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

Team name CVB (Center for Vector Biology)		

Team leader

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Other team members

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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.

A Bayesian model was created in Stan computational framework (http://mc-stan.org/) accessed with brms package (Bürkner, 2017). To improve convergence and guard against overfitting, mildly informative default conservative priors were specified. Raw numbers of WNV human cases were converted into bins as specified in the output requirements. Each observation was weighted to produce inverse weights. Predictors were selected from climatic, land use, and lagged WNV activity variables. Highly correlated predictors were removed prior to analysis.

$$\text{bins|weights(weights)} \sim \text{region*suburb\_per} + \text{region*agr\_per} + \text{prev.yr.PCP} + \text{janminT} + \text{wnvlag2} + \text{avg\_nei\_ct} + \text{offset(log(pop\_den))} + (1|\text{fips})$$

Variables

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

1. region – climatic NOAA region
2. suburb_per - % suburban areas each county
3. agr_per - % agricultural areas each county
4. prev.yr.PCP – previous year precipitation
5. janminT – minimum temperature in January
6. wnvlag2 – 2 year lag of WNV cases in the county
7. avg_nei_ct – average number of WNV cases in the neighboring counties, 2003-2018
8. pop_den – population density per county

| 9. fips – location, i.e. "group" level or "random" effect |
| 10. |

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

| R, package brms, other packages used to process the data |

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

| Agricultural and urban land covers Bowden et al 2011 Regional Differences in the Association Between Land Cover and West Nile Virus Disease Incidence in Humans
Min temp in January   Manore et al 2014 Towards an Early Warning System for Forecasting Human West Nile Virus Incidence
Annual precipitation preceding year Landesman, William J., et al. "Inter-annual associations between precipitation and human incidence of West Nile virus in the United States." Vector-Borne and Zoonotic Diseases 7.3 (2007): 337-343 |

Participation agreement

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

| Team lead name | Date |
| Ilia Rochlin | 4/24/2020 |