

# Early Season Abundance of *Culex restuans* as an Indicator of West Nile Virus Activity

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# Mosquito Surveillance at Valdosta State University

Laboratory of Dr. Mark Blackmore

- 14 trap sites in Lowndes County
- Gravid and CDC Light traps
- Mosquitoes identified to species
- Vector species tested for arboviruses



# *Culex* in Lowndes County

*Culex coronator*

*Cx. erraticus*

*Cx. nigripapus*

*Cx. restuans*

\* *Cx. quinquefasciatus*

*Cx. salinarius*

*Cx. territans*

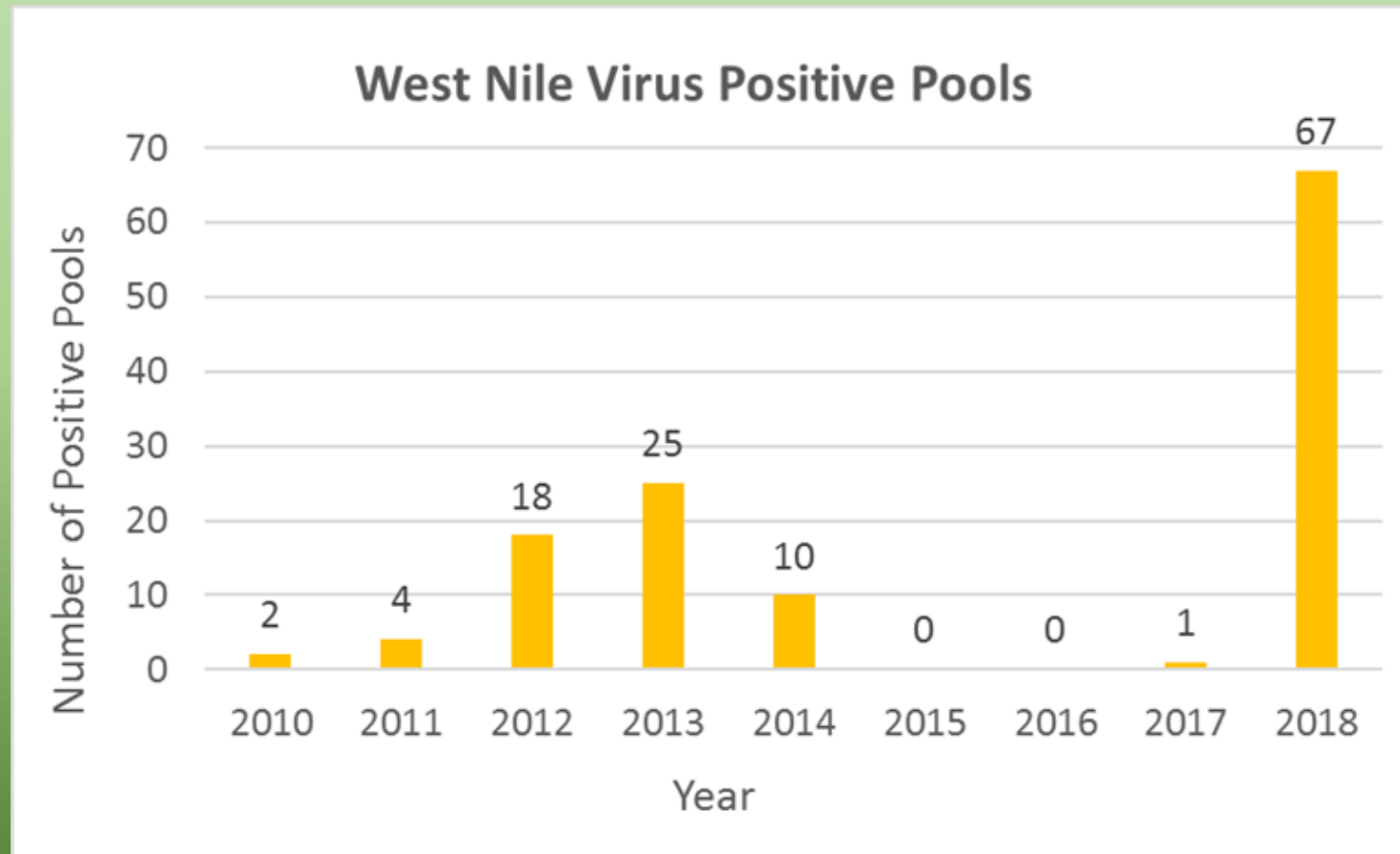
Pooled for testing



*Culex quinquefasciatus*, photo by James Newman, University of Florida

# 2018 West Nile Virus in Lowndes

- 2018: record high numbers of WNV positive pools

