

Determining Peak Activity Times of
Aedes albopictus
Using New BG-Counter and
Modified Rotator Trap

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City of Suffolk

Importance of Knowing Hourly Distributions of Your Mosquitoes

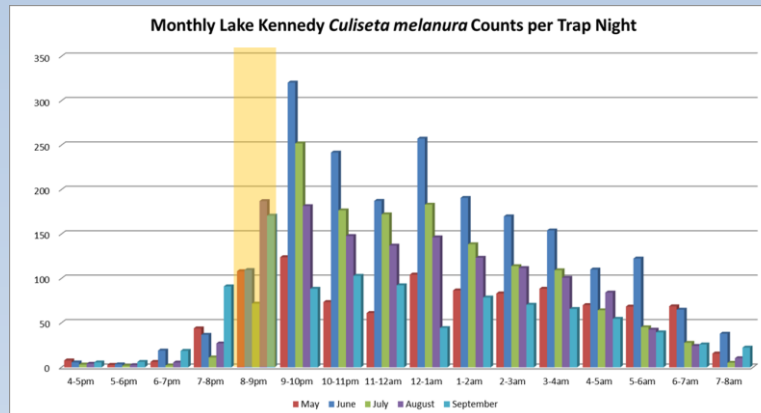
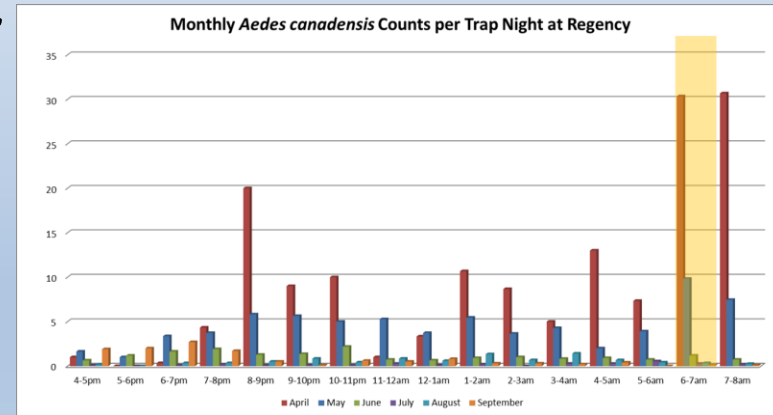
- Knowledge of mosquito behaviors can help with their control
- In adult mosquito control
 - Traps are set to find adult mosquito populations
 - Spray routes are then planned according to those trap collections.
 - Depending on the species caught, the time these spray routes take place can be altered for more effective control

Importance of Knowing Hourly Distributions of Your Mosquitoes

- Generalizations
 - Dusk and dawn
 - Common phrasing given to citizens to protect themselves
 - But not all species

Past Research On Mosquito Activity Times/Hourly Distributions

Aedes canadensis Distributions



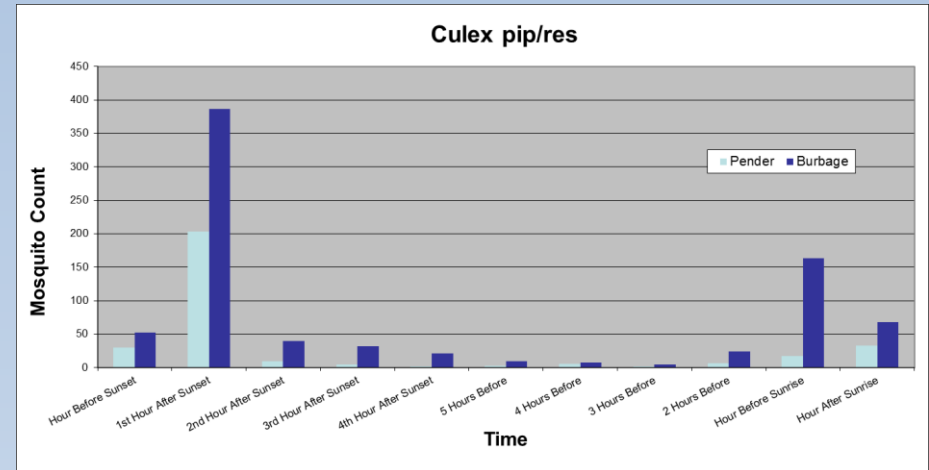
Culiseta melanura Distributions

Past Research On Mosquito Activity Times/Hourly Distributions

Gravid Study

Suffolk repeated PA's Study

Culex pipiens/restuans distributions



One Important Species We Were Still Interested in... *Aedes albopictus*



- Urban species
- Found near artificial containers holding water
- Active during the day
 - Daytime biters

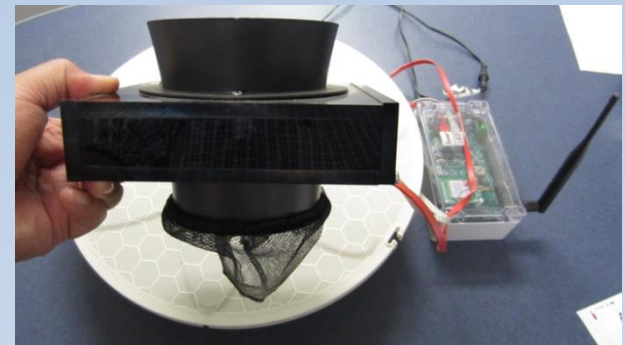
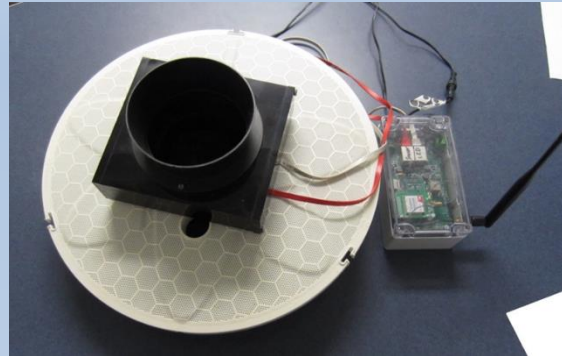


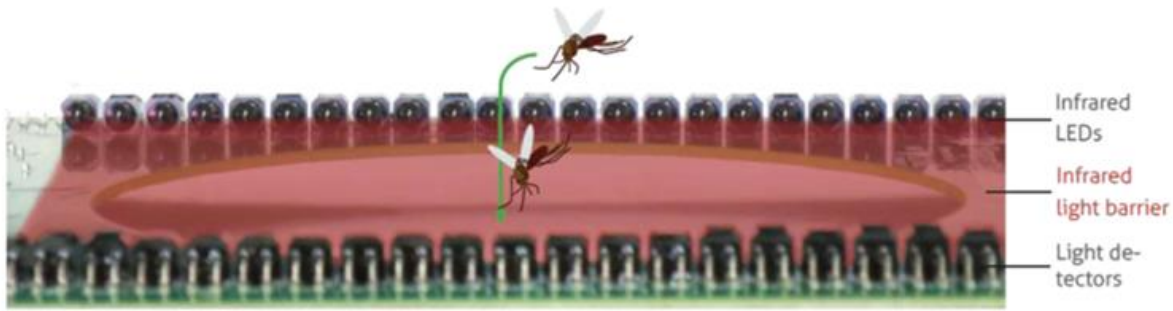
Biogents BG-Counter

Remote Mosquito Monitoring

Designed for surveillance
in remote areas

- BG trap fitted with a mosquito counting device
- Device sends data and is uploaded to website
 - Mosquito counts is 15 min intervals
- Device can be turned on and off remotely from your computer
 - Fan, Counter, CO2 Tank





An insect is sucked through the BG-Counter and disrupts infrared rays. This is detected by the light detectors

