Trapping Mosquitoes:

The Good, The Bad And The Ugly

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CHATHAM COUNTY MOSQUITO CONTROL
SAVANNAH, GEORGIA

How can trapping help us?

Abundance

Seasonality

Submit samples for testing

Trap thresholds

Assessment of pre/post treatments

Are you treating at the right time?

Factors influencing trap collections

Weather

Collection times

Choice of trap

Seasonality

Choice of bait

New Jersey Light Trap

- Chatham County Mosquito Commission formed 1957, Savannah GA
- Primary mission was to control nuisance mosquitoes
- 15 original trap sites across the County
- “Gold standard”
- Bulky, caught various insects, power source required

New Jersey Light Trap

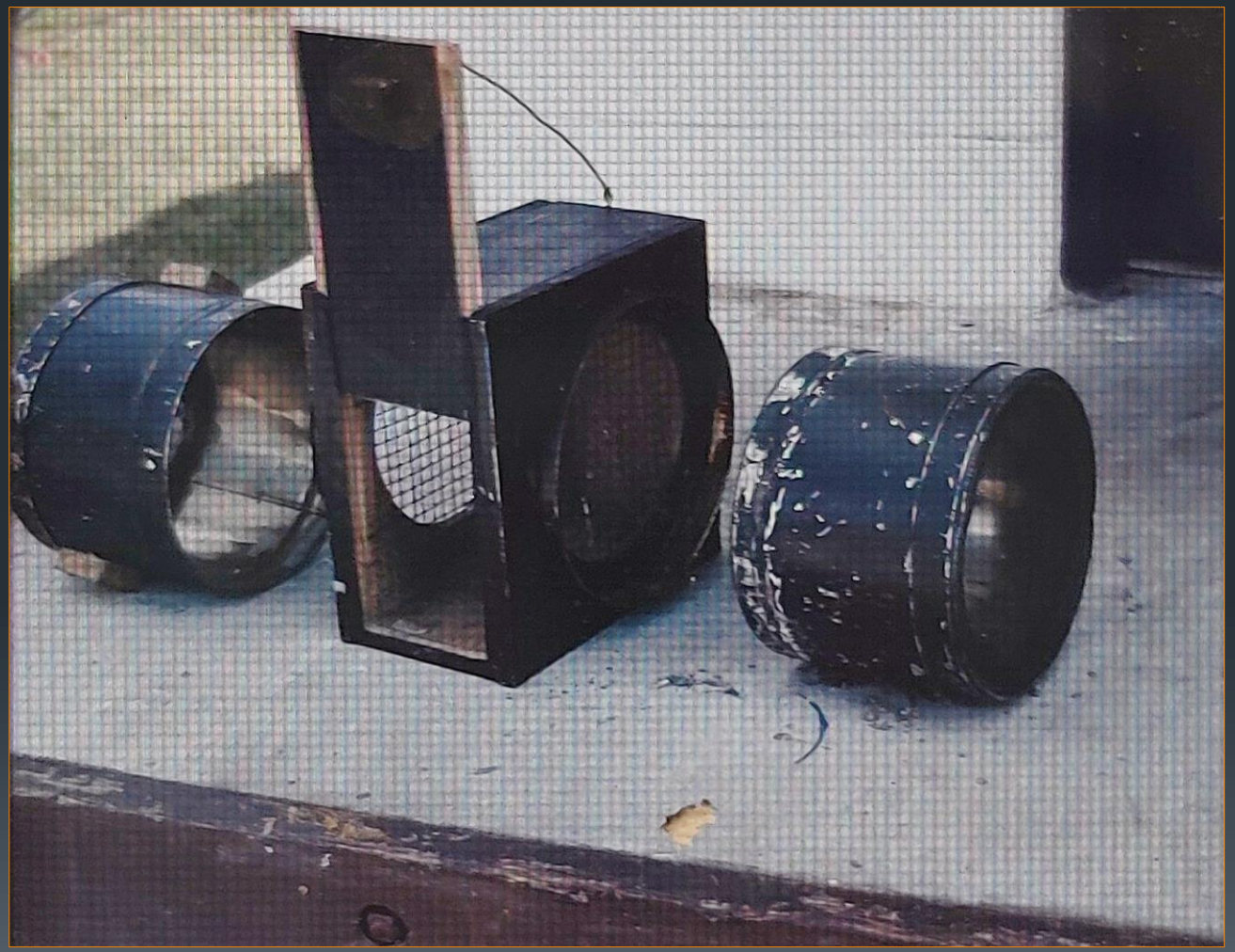
Truck Traps

Truck mounted trap

- Used in 1960's
- We went to the mosquitoes
- Limited by roads
- 2 positive mosquito samples of *Aedes atlanticus*
  - July 1966 California Encephalitis
  - August 1966 Western Equine Encepahlitis

Bait Trap

- Used in the mid 1960's
- Housed hamsters and chicks
- 2 positive mosquito samples
  - July 1966 *Aedes atlanticus* California Encephalitis
  - August 1966 *Culiseta melanura* Western Equine Encephalitis



