# Mosquito Surveillance Report

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## Contents



# Executive Summary

## Most Recent Collection

As predicted, the most recent trap collection (July 02, 2014) saw rising levels of mosquitoes, with geographic dispersal throughout the county.

## Forecast

We forecast that mosquito levels will rise steadily through the next two weeks from current levels (a weekly rate of approximately 165 specimens per trap) to nearly 300 specimens per trap (70% confidence range for July 21st = 115 to 430 mosquitoes per trap).

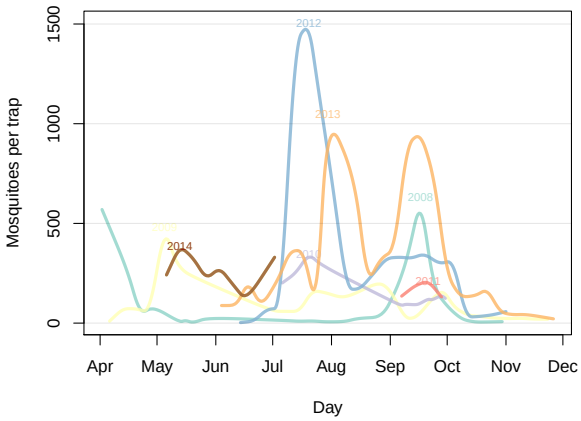
## Predictive Model Validation

At 330.2 specimens per trap, the most recent collection was higher than our prediction of 115.

# Visual Overview

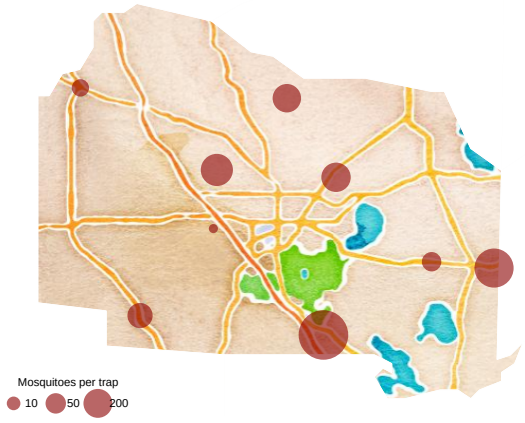
## Time

As with previous years, the current mosquito population has shown signs of increasing.



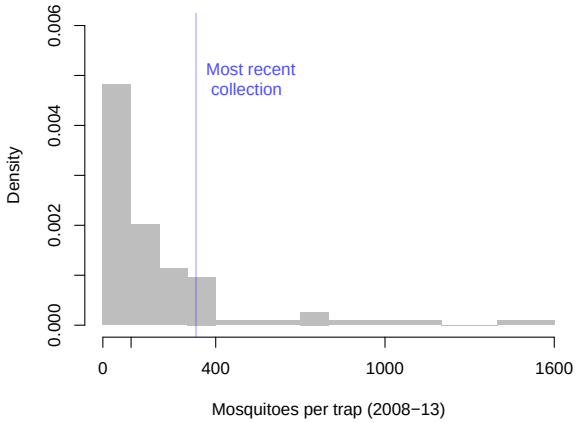

## Space

Mosquitoes were largely scattered throughout the county, with a slight concentration in the southeast.



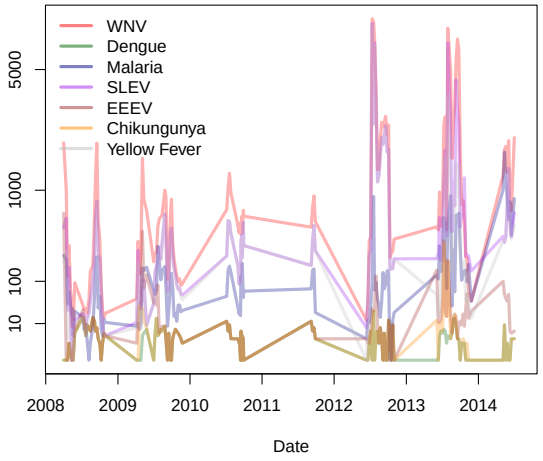

## Normality

The most recent collection was at levels equivalent to approximately the 65th percentile of historical (2008-13) levels.