Filter

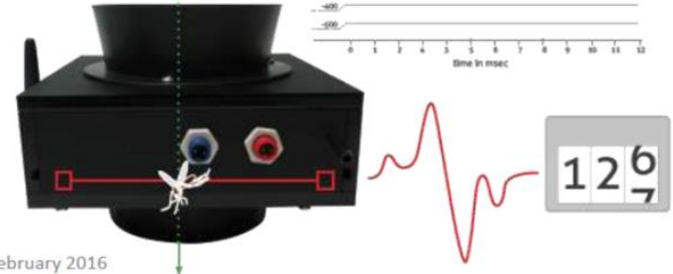
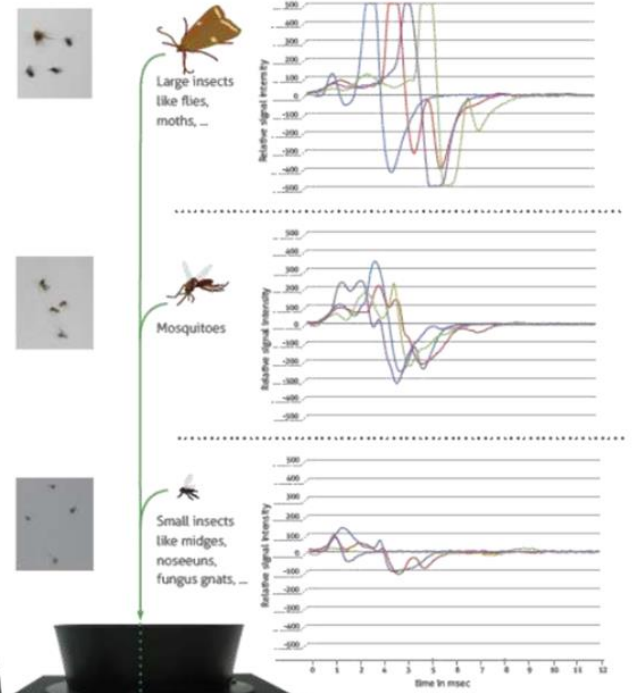
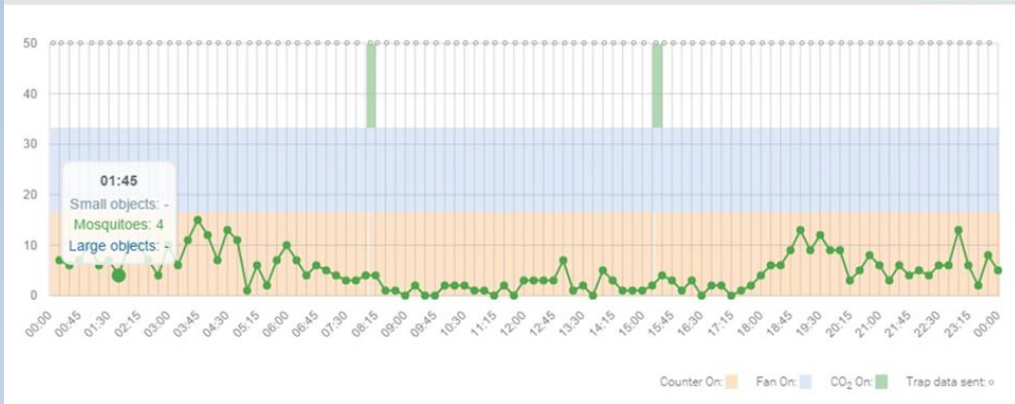
Filter by insect type

Filter by time (2015-10-28@00:00 - 2015-10-29@00:00)

- Show Mosquitoes
- Show large objects
- Show small objects

Chart of Captures from 2015-10-28@00:00 to 2015-10-29@00:00

Range of y-Axis: 0 - 50

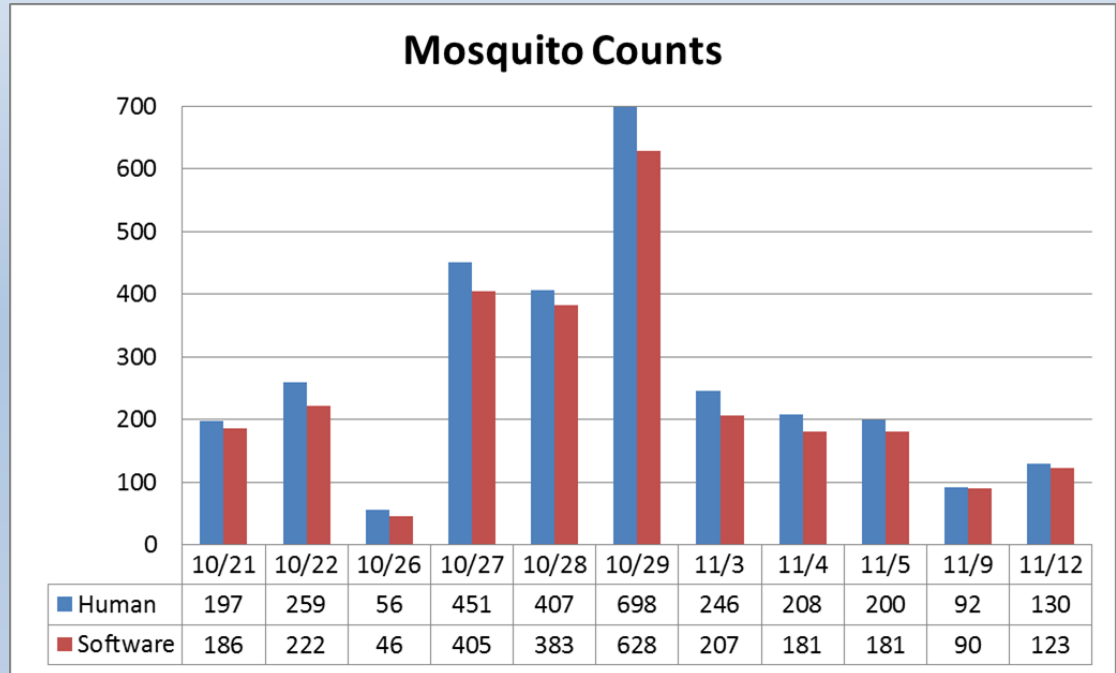


February 2016

Working With The BG-Counter

2015

- Trapped during October and November
 - 11 trapnights
- Looked at the accuracy of the counter
 - BG vs Human Count
 - **91% accurate**



Working With The BG-Counter



2016

- Focused on *Aedes albopictus*
- Chose an area with historically high *Ae. albopictus* populations and low mosquito diversity



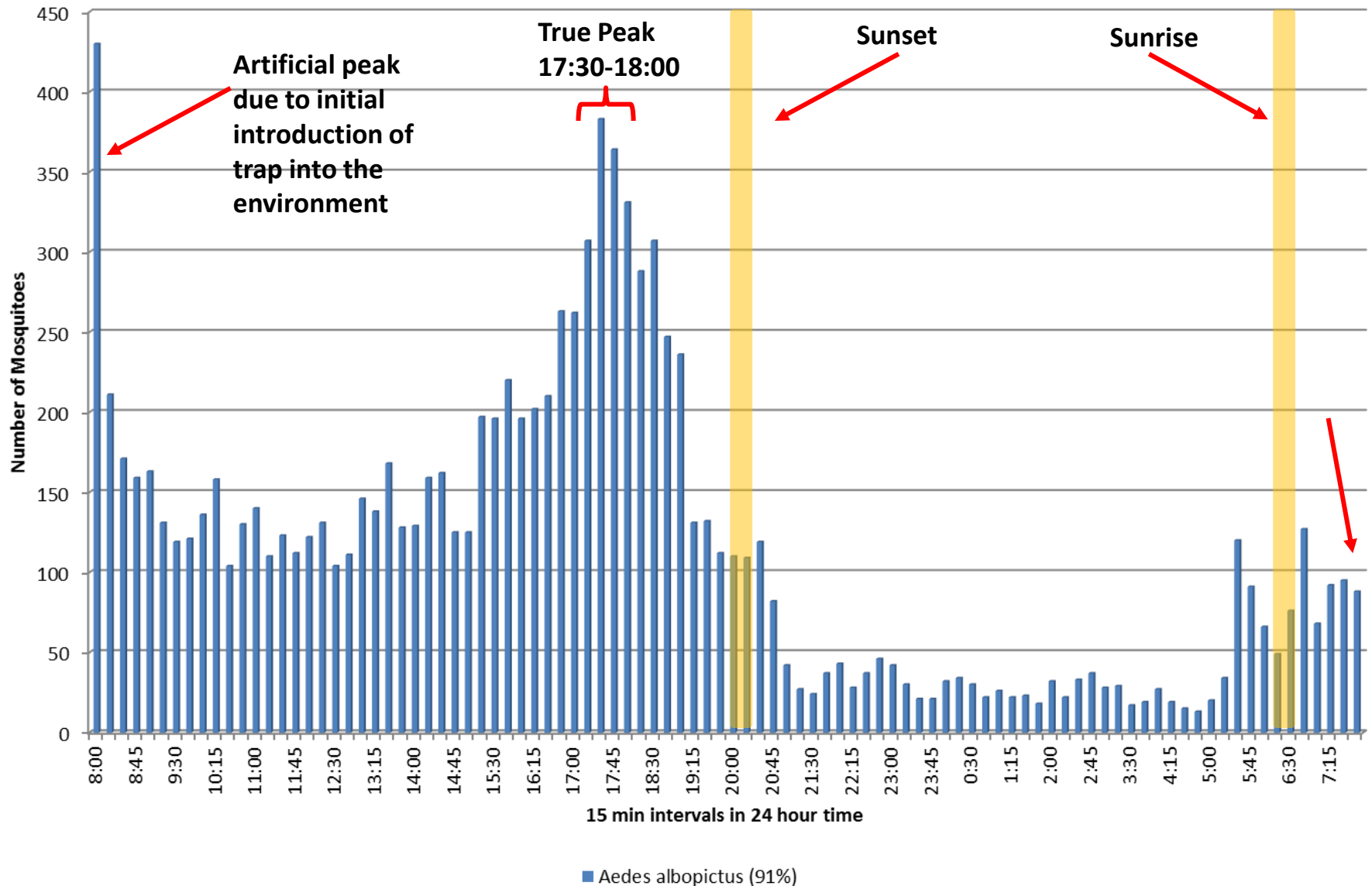
Working With The BG-Counter

2016

Assumptions In Data Analysis

- Trapped twice a week from June-September
 - Trapped for 24 hours, took trap away for at least 24 hours before trapping again
 - 29 trapnights
- Human vs Counter
 - Average of 95% accuracy
- 11,985 mosquitoes collected (90.9% *Ae. albopictus*)
 - 5,524 males (99.9% *Ae. albopictus*)
 - 6,461 females (83.2% *Ae. albopictus*)
 - *Ae. triseriatus* (6.9%)
 - *Cs. melanura* (2.3%)
 - *Cs. salinarius* (2.2%)
 - *Cx. pipiens* (1.7%)
 - *Ae. vexans* (1.5%)
 - Other species (2.2%)
- Behaviors may change throughout the season
 - Sunset times, temperature, changes in host species
- Avoid consecutive trapping days
 - Allow the population to recoup
- Counter is 95% accurate
 - 5% error is assumed to be distributed evenly
- 90.9% *Ae. albopictus*
 - 9.1% of the data is non albopictus
- Males made up 46.1% of mosquitoes
 - 50.7% of all *Ae. albopictus*
 - Looking at *Ae. albopictus* behavior as a whole, assuming male and female activity times are the same

