ArboMAP: Arbovirus Modeling and Prediction to Forecast Mosquito-Borne Disease Outbreaks

Summary of Model Outputs (v2.0)
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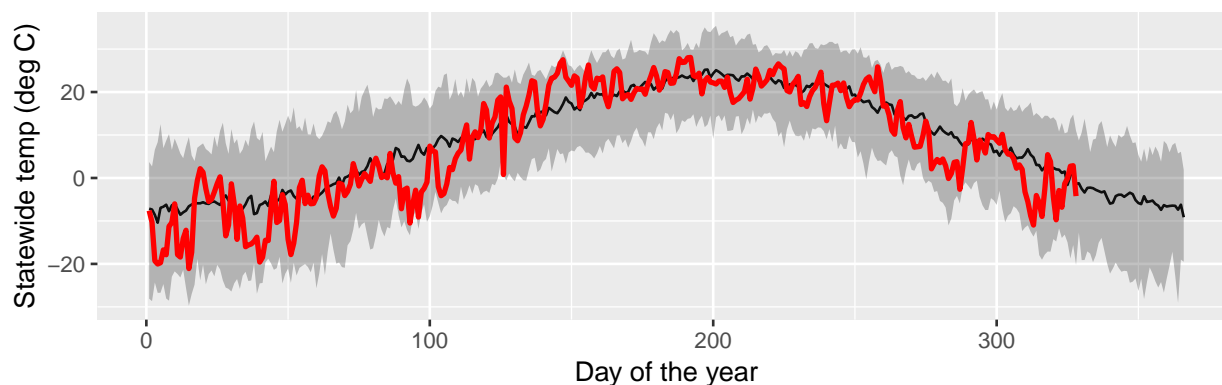
Updated January 07, 2019

Data used for predictions

Weather data

Weather data from the gridMET data set range from 1999-01-01 to 2018-11-24. Below are graphs of statewide daily averages of temperature and the vapor pressure deficit. The min/max/median for all years are in grey, and observations from this year are in red.

Higher temperatures typically mean higher risk of mosquito-borne infection. Since the beginning of this year, the average statewide temperature in 2018 has been 8.2°C, compared to 8.3°C in all years. The vapor pressure deficit in 2018 has been 0.6 kPa, compared to 0.6 kPa in all years. Lower vapor pressure deficit typically means more risk of infection, because there is more moisture in the air, which typically increases mosquito activity.
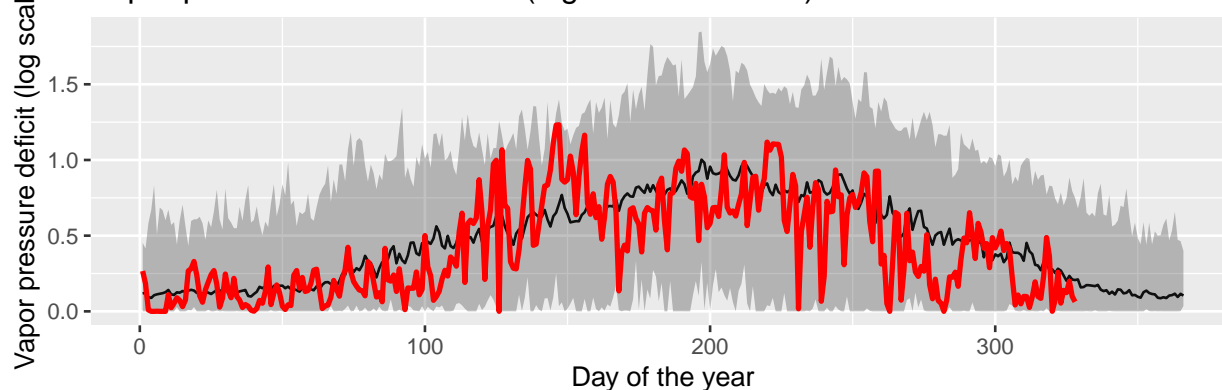
Mosquito infection data

There are 16274 samples in the mosquito testing database. For 2018, there are 1697 tested pools, with 66 (3.9%) positive. The estimated risk of human infection due to the early-season mosquito infection growth rate is shown below. Higher means that the virus is spreading more rapidly among mosquitoes, and more human cases should be expected. The regions are mapped below.