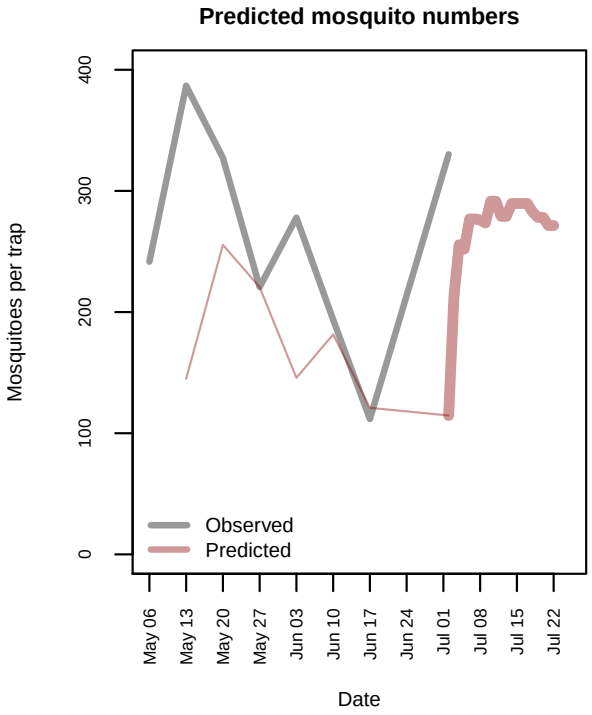

## Disease Vectors

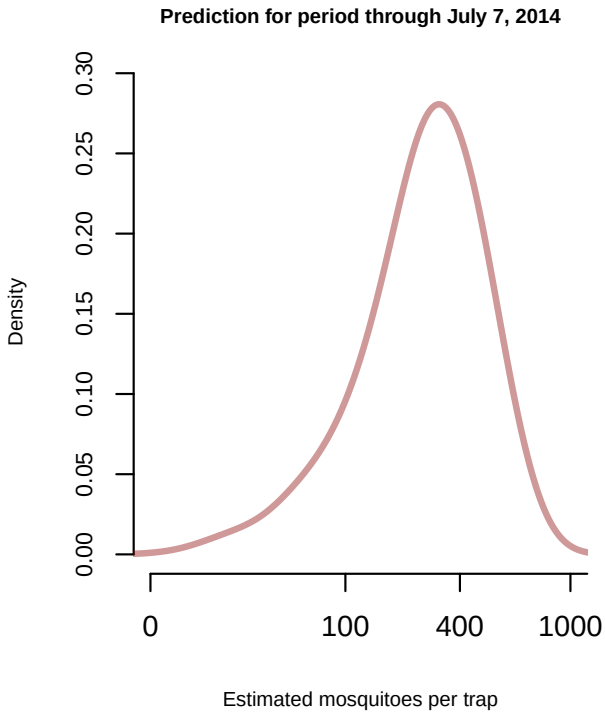
Of recently trapped mosquitoes, those species capable of carrying WNV saw a rise last week.