Total number of *Aedes albopictus* Collected from June-September 2016 in 15 Minute Intervals

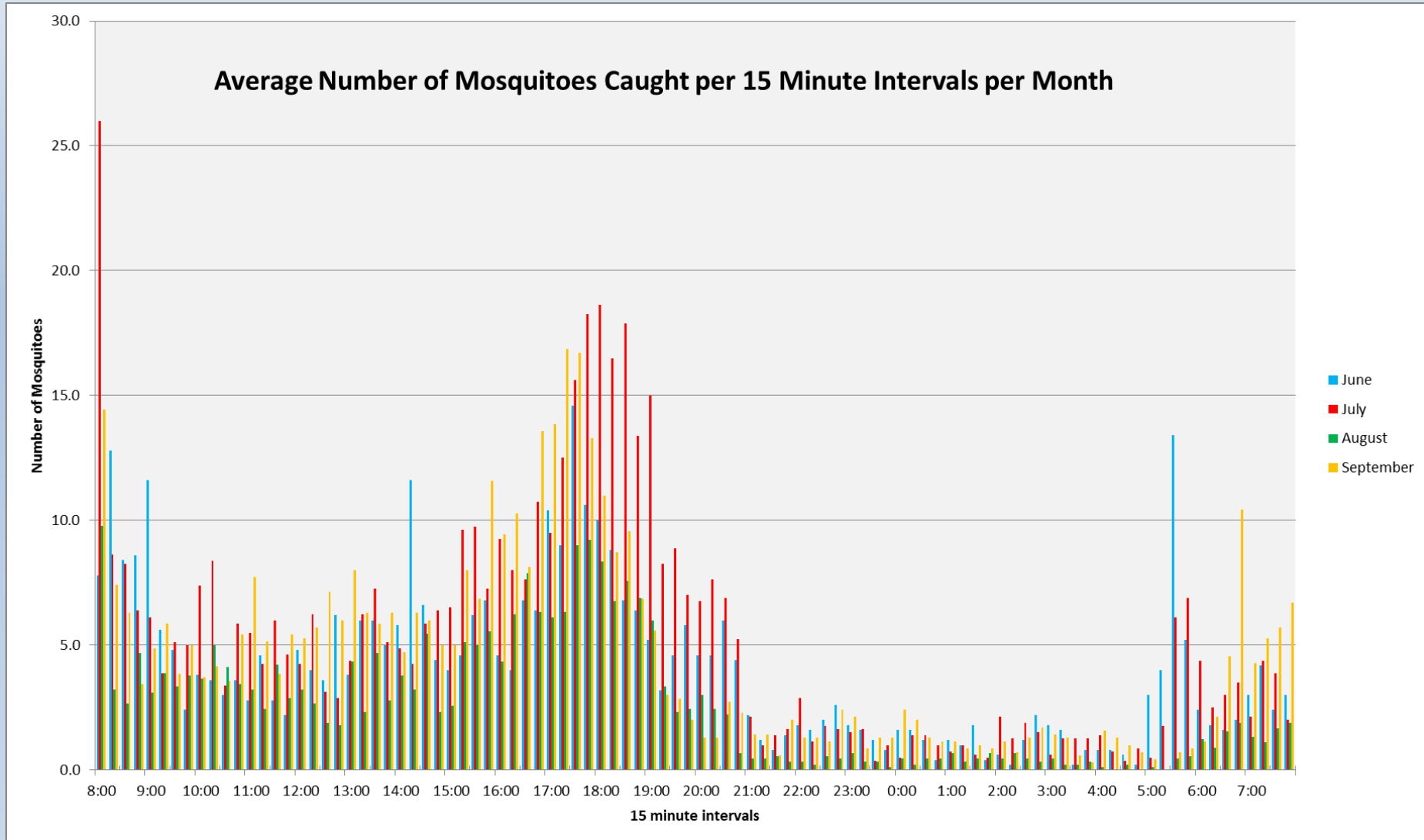


Sunset and Sunrise

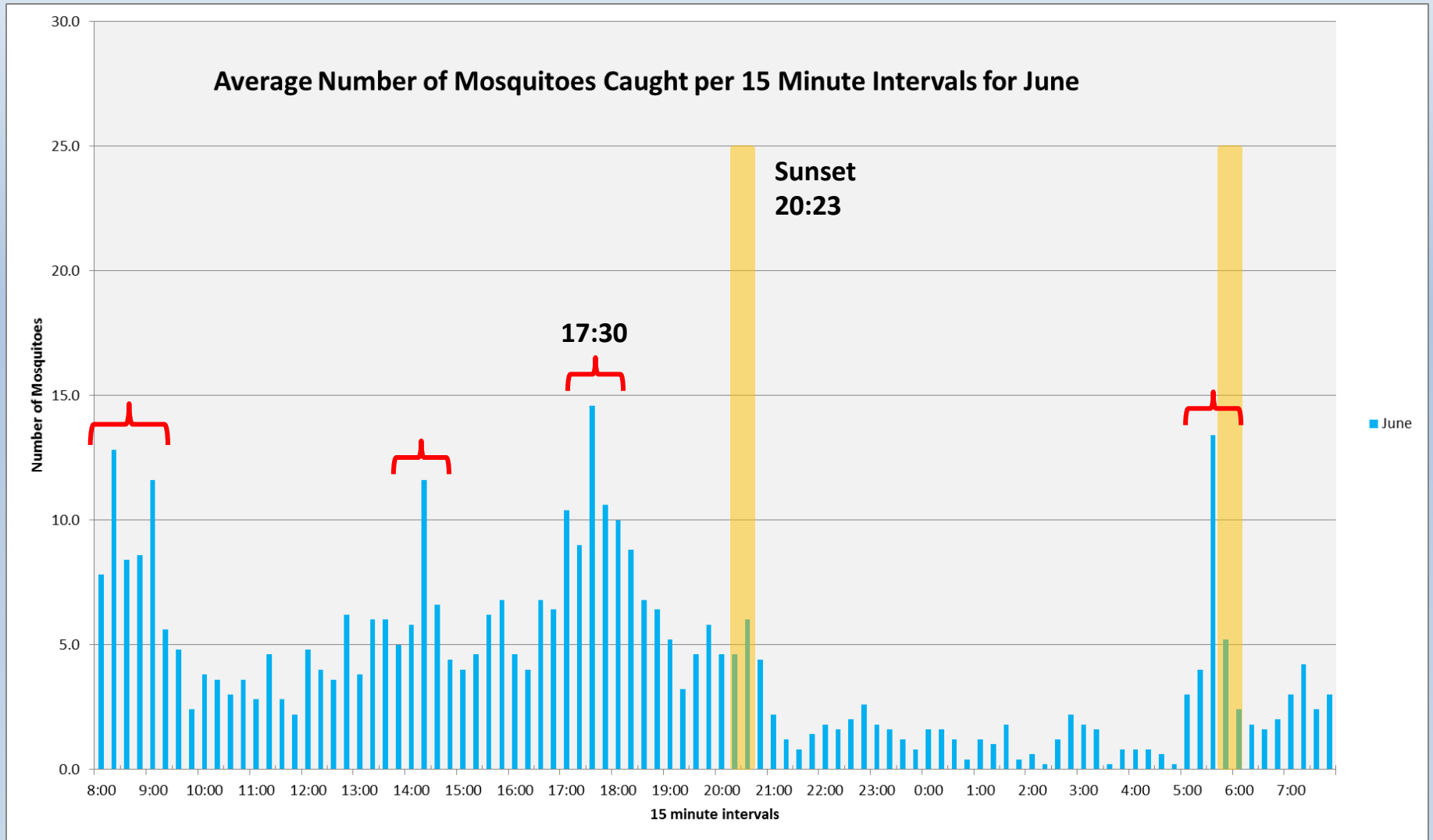
- Previous graph shows total mosquito counts from June-September
 - Seasonal average for June-September
 - Sunset – 7:55pm
 - Sunrise – 6:16am
- Changes in Sunset and Sunrise times
 - monthly data