Traps baited with small animals

Chicken sentinels and Exit traps

- Chicken sentinel program established June 1981
- Elevate chicken into tree canopy
- Preferred bird feeders – *Culiseta melanura*
- 1992 Made a switch from flocks to individuals birds
- 2005 Used passive trap on lid of bucket

"The girls"

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- 2005 Used passive trap on lid of bucket

Exit trap mounted to bucket lid

CDC Light Trap

- Battery powered (4 D cells) 6volt light and fan
- Baited with dry ice
- Host-seeking trap for FW,PW, SM
- Live collections for viral testing and assays
- Disease vectors *Culiseta melanura*

CDC light trap at regularly run trap site

CDC Light Trap

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- Battery powered (4 D cells) 6volt light and fan
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Aedes sollicitans

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Aedes taeniorhynchus

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Culiseta melanura

Gravid Trap

- Prior to 2000 our local *Culex quinquefasciatus* populations weren't a concern
- Egg laying trap baited with in-house brew
- Isolated WNv+ mosquito samples in late 2001
- Egg rafts allow us to perform susceptibility tests

Gravid traps set in our urbanized areas

Gravid Trap

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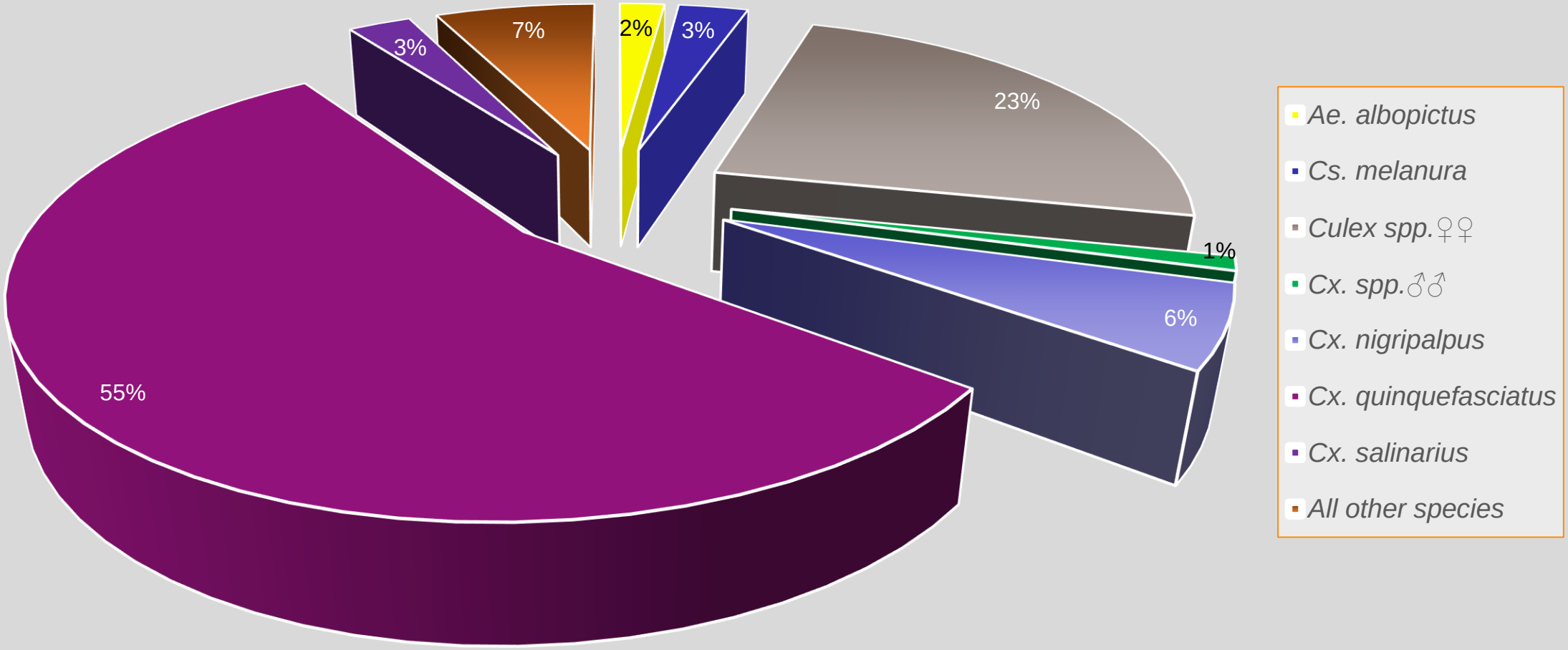
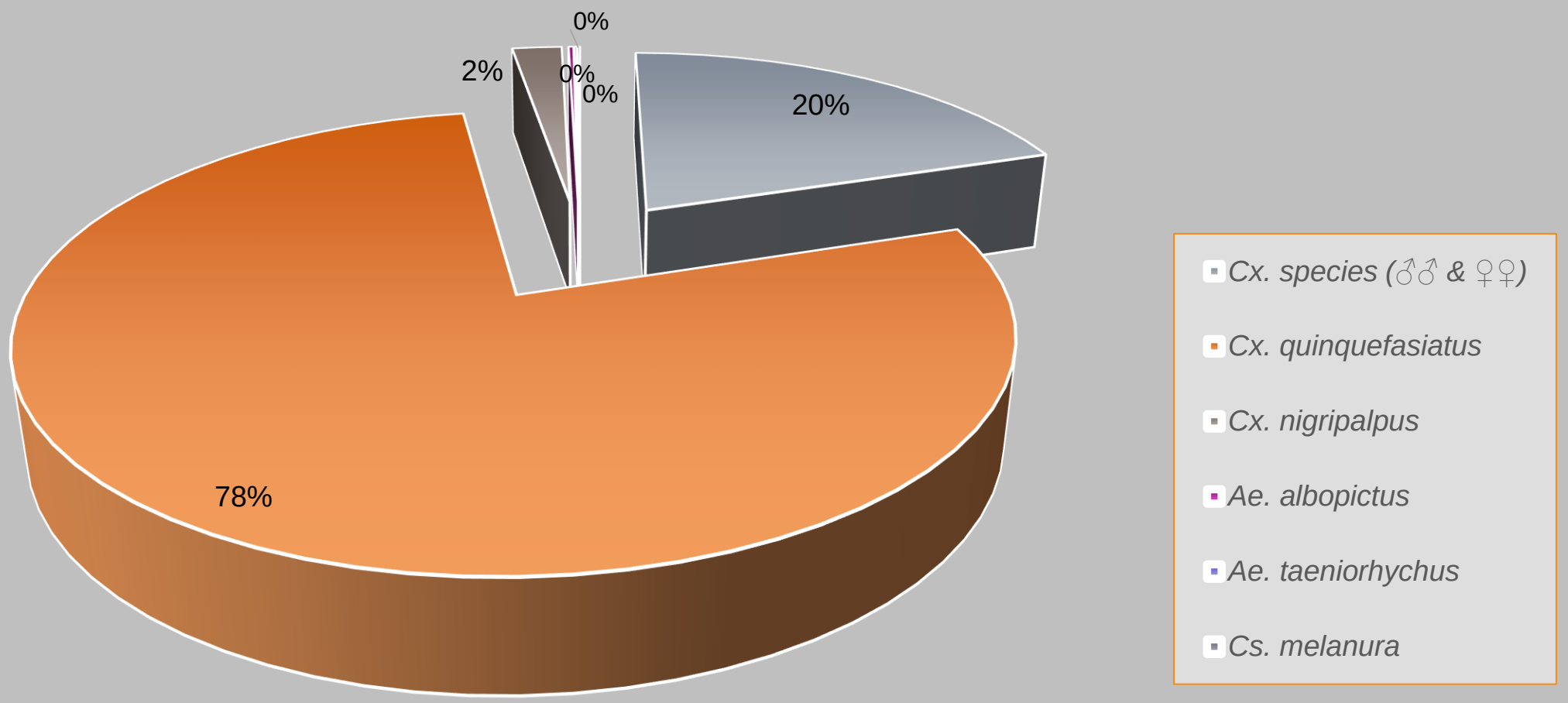
Culex quinquefasciatus

