West Nile virus forecast model submission form
Email completed form to vbd-predict@cdc.gov

Team name
Los Alamos National Laboratory

Team leader

Name	Institution	Email
Morgan Gorris	Los Alamos National Laboratory	mgorris@lanl.gov

Other team members

Name	Institution	Email
Deborah Shutt	Los Alamos National Laboratory	dshutt@lanl.gov
David Osthus	Los Alamos National Laboratory	dosthus@lanl.gov

Model description
Provide a brief summary of the model methods with sufficient detail for another modeler to understand the approach being applied. If multiple models are used, describe each model and how they were combined.

We created a forecast of WNV neuroinvasive cases for 2020 considering the mean and variance of the number of cases from 2005-2019. We characterized the forecast probability and point forecast in each county based on one of the following three criteria:

1. If there were no cases of nueroinvasive WNV from 2005-2019, we assigned 0.85 to the first bin [0,1); 0.1 to the second bin [1,6); 0.05 to the third bin [6-11); and 0.00 to the remaining bins. Our point forecast is 0 cases.
2. If the mean of nueroinvasive cases from 2005-2019 was greater or equal to the variance, we assumed a Poisson distribution across the forecast bins using the historical mean of the number of cases as the expected value. We created our probability distribution by randomly sampling the Poisson distribution across the bins 1,000,000 times. Our point forecast is the mean of nueroinvasive cases from 2005-2019.
3. If the mean of nueroinvasive cases from 2005-2019 was less than the variance, we translated the number of cases in each year to the bin in which the case total fell. Then, we used the bin number to fit a negative binomial generalized linear model. We used the parameters from the fitted

model to randomly sample 1,000,000 times to create the corresponding negative binomial distribution across the forecast bins. Our point forecast is the mean value of the bin spread within the bin of highest probability, rounding down if the number isn't whole (e.g., for the 6-11 bin, the point forecast is 8 cases).

We forecast the total number of neuroinvasive cases in the US for 2020 at 3,188.

Variables

List each variable used and its temporal relationship to the forecast. If multiple models are used, specify which enter into each model.

1. Mean and variance annual neuroinvasive cases, averaged from 2005-2019
2.
3.
4.
5.
6.
7.
8.
9.
10.

Computational resources

Describe the programming languages and software tools that were used to write and execute the forecasts.

R and Python

Publications

Note whether the model was derived from previously published work and, if so, provide references.

N/A

Participation agreement

By submitting these forecasts, the team agrees to abide by the project rules and data use agreements.

Team lead name	Date
Morgan Gorris	6-30-2020