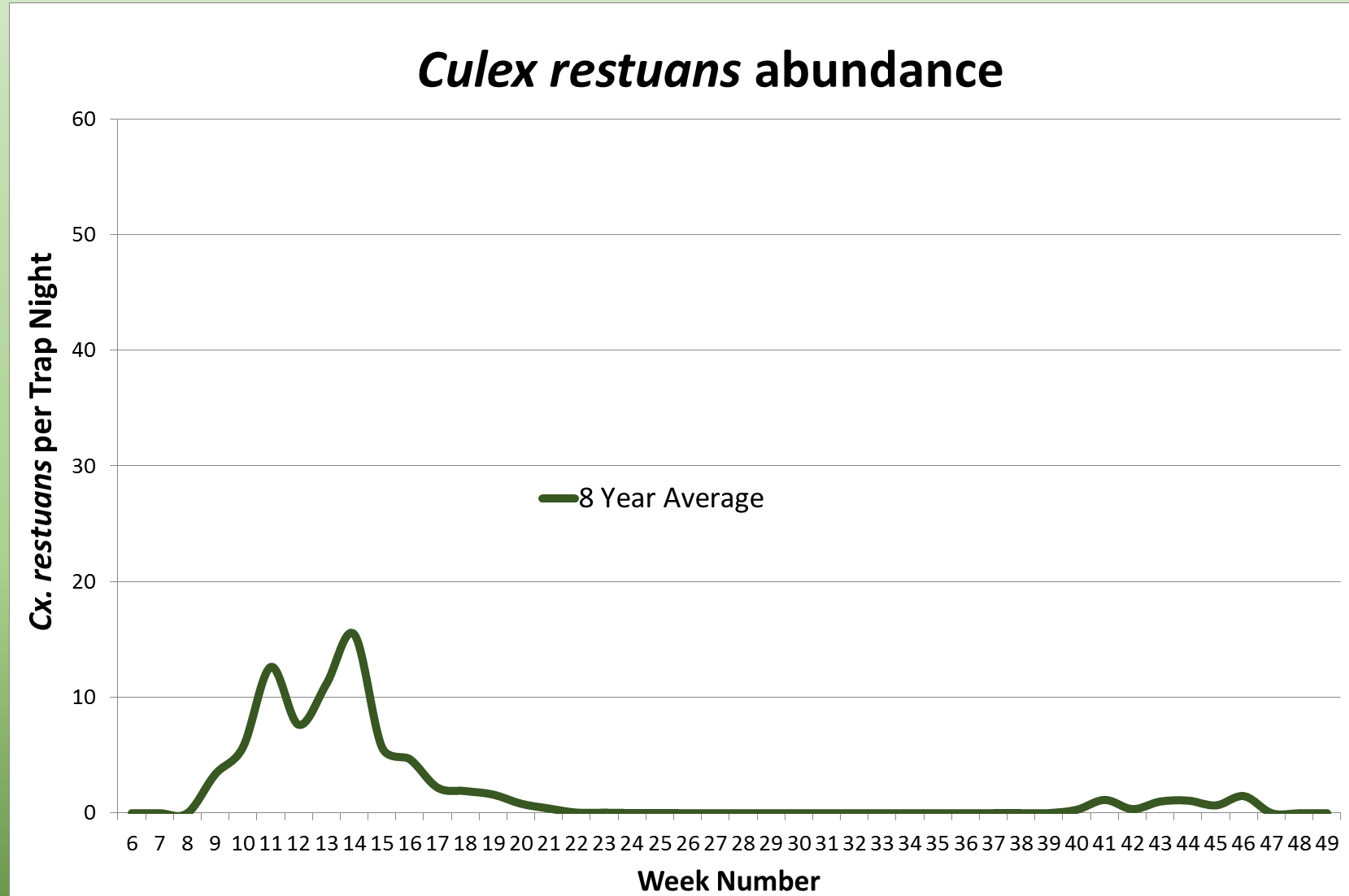


# *Culex restuans*

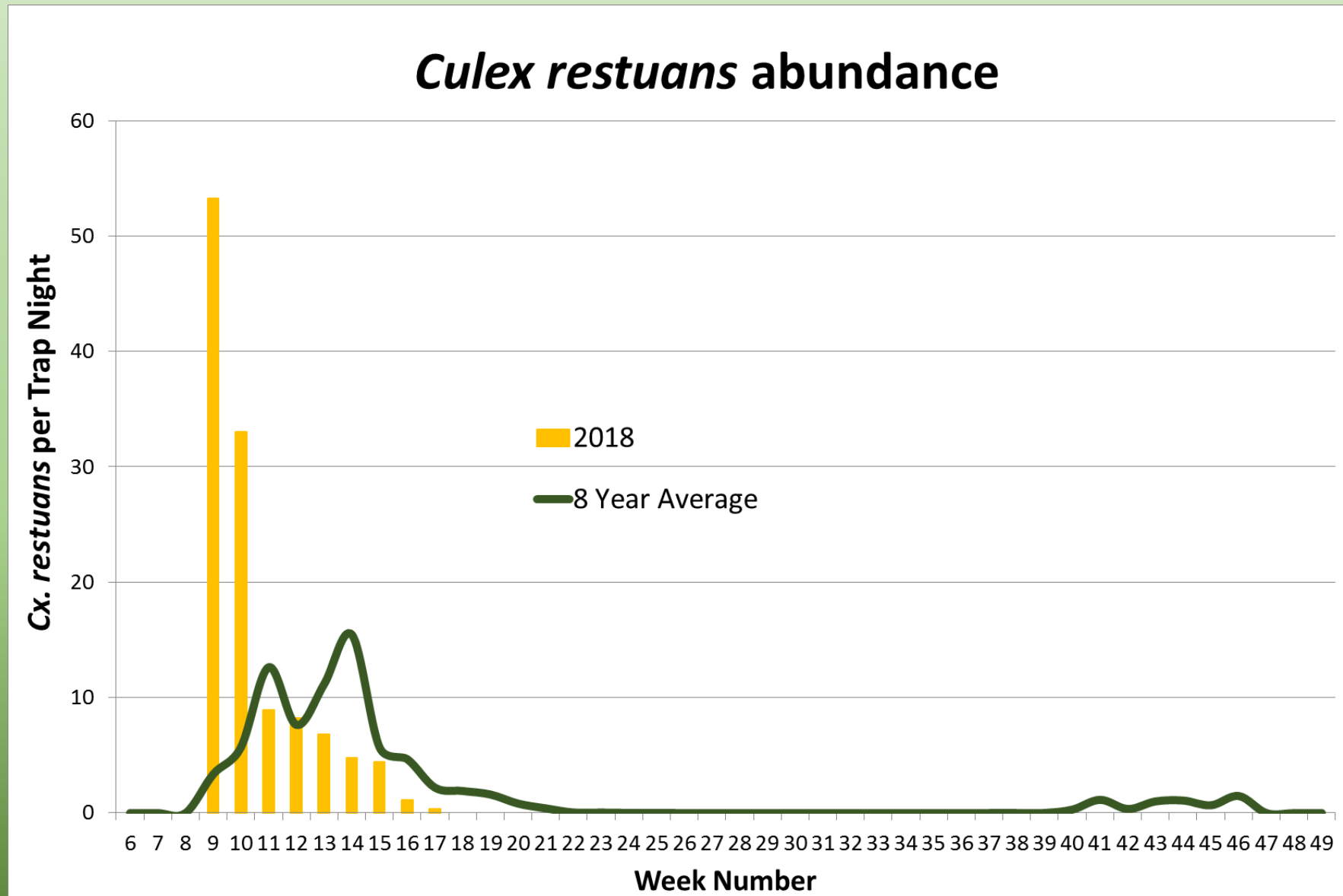
- Populations peak in spring and fall
- Tested for WNV
  - seldom in large numbers due to summer decline



*Culex restuans* photo by Ilona L., 2010



*Cx. restuans* abundance higher in 2018



# Correlation?

- Is there an association between increase in *Cx. restuans* & number of WNV positive pools?
- 3 potential factors:
  - 1) How far into the year *Cx. restuans* persist
  - 2) Part of the year before *Cx. quinquefasciatus* becomes more abundant
  - 3) Overall abundance of *Cx. restuans*

# *Cx. restuans* Data

- Compiled data from 2010 – 2018:
  - Last week of *Cx. restuans* persistence
  - Last week where ratio of *Cx. restuans* to *Cx. quinquefasciatus* exceeded 1
  - Average number of *Cx. restuans* per gravid trap for each week
    - Average of all weeks = abundance



# WNV Infection Rates

- Sites with high risk of WNV exposure assessed
- PoolScreen software: maximum likelihood estimate of WNV infection rates in *Cx. quinquefasciatus*

# Statistical Analyses

- Correlation coefficients calculated for each variable and MLE's
- Correlated variables used to produce regression line

## Last Week of Persistence

Year	Week #
2010	21
2011	25
2012	25
2013	23
2014	23
2015	21
2016	22
2017	20
2018	23

## Crossover Week

Year	Week #
2010	17
2011	15
2012	11
2013	10
2014	18
2015	14
2016	15
2017	12
2018	16

## *Cx. restuans* Abundance

Year	Mosquitoes/Trap
2010	5.7
2011	3.7
2012	3.9
2013	1.6
2014	9.4
2015	5.5
2016	7.1
2017	1.1
2018	13.4