Species composition of pools submitted for analysis from Chatham County GA, 2001-2019.

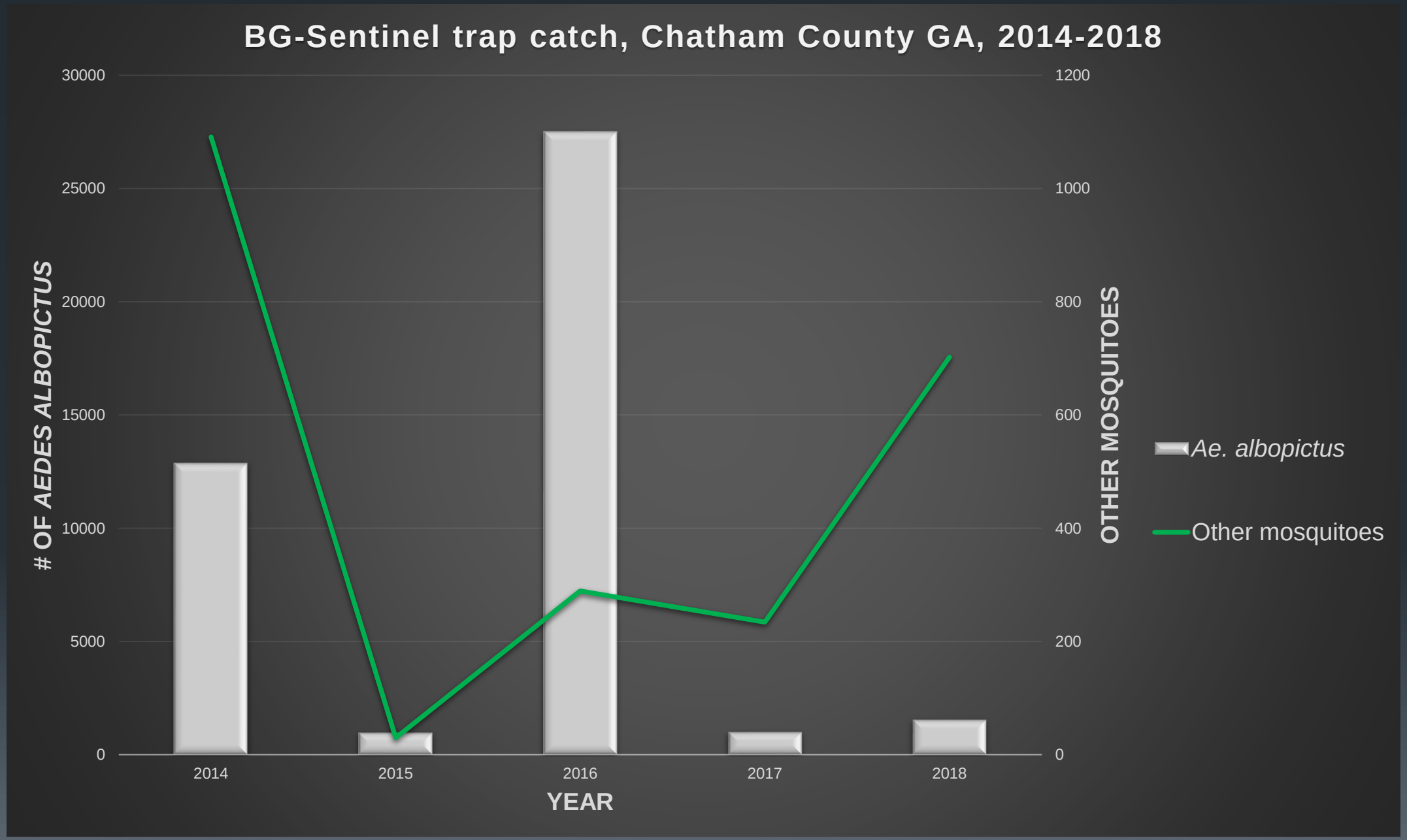


Species detected with WNv, Chatham County, GA 2002-19



BG-Sentinel Trap

- Last collection of *Aedes aegypti* was in 2012
- Baits include BG Lure and Octenol
- Clean, pristine collections for identification purposes
- Deployed in ideal *Ae. Albopictus* locations i.e. tire piles, urban settings
- Battery sources are expensive, heavy and require charging


BG-Sentinel trap catch, Chatham County GA, 2014-2018
30000
25000
20000
15000
10000
5000
0
OF AEDES ALBOPICTUS
1200
1000
800
600
400
200
0
OTHER MOSQUITOES
2014
2015
2016
2017
2018
YEAR
Ae. albopictus
Other mosquitoes

Smart traps
BG-Counter

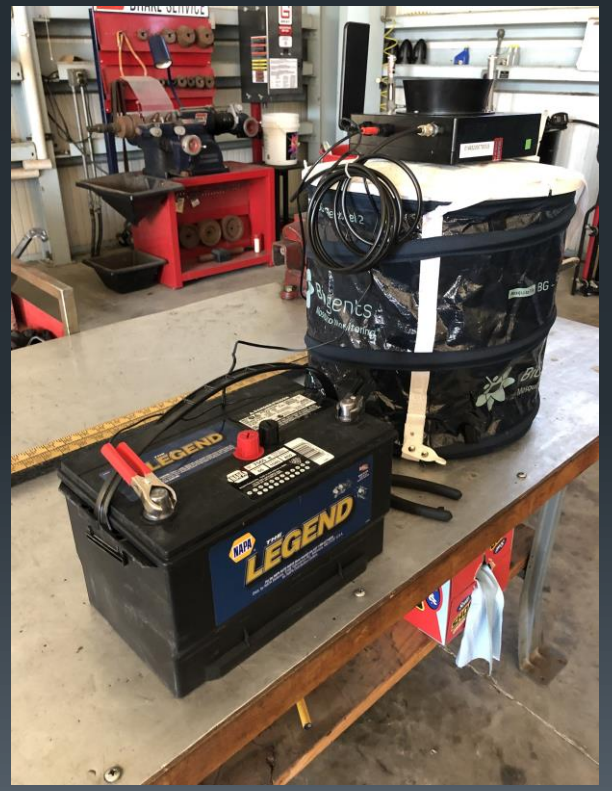
- Received August 2019
- Remote sensing device for the BG Sentinel II trap
- Trapping info. included time of collections, temp., humidity, size of insect, collections every 15 mins.