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## singular fit
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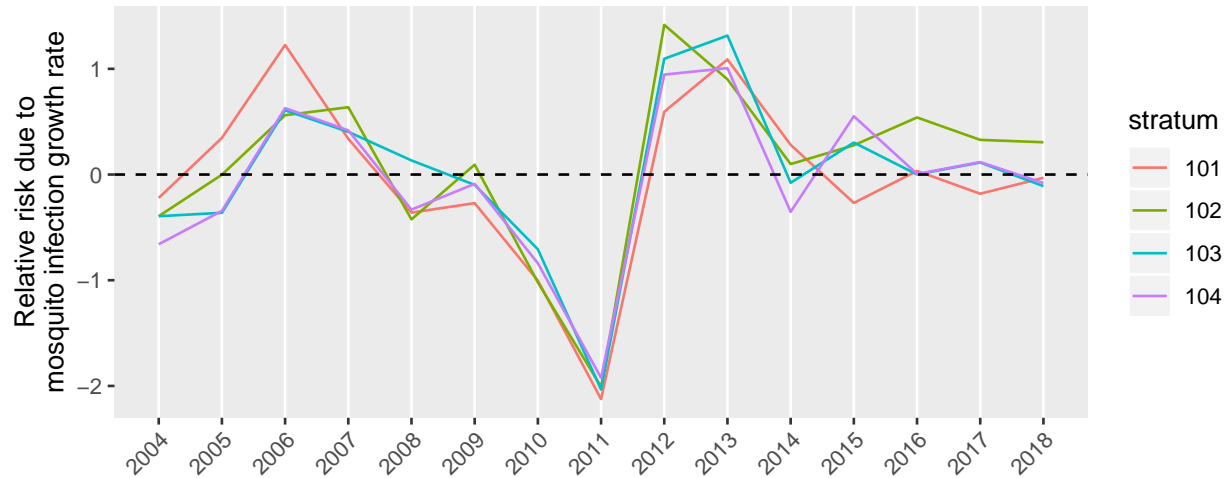

State stratification map
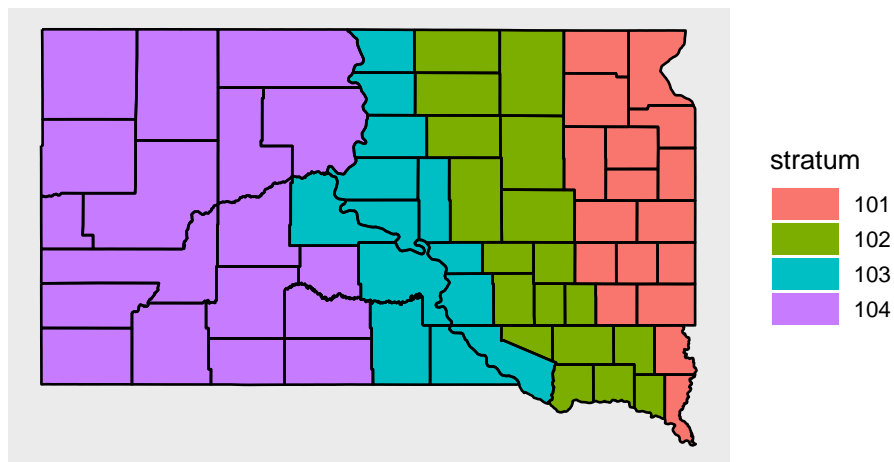
The following graph shows the estimated growth of positive pools for every year (grey), with 2012 (blue) and 2017 (blue, dashed) selected for comparison, and estimates and observations for 2018 (red). The lines are modeled pool positive rates; the actual statewide positive pool rate for 2018 is shown here by grouping observations nearby in time.
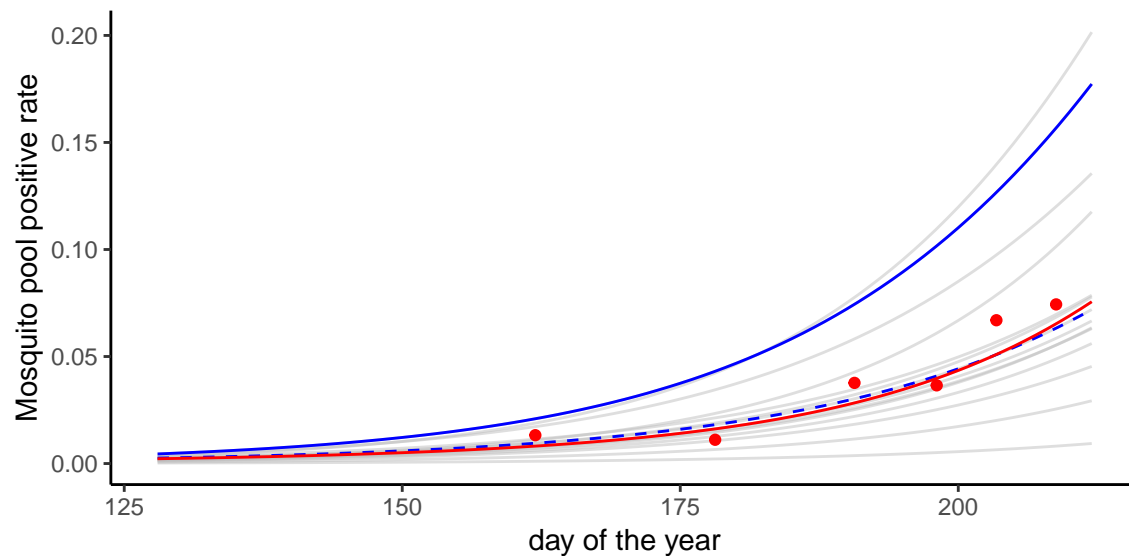
Human data