## Maximum Likelihood Estimates of Infection Rates

Year	Infection Rate
2010	0.00018
2011	0.00085
2012	0.00130
2013	0.00170
2014	0.00092
2015	0.00000
2016	0.00000
2017	0.00000
2018	0.00730

# Correlation Coefficients

Last week of persistence = 0.29

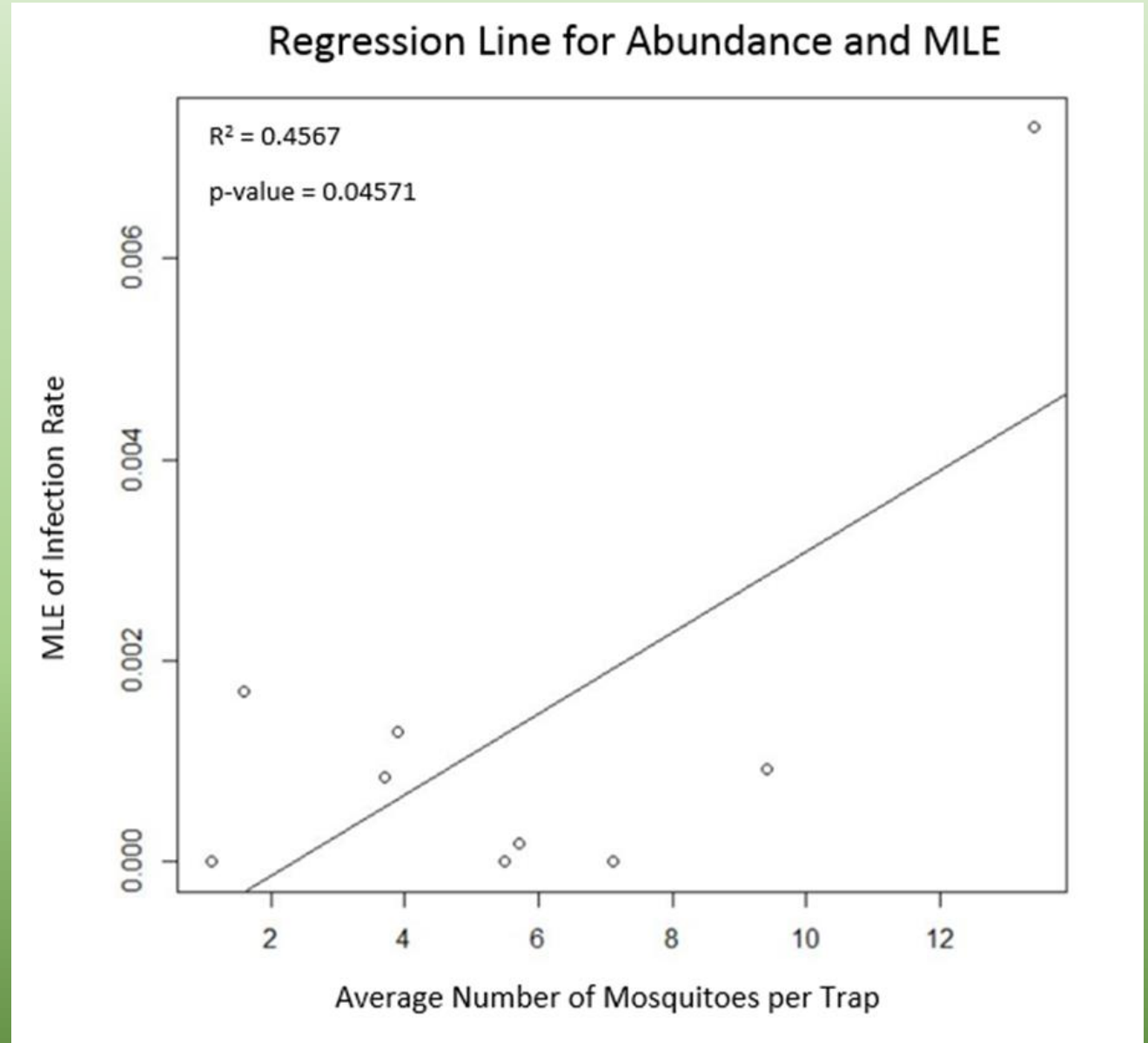
Week of abundance shift = 0.12

*Cx. restuans* abundance = 0.68

# Regression

$$y=0.00043x-.00094$$

- Predicts infection rate from 2019 data that is within the actual confidence interval





# Discussion

- *Cx. restuans* likely amplifies virus early in the year, before emergence of *Cx. quinquesfasciatus*
- *Cx. restuans* overwinter as adults with minor activity
- If WNV overwinters in vector, *Cx. restuans* more likely
- Additional variables also important

# Thank You!

Dr. Mark Blackmore - access to data

Joshua Brown – assistance with R