Our initial thoughts:

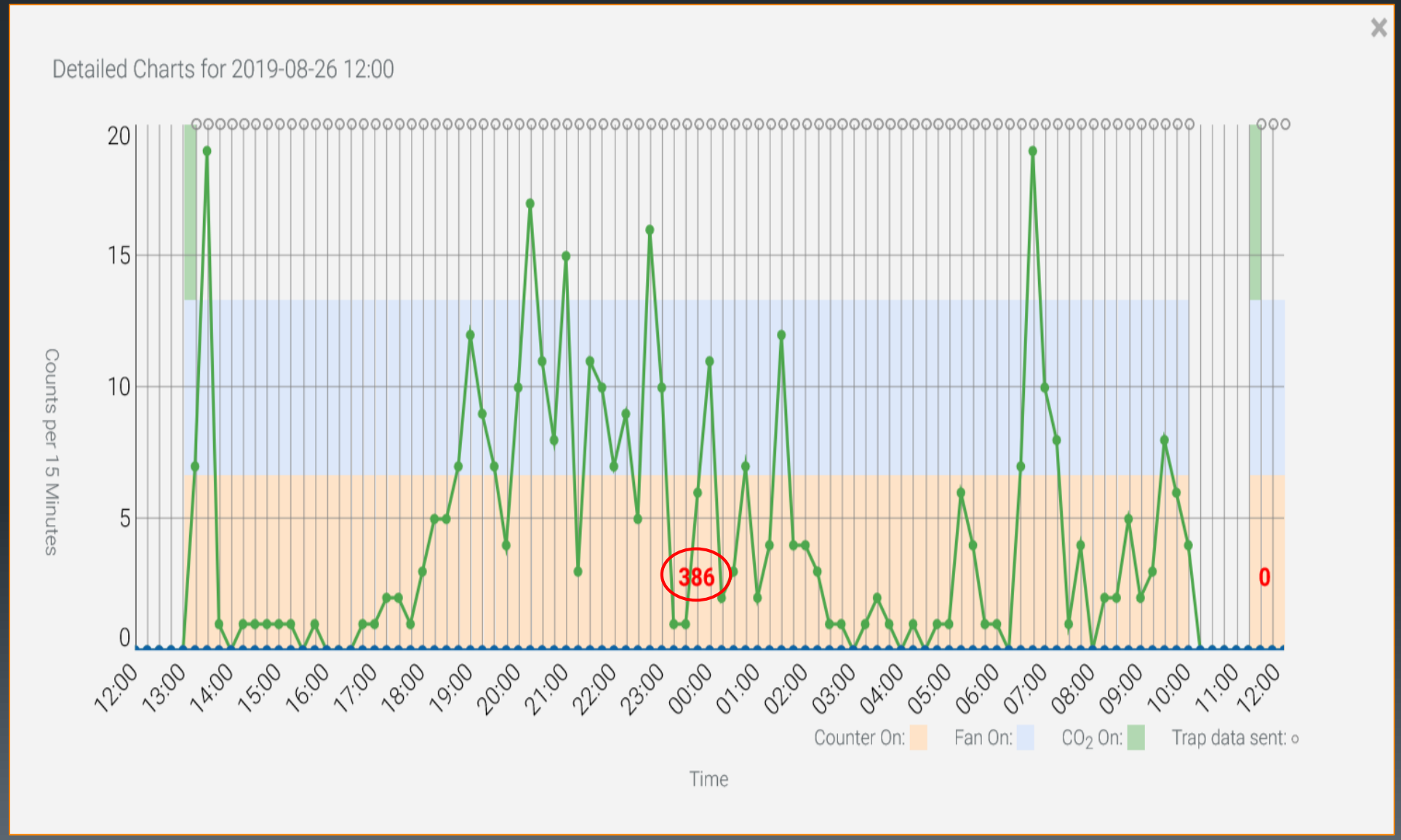
- Have to have cellular reception
- Have to have power supply
- Have to put in area where counter won't be messed with