Month	Sunset	Sunrise
April	7:43 pm	6:28 am
May	8:05 pm	6:00 am
June	8:23 pm	5:49 am
July	8:20 pm	6:02 am
August	7:45 pm	6:30 am
September	7:12 pm	6:47 am
October	6:35 pm	7:13 am

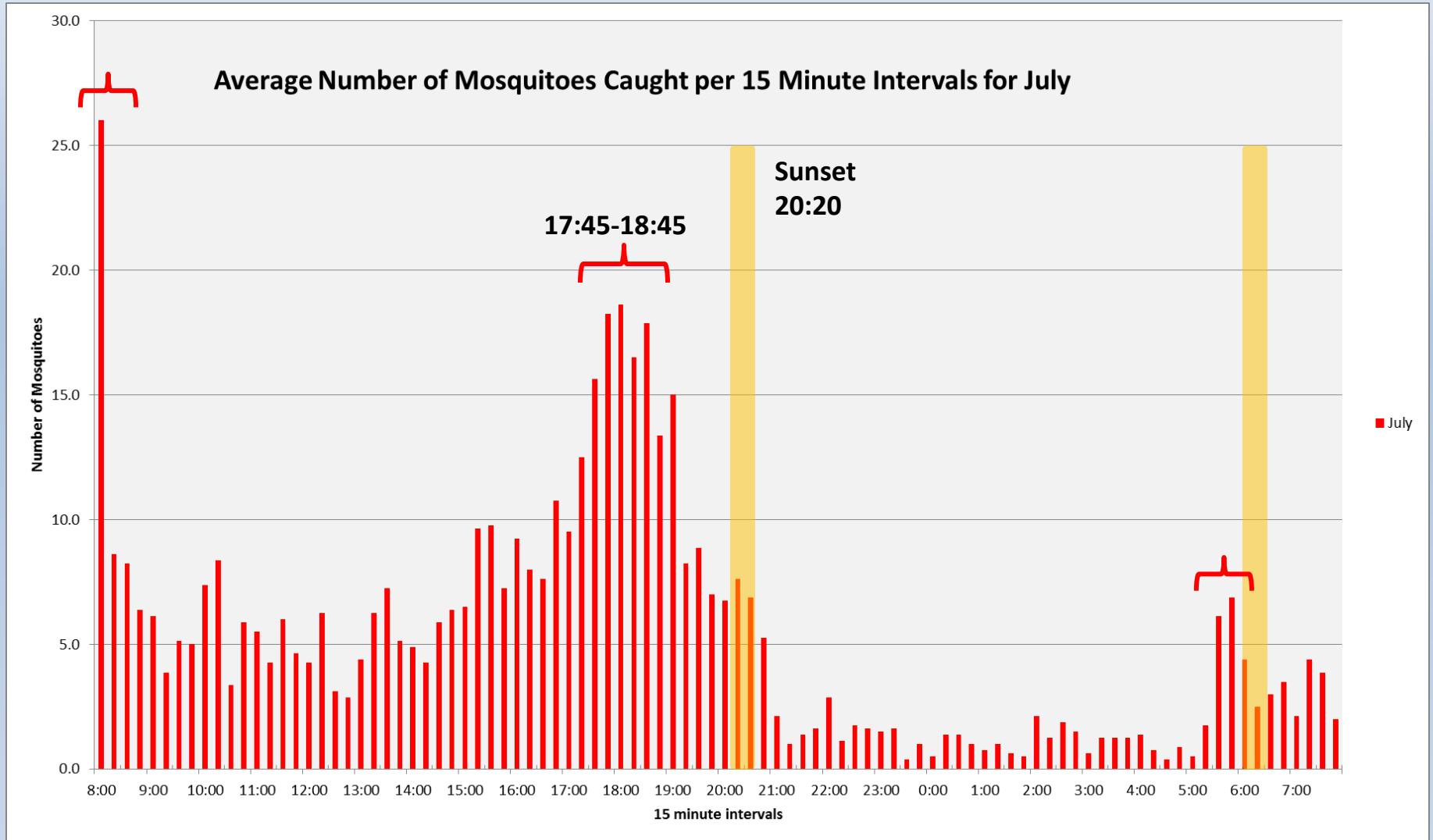
Monthly Collections



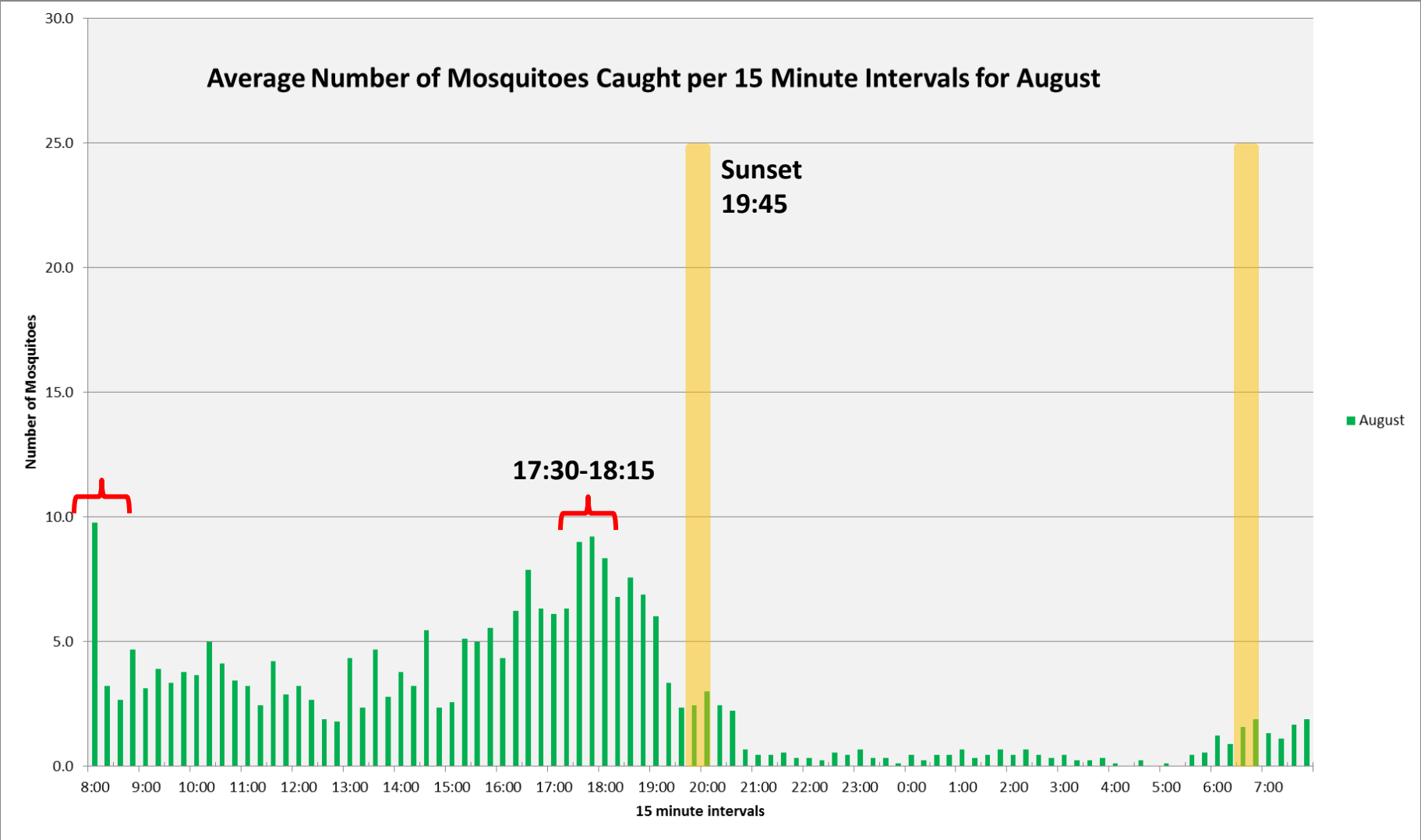
June Collections



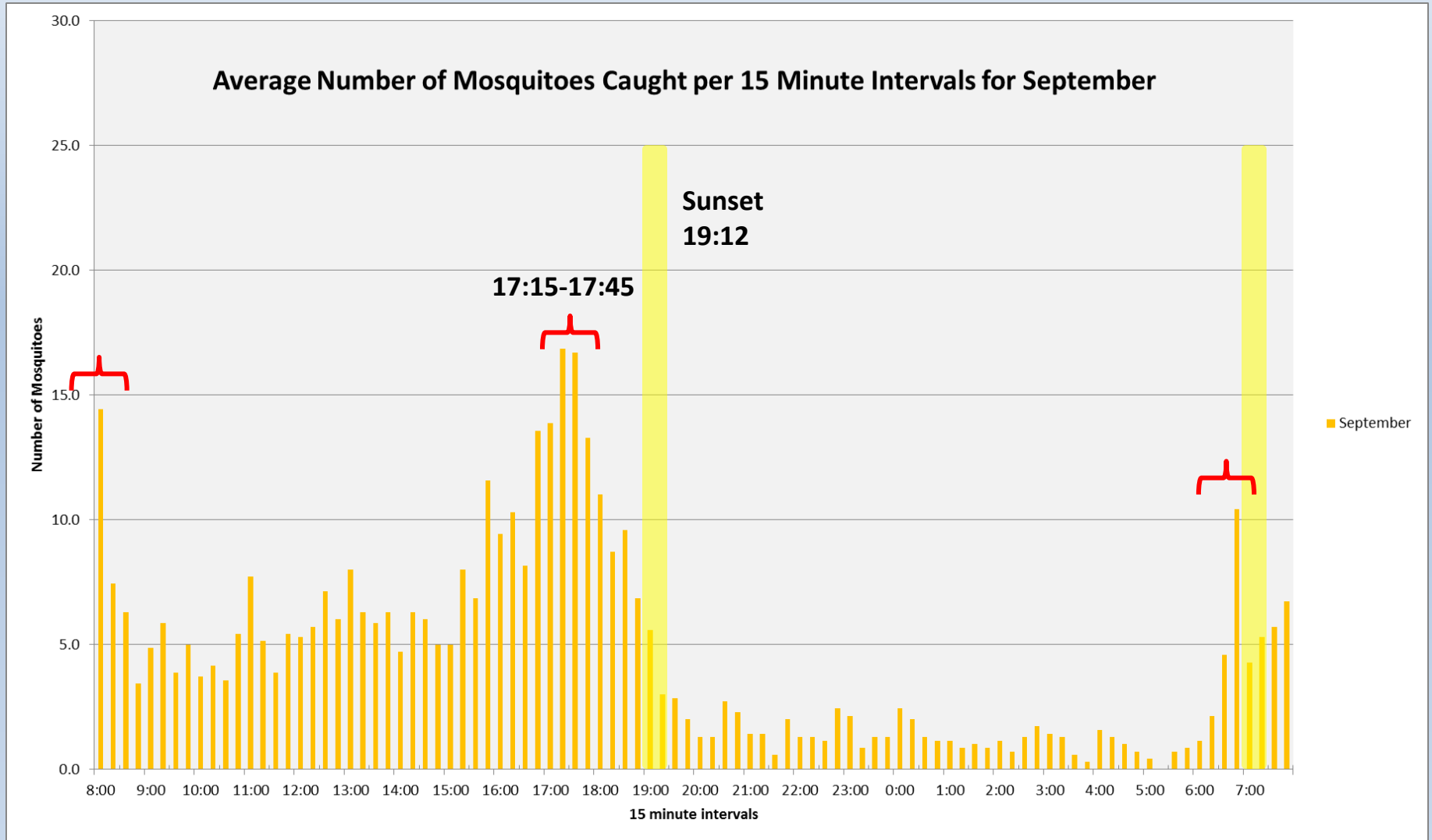
July Collections



August Collections



September Collections



BG-Counter vs Landing Rates