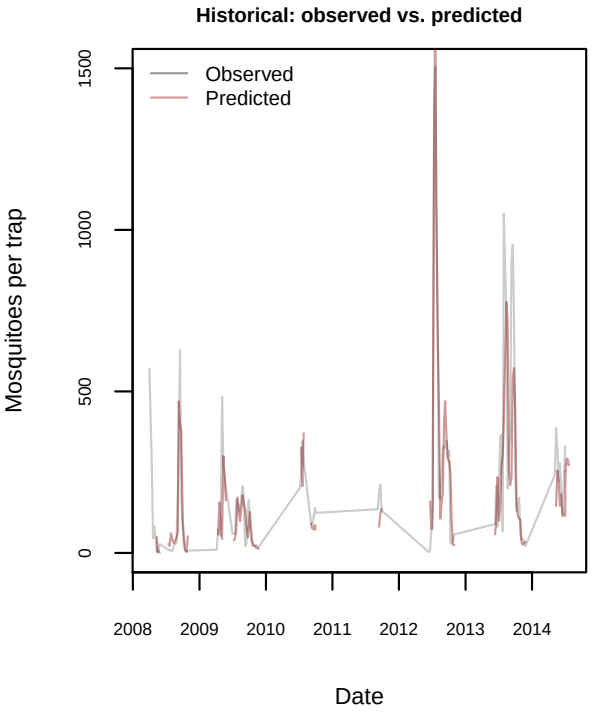


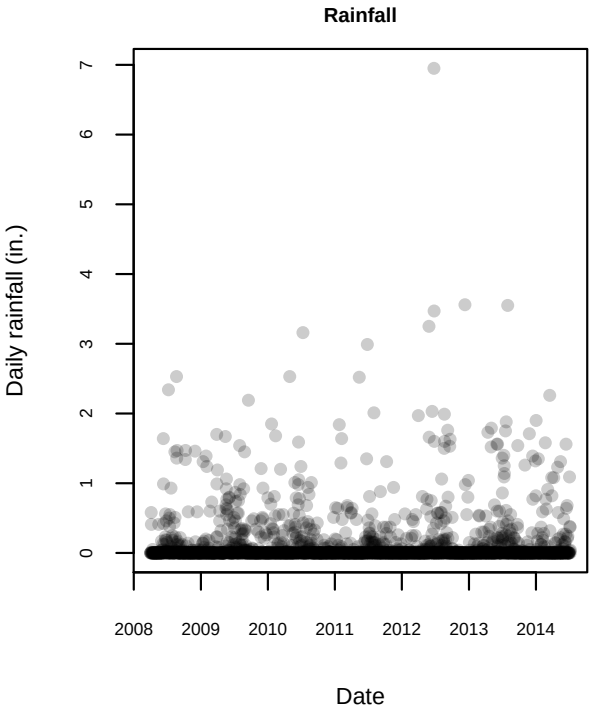
# Forecast

We use recursive, quadratic linear regression modelling to forecast the average number of mosquitoes per trap up to 15 days in advance.[1]