The predictive model of human WNV was calibrated using 1324 historical human cases, not including any cases from 2018. No cases from 2018 are used to make predictions; the estimates for this year are based solely on weather and mosquito data. Typically, 62% of a year's cases occur before the end of this week in any given year.

# Model results

Statewide trends

The graphs below show observed statewide risk (black) and estimated risk (red) up to Sunday 2018-12-30. Observed risk should be completely zero during the last year - these data are not used in the model, and will only be updated once final human case data are received at the end of the year.

Statewide model predictions
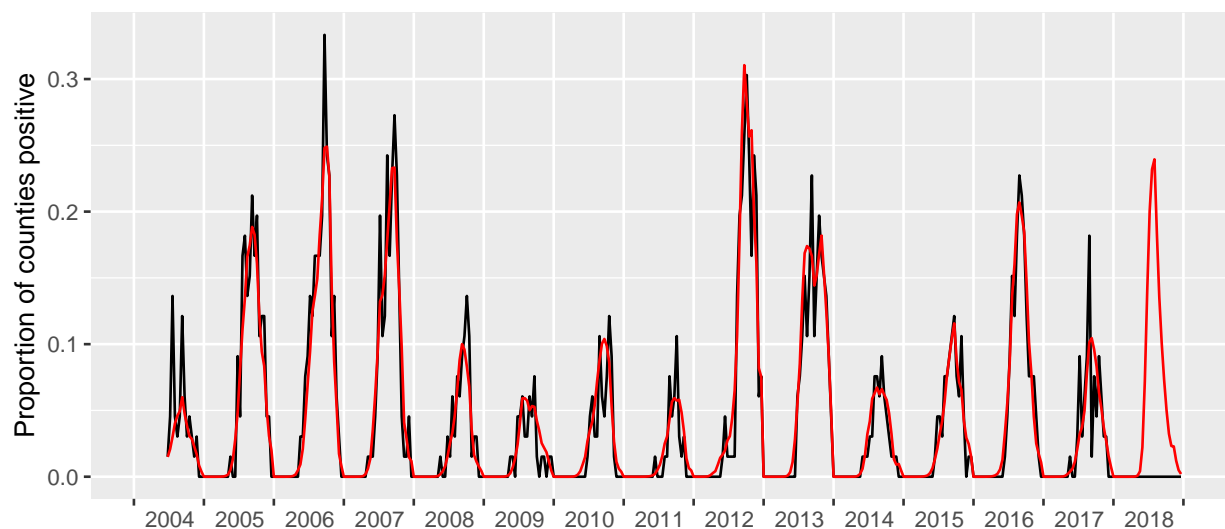
Predictions for 2018 are compared to observations in 2012 and 2017. We expect 6.7 counties to have at least one human case between Sunday 2018-08-12 and Saturday 2018-08-18.