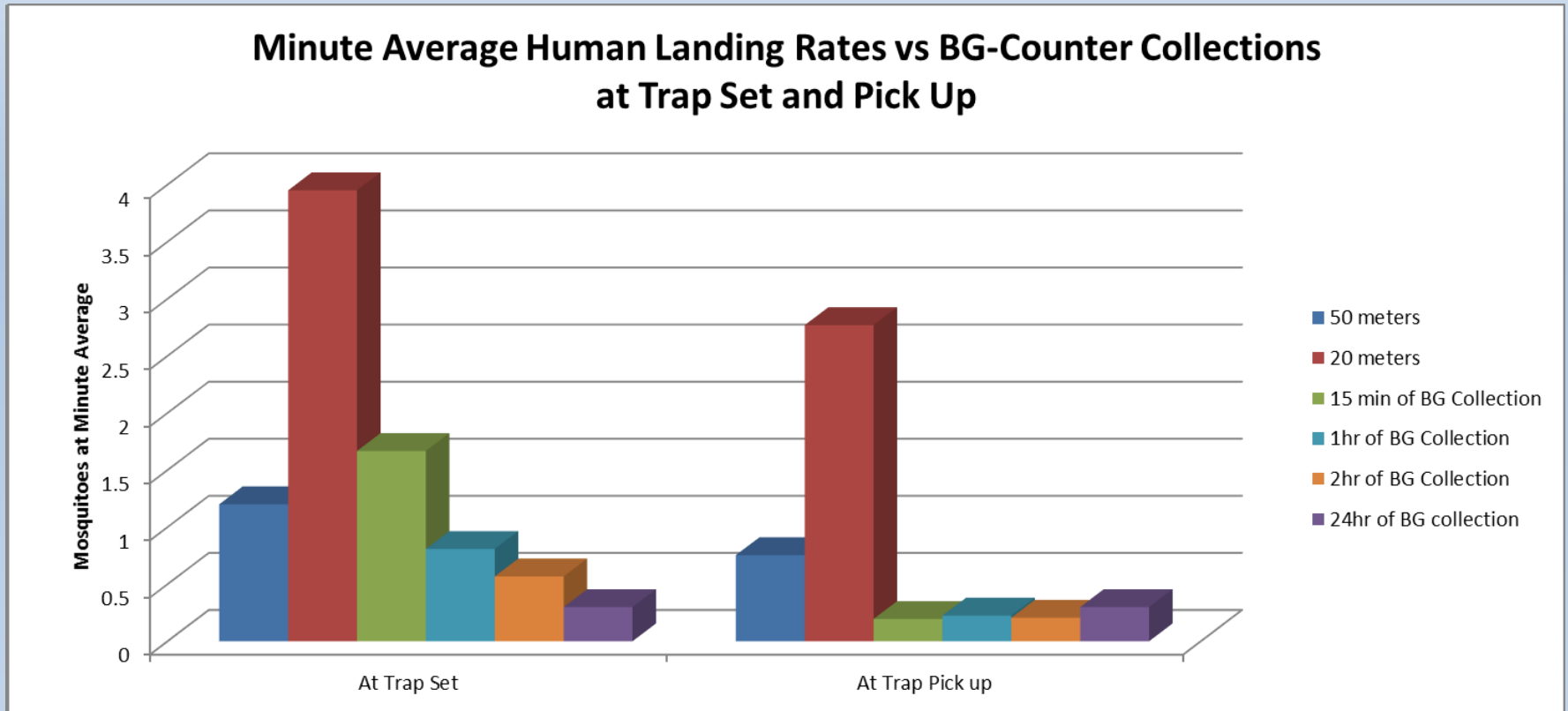
Standardization of Landing Rates

- Same person doing rates
 - Jay Kiser
- Same time of day
 - Between 7:30-8:00am
- Same amount of time
 - 5 minute landing rates
- Same counting behaviors
 - Mosquitoes-
 - Counter- posture, movements, clothing

- Conducted landing rates
 - June – August
 - Two locations
 - 50 meters from trap
 - 20 meters from trap
 - 13 times at trap pickup
 - 8 times at trap set