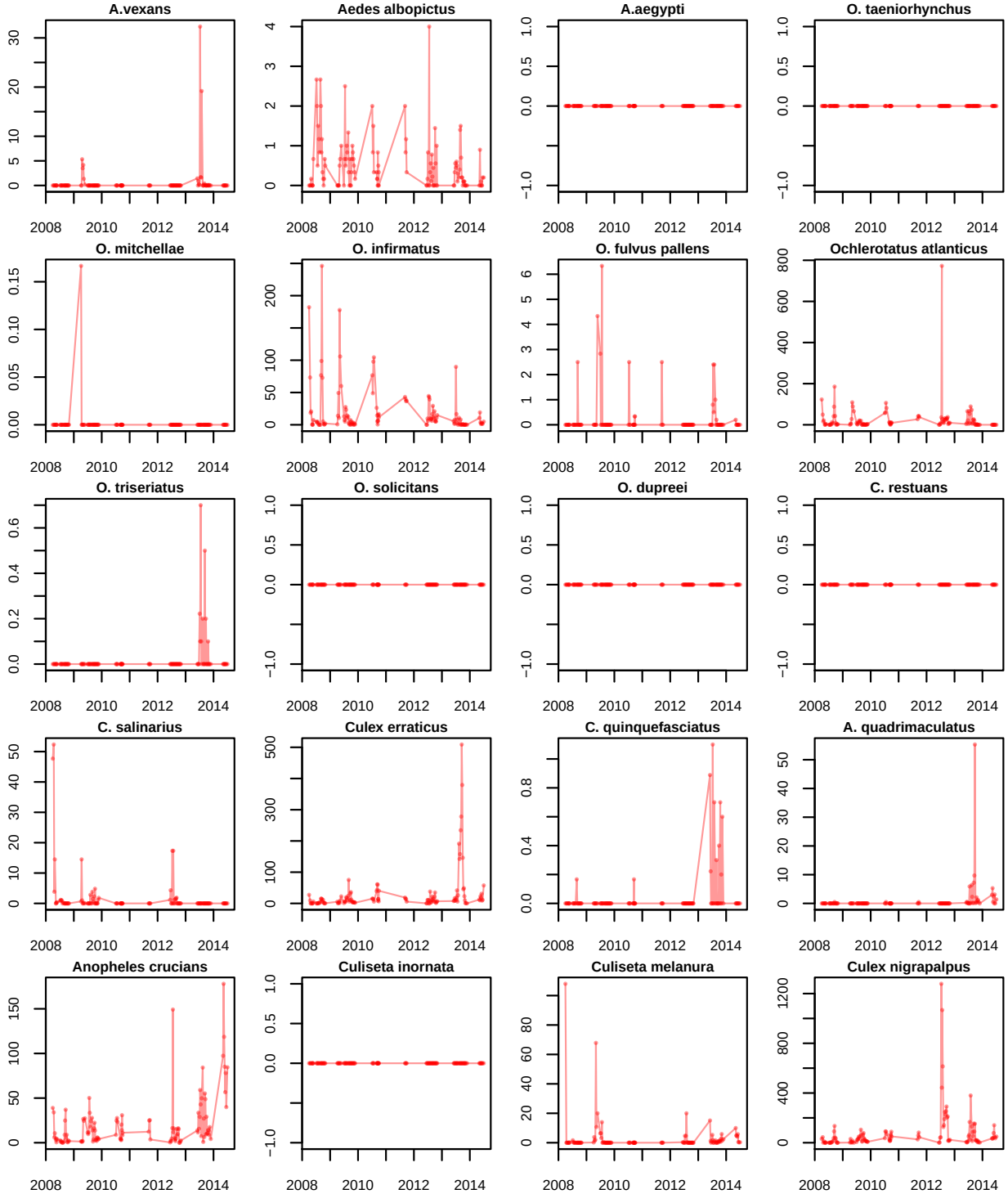



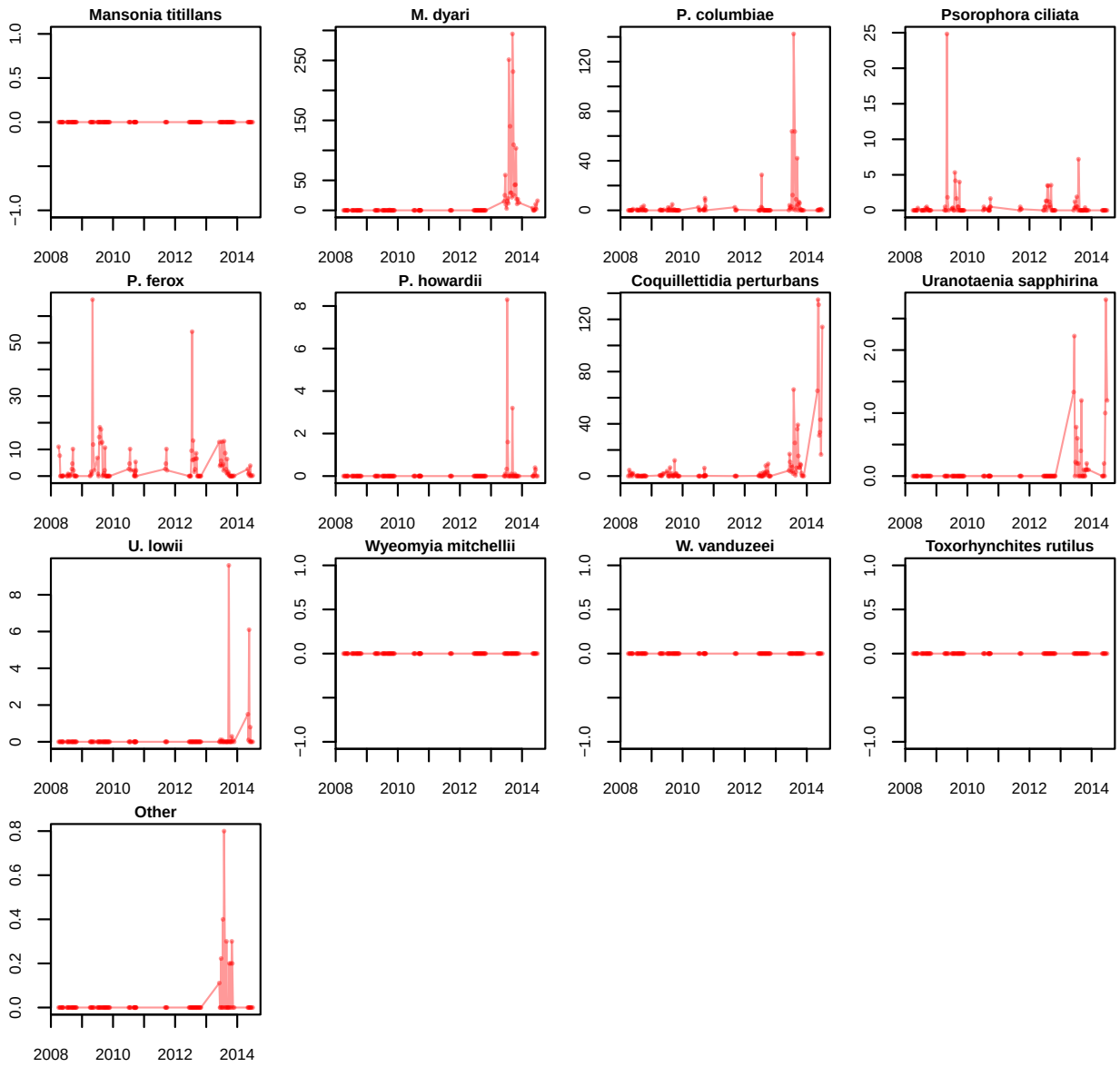

[1] We are actively experimenting with non-parametric approaches to improve modelling accuracy, and expect to have a modified KNN model with better results by late July.

# Vectors of Disease by Location

# Mosquito Types

No particular species shows abnormal growth in recent weeks.




Mansonia titillans
M. dyari
P. columbiae
Psorophora ciliata
P. ferox
P. howardii
Coquillettidia perturbans
Uranotaenia sapphirina
U. lowii
Wyeomyia mitchellii
W. vanduzeei
Toxorhynchites rutilus
Other
2008
2010
2012
2014

# Details of Predictive Model

Historically, the model has performed well, correctly predicting the late summer spikes in 2012 and 2013. Given the preference for accuracy at high numbers, the model intentionally includes outlying high observations, thereby weighting them.

Having simulated more than 65,000 unique models, our best fit equation (using the sum of least squares approach) was:

$$\hat{Y} = \beta_0 + \beta_1^2(5.6508) + \beta_2(0.5938)$$

where $\hat{Y}$ is the estimated mean number of mosquitoes per trap, $\beta_0$ is set to 0, $\beta_1$ is the cumulative rainfall in the period 15 to 29 days prior to the date of prediction and $\beta_2$ is the mean number of mosquitoes per trap in the most recent prior trap collection.

Though an original model relied only on rainfall, incorporating the most recent trap predicition saw our R-squared improve from 0.52 to 0.82. This means that we can now explain over 80% of the variance in mosquito populations up to 15 days ahead of time.