Estimates for 2018 compared to observations in 2012 and 2017 with week beginning 2018–08–12 highlighted
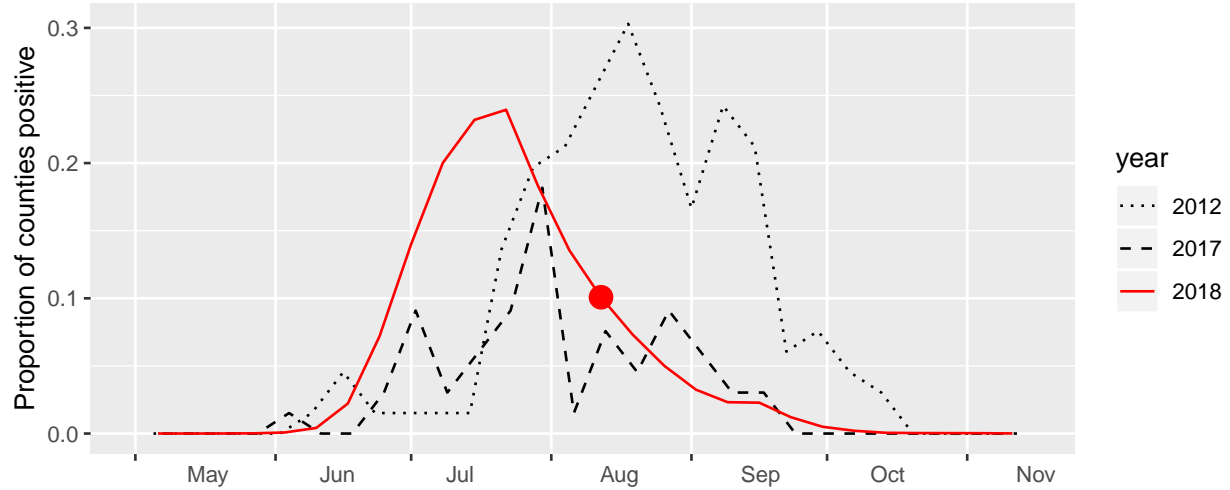

We expect that there will be 102.7 positive county-weeks this year. If we assume that each positive county-week corresponds to 1.14 cases, which is an estimate based on historical data, then this yields a total of 117.1 cases estimated for 2018.
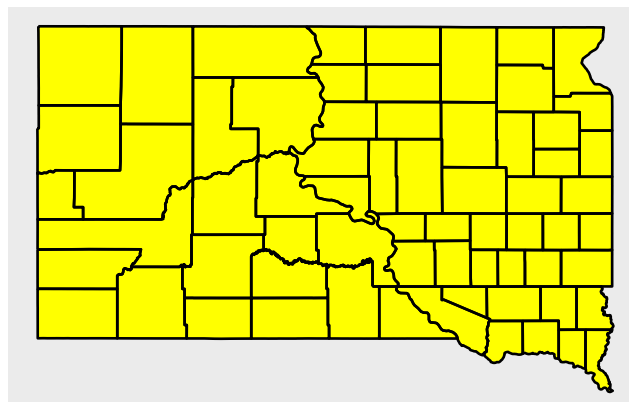
Results for 2018-08-12 to 08-18

We visualize the raw estimated risk for 2018-08-15 below. If a county is darkest blue, then we estimate that there should be no human cases reported for this county, during this week. If a county is brightest red, we are certain that there will be at least one human case reported for this county, during this week.

Estimate for week beginning 2018–08–12

Will definitely not
report any cases

Will definitely
report some cases
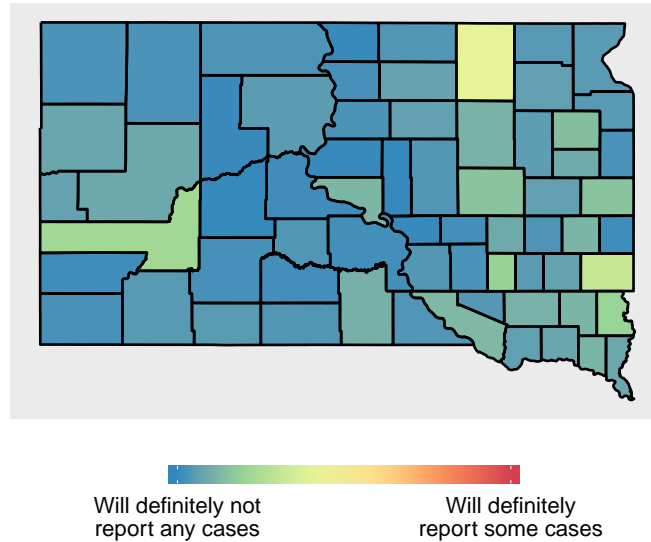
This map indicates whether probabilities reported in the previous map are higher (red) than average, lower (blue) than average, or right about normal (yellow) compared to the same week in previous years.

Risk for 2018–08–12 to 08–18

About average