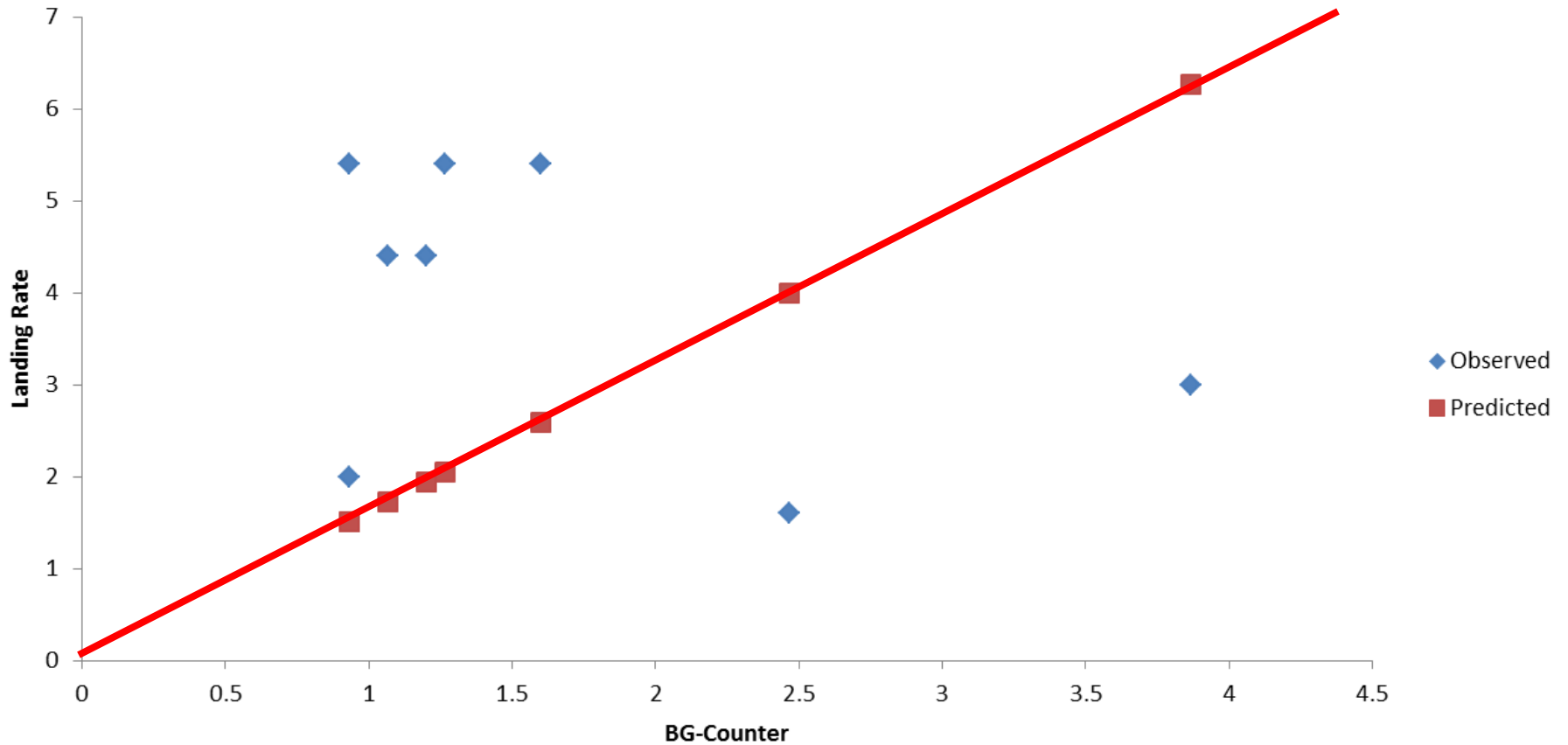


BG-Counter vs Landing Rates



BG-Counter vs Landing Rates

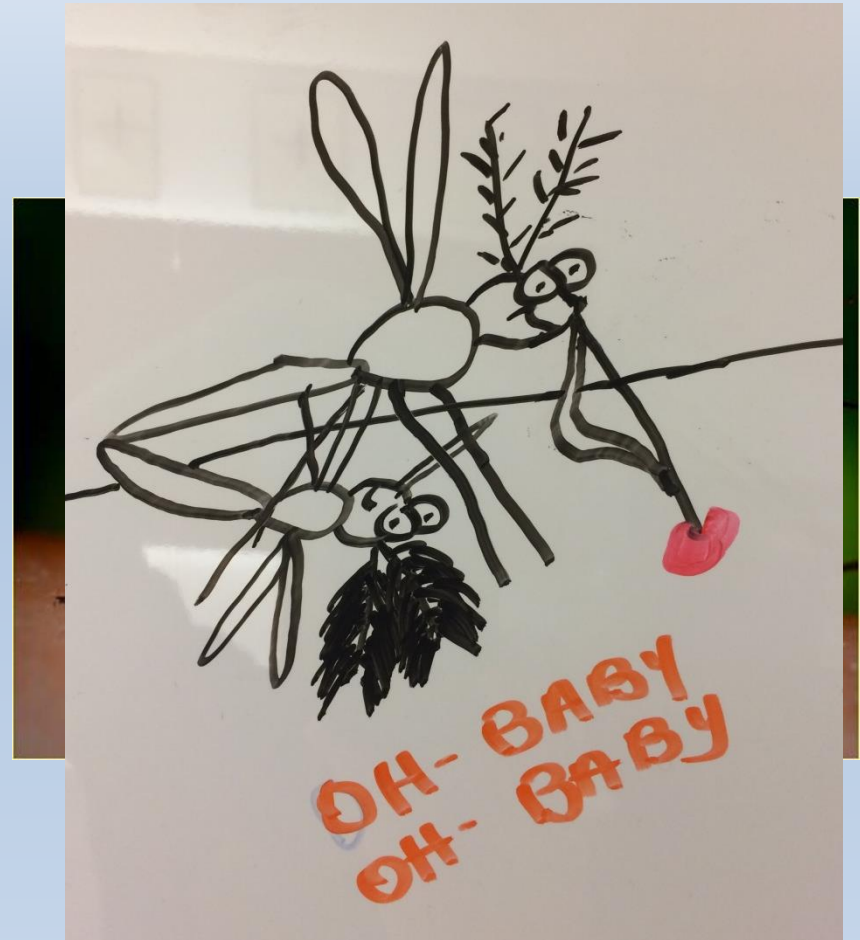
Correlation Between Landing Rate and BG Counts After 15 min



BG-Counter vs Landing Rates

Observed Behaviors During Landing Rates

- Number of males
 - Hovering
 - Landing
- Number of mating pairs
 - Hovering
 - Landing with female probing
 - Observed 4 out of the 21 landing rates taken at 20m



Looking For Behavioral Differences Between Male and Female *Aedes albopictus*

- Due to
 - Large numbers of male *Aedes albopictus* collected in the BG-Counter
 - Presence of males and mating during landing rates
- Created a modified Rotator Trap
 - Look for differences in activity rates between males and females



What is a Rotator Trap?

CDC Bottle Rotator Trap

- Modified CDC Light Trap
 - **Same** fan
 - **Same** light attracts
 - Light bulb and CO₂
 - **Different** collection chamber setup
 - Has multiple chambers
 - Active collection chamber changes throughout night
 - Programmable time setup for chamber rotation
 - **Different** Battery Needed
 - 12Volt needed instead of 6volt

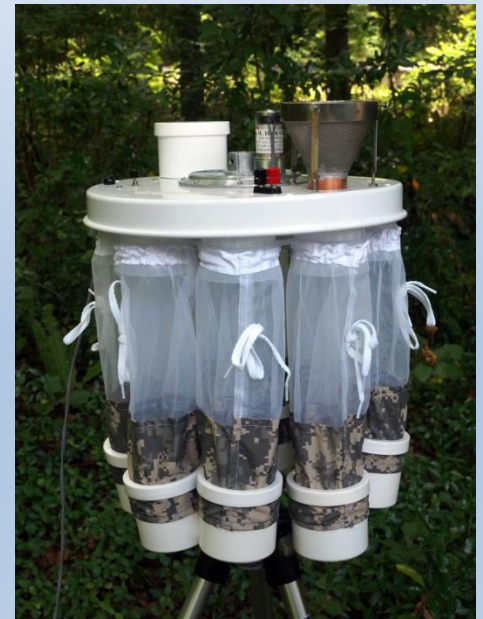
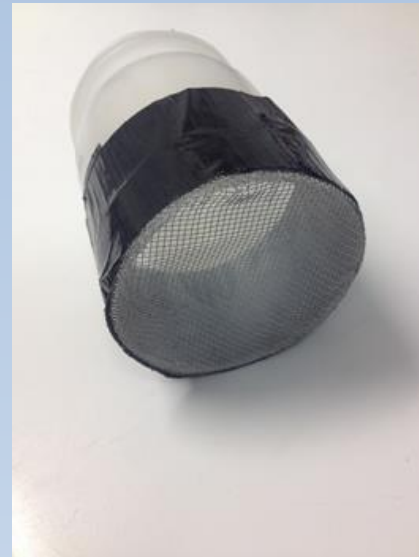


Rotator Traps



Modifications to Rotator Chambers

- Standard chamber bottles hinder airflow.
 - Less suction
 - Less mosquitoes
- CDC light trap style chambers are available
- Suffolk modifies chamber bottles
 - Cut off plastic bottoms
 - Replace with screen