Modifications were made to the counter on the BG II Sentinel Trap

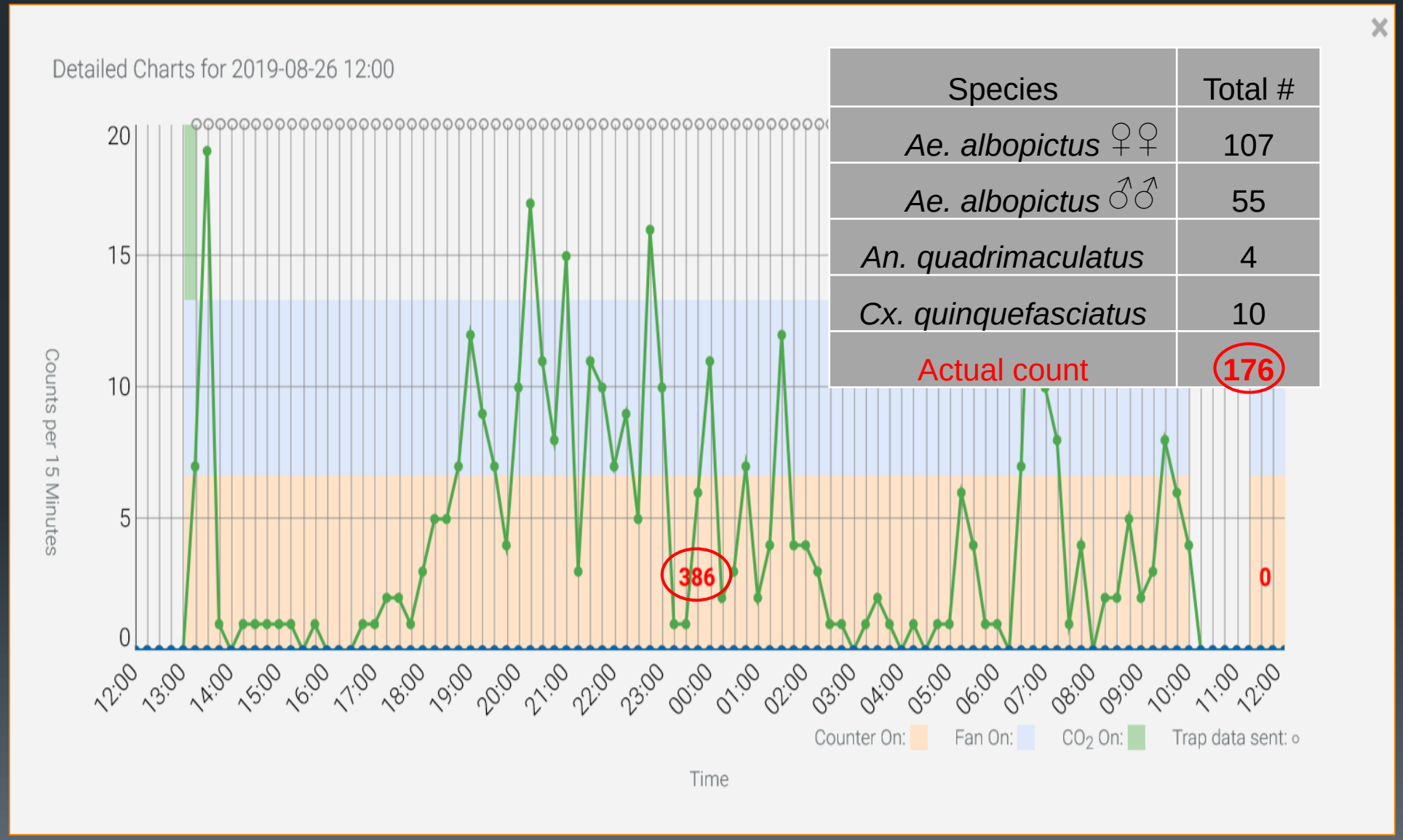
- 12 volt battery died… time after time, after time…
  - Used a car battery with 500 cold cranking amps.
- Mosquito collections proved difficult
  - Used a rearing chamber instead of net for mosquito collections
- BG Lure holder opening set back 2in.
  - Inaccurate counts
  - Patience needed with online access to the counter



Data from real time mosquito collections are graphed and can be accessed from desktop or mobile devices

