	0	2.5	7
Georgia	8	0	2	4	8	17	0	3	15
Idaho	8	0	1	3	7.3	17.3	1	4	8
Illinois	8	0.9	4	13	26	70	8	20	77
Indiana	8	0	2	4	8	19	0	4	12
Iowa	8	0	1	3	6.2	14	0	2	37
Kansas	8	0	2	5	9	15.5	2	5	21
Kentucky	9	0	0	1.9	3	6	0	1	4
Louisiana	8	1	5	12	20	41	1	13.5	24
Maine	8	0	0	0	0	1	0	0	1
Maryland	8	0	1.8	4	7	15	1	3	20
Massachusetts	8	0	0	2	4	9	1	2.5	23
Michigan	8	0	3	8	16	40	0	11	33
Minnesota	8	0	1.8	5	9.5	23	0	6.5	22
Mississippi	8	1	3	5.9	11.1	25.5	1	7.5	14
Missouri	8	0	1.5	5	10	20.5	0	3	12
Montana	8	0	0	2	4	10	0	2	17
Nebraska	8	0	2.2	7.9	17	39	0	8.5	64
Nevada	8	0	1	2	7	15	0	1	19
New Hampshire	8	0	0	0	1	2	0	0	1
New Jersey	8	0	1	3	7	15	0	4.5	24
New Mexico	8	0	2	5	9	19.9	1	5	15
New York	8	1	3	8	16	29.1	3	10.5	36
North Carolina	8	0	0	1.5	3.2	7.9	0	1	4
North Dakota	8	0	2	4	13	29.4	0	8.5	37
Ohio	8	0	2	6	9	28.3	0	4	22
Oklahoma	8	0	2	4	10	20.4	1	7.5	23
Oregon	8	0	0	1	2	5	0	1.5	5
Pennsylvania	8	0	2	5	9	20	0	6.5	46
Rhode Island	9	0	0	0	1	2	0	0	1
South Carolina	9	0	0	2	3	6	0	1.5	5
South Dakota	8	0	2.2	7	15	34	0	11	28
Tennessee	8	0	1	3	6	14	0	1.5	11
Texas	8	1.1	8.2	25	59	121	6	47	112
Utah	9	0	1	3	7	15.1	1	3	23
Vermont	8	0	0	0	1	2	0	0	0
Virginia	8	0	0	2	4	9	0	2	17
Washington	8	0	0	1	3	8.6	0	0.5	6
West Virginia	9	0	0	0.5	0.8	3	0	0	1
Wisconsin	9	0	1	2.8	5	13	0	3.5	13
Wyoming	8	0	0	2	3	9	0	1	7

This table provides state-level ensemble forecasts for forecast month of peak WNND incidence. Ensemble forecast values are shown for the month of forecast peak, 5th, 25th, median, 75th, and 95th percentiles, as well as 10-year historical minimum, median, and maximum values.