Knocking Down Mosquitoes



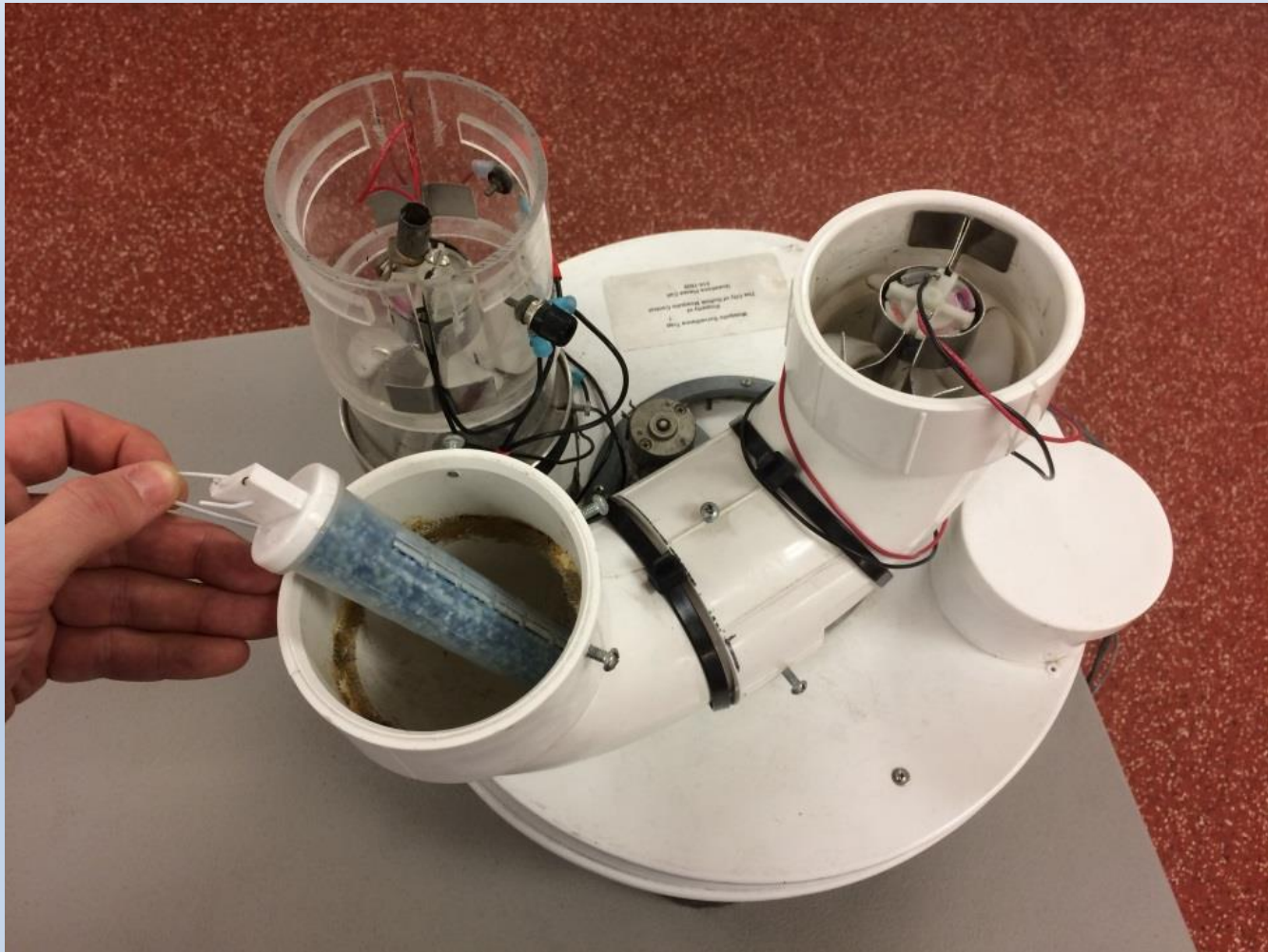
- Hot Shot No-Pest Strip₃
 - Active Ingredients
Dichlorvos
 - (2,2-dichlorovinyl dimethyl phosphate) 18.6%
- Cut into strips
- Store with chambers
 - In Tupperware ≥ 7 days
- Treated chambers knockout mosquitoes during night of collection
- Pesticide replace halfway through season



Creating the BG-Rotator



Creating the BG-Rotator



Creating the BG-Rotator



Creating the BG Rotator

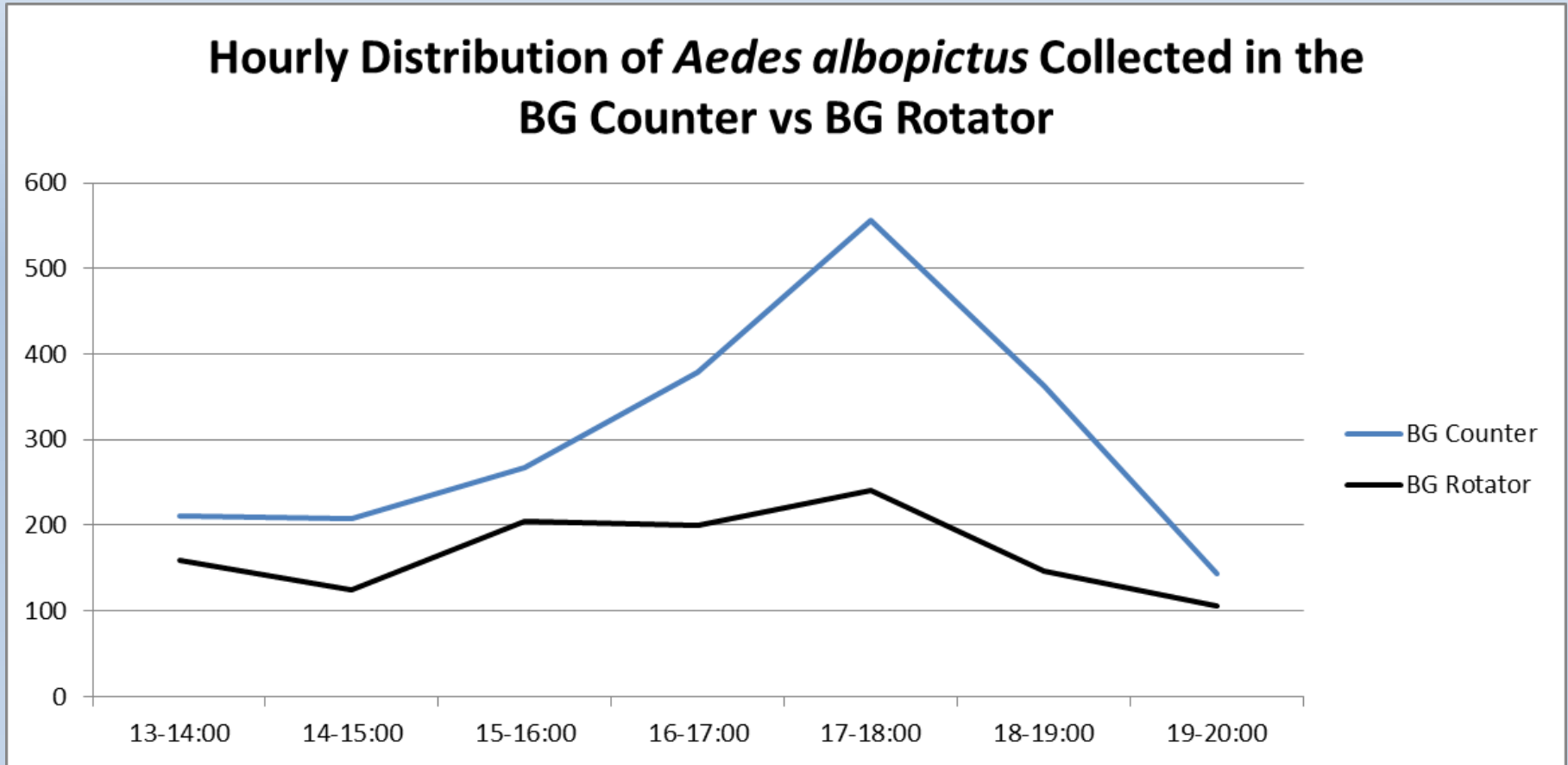


BG-Rotator vs BG-Counter

- 11 trapnights
- August and September
- BG-Rotator
 - 1pm-8pm
 - Chambers switch 1 hr
- BG-Counter
 - 24 hr
- 1,180 mosquitoes
 - 509 males
 - 100% *Ae. albopictus*
 - 671 females
 - 96% *Ae. albopictus*