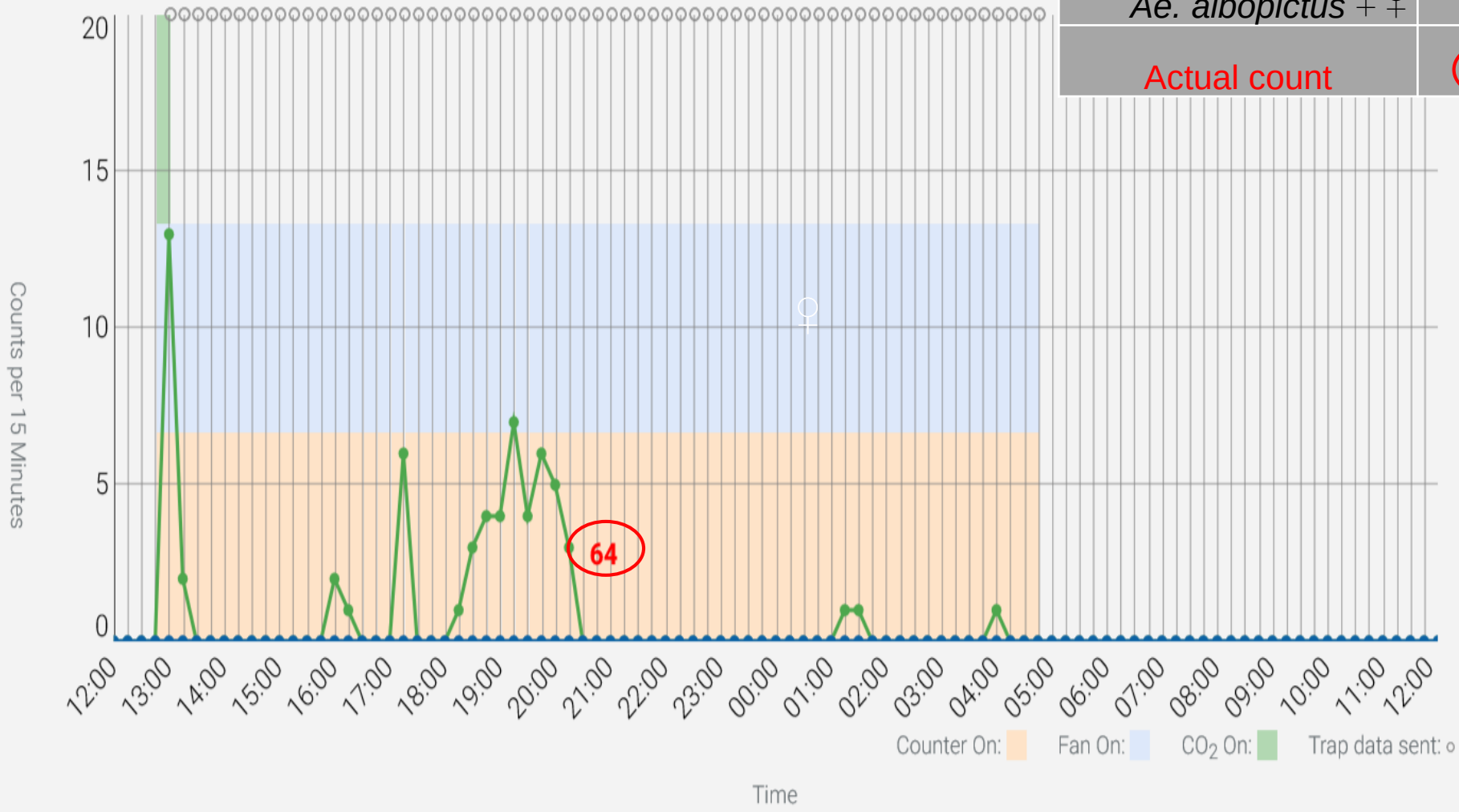


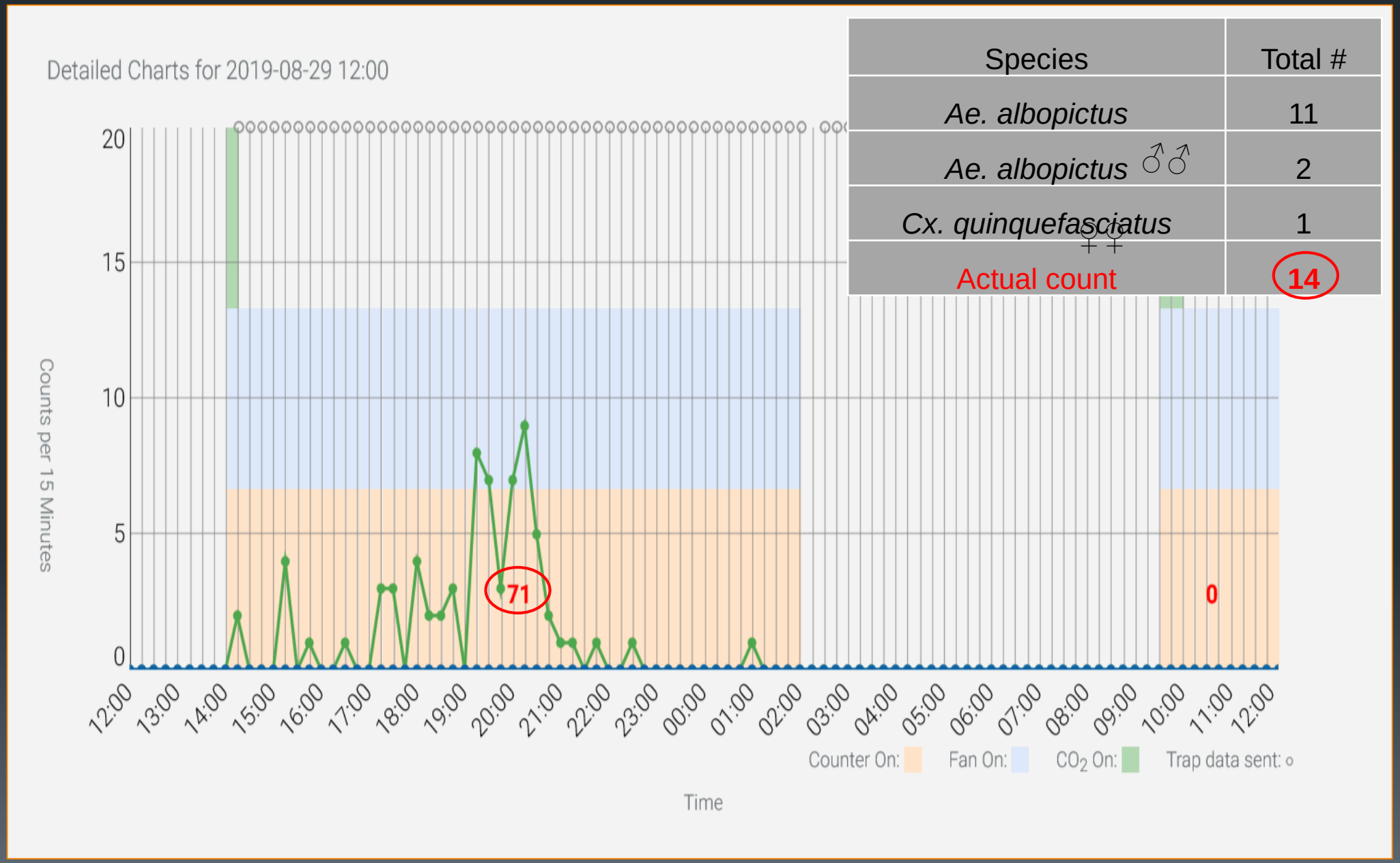
On our initial run, without any modification, there was a 45.6% overestimation in counts