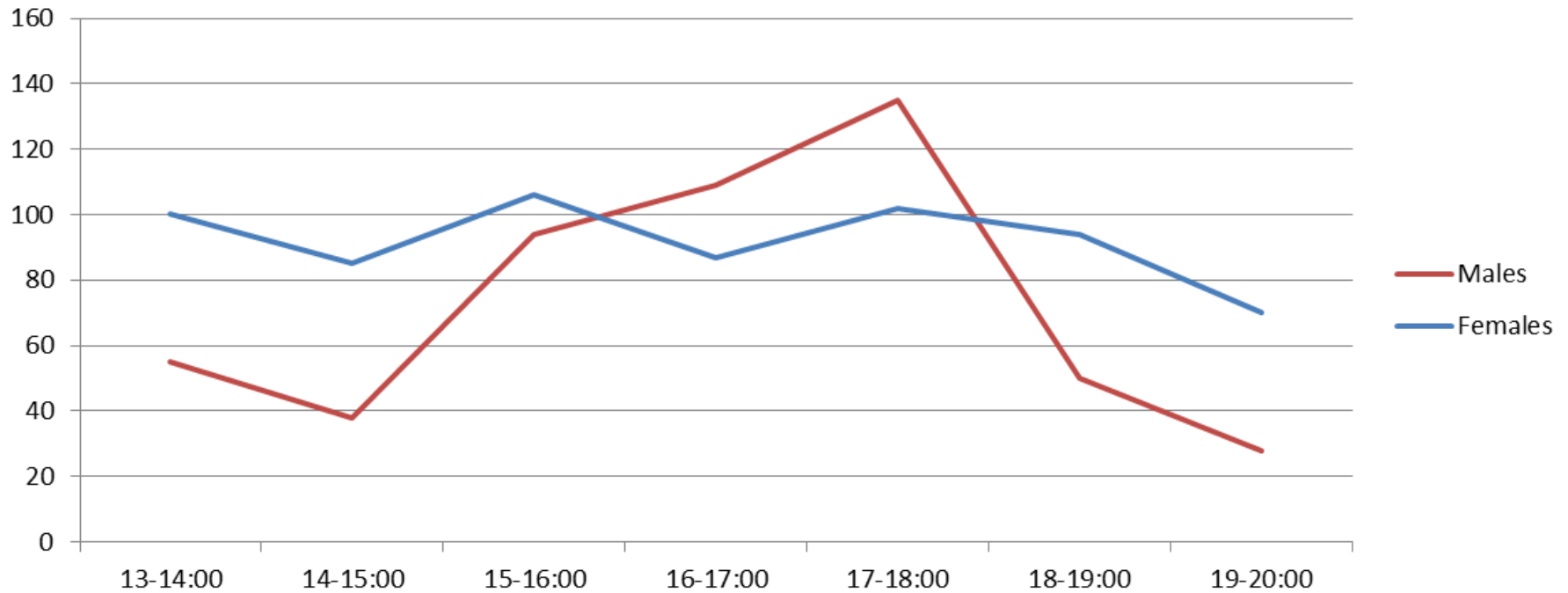


BG-Rotator vs BG-Counter



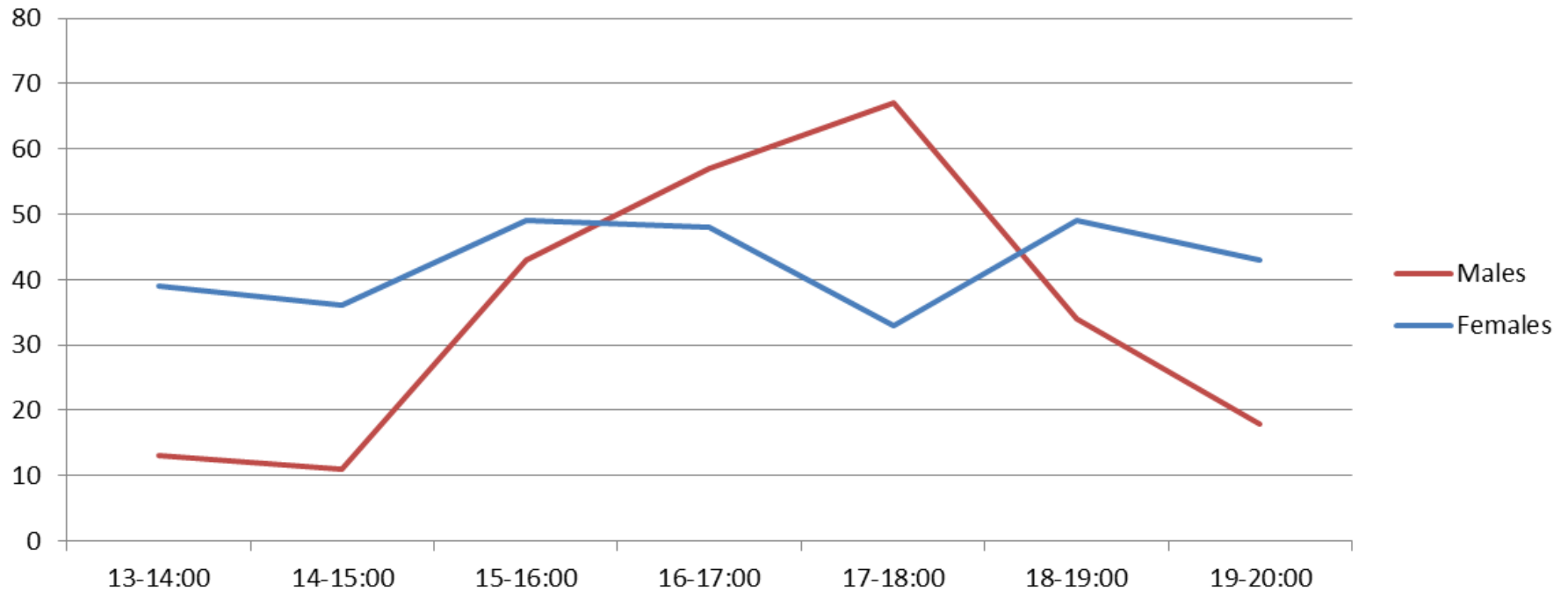
Males vs Females Collected in BG-Rotator

Hourly Distribution of Male and Female *Aedes albopictus* Collected From the BG Rotator

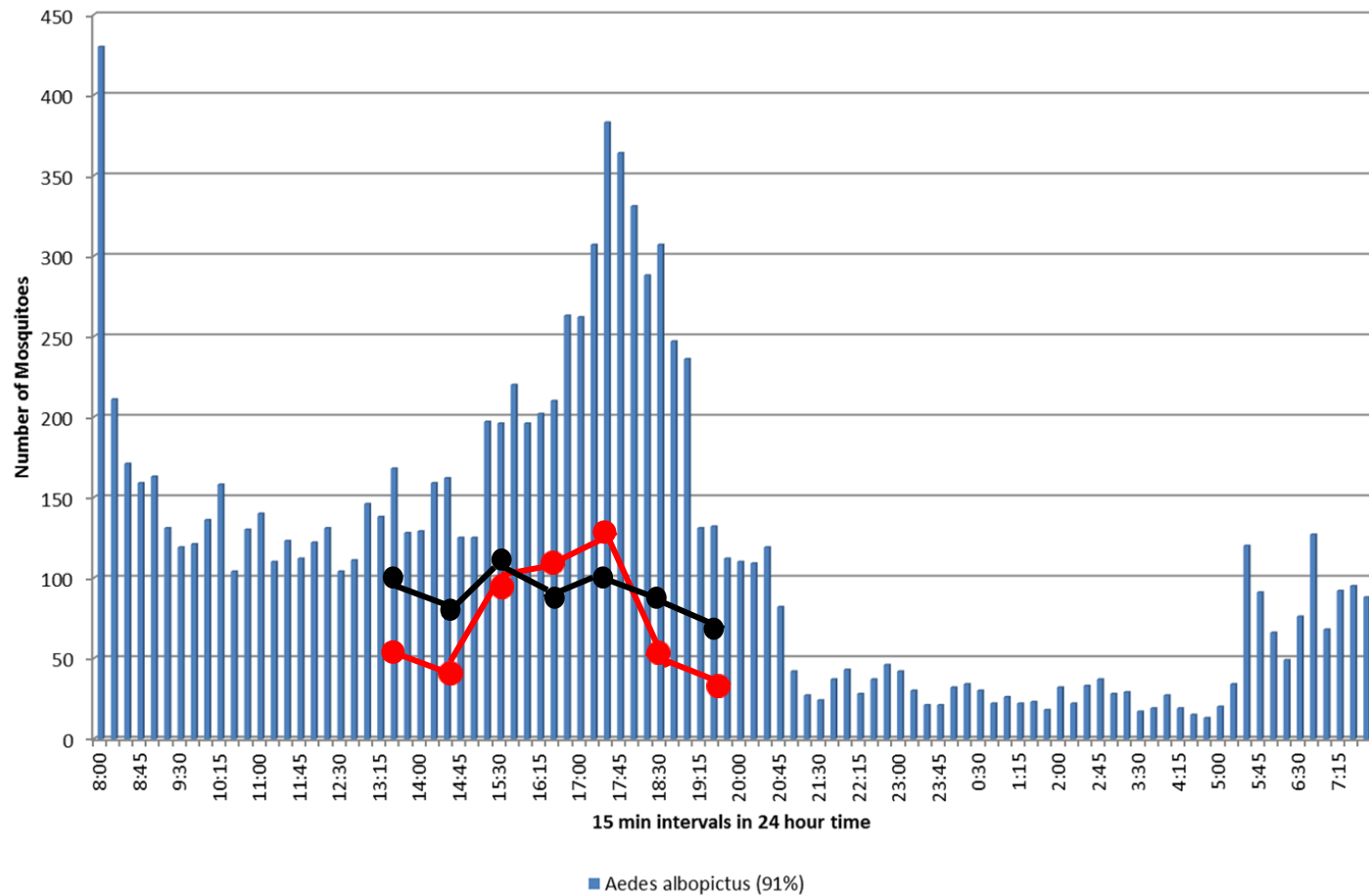


Males vs Females Collected in BG-Rotator

Hourly Distribution of Male and Female *Aedes albopictus* Collected From the BG Rotator in the Month of August



Total number of *Aedes albopictus* Collected from June-September 2016 in 15 Minute Intervals



Conclusions

- *Aedes albopictus*:
 - Peak of activity around 5:30-6pm
 - About 2 hours before 2-3 hours before sunset
 - 4:45-7:15pm 27% of all mosquitoes collected
- Males vs Females
 - The above peak maybe due to males
 - More trapping is needed
- How does this help with control?

Future Plans

- Continue looking at *Aedes albopictus* activity
 - Using the BG-Counter
 - Trap throughout the season
 - June-September
- Continue looking at Male vs Female activity
 - Using BG-Rotator
 - Widen the time of trapping
 - Smaller increments of time
- Trap-Spray-Trap Studies
 - Compare Times of Spraying

Acknowledgements

- Thank you
 - Biogents
 - City of Suffolk
 - Karen Akaratovic
 - Charles Abadam
 - Jamie Durden

Questions?