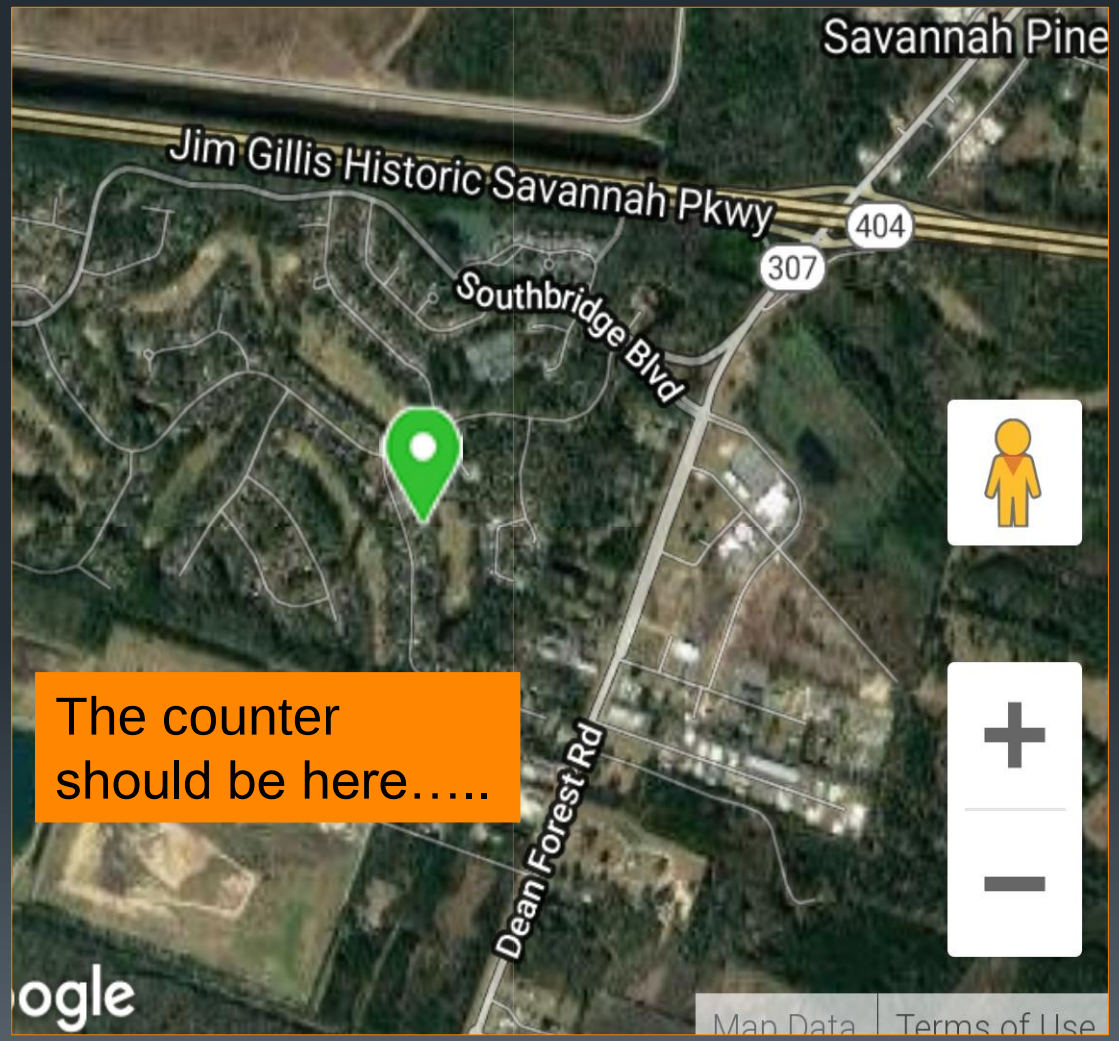
Species	Total #
Ae. albopictus ♀♀	107
Ae. albopictus ♂♂	55
An. quadrimaculatus	4
Cx. quinquefasciatus	10
Actual count	176

Species	Total #
Ae. albopictus ♀♀	8
Actual count	**8**




Detailed Charts for 2019-08-29 12:00
Species
Total #
Ae. albopictus
11
Ae. albopictus ♂♂
2
Cx. quinquefasciatus ♀♀
1
Actual count
14
Counts per 15 Minutes
20
15
10
5
0
71
0
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
Counter On:
Fan On:
CO2 On:
Trap data sent:
Time

GPS coordinates within the counter allowed us to check-in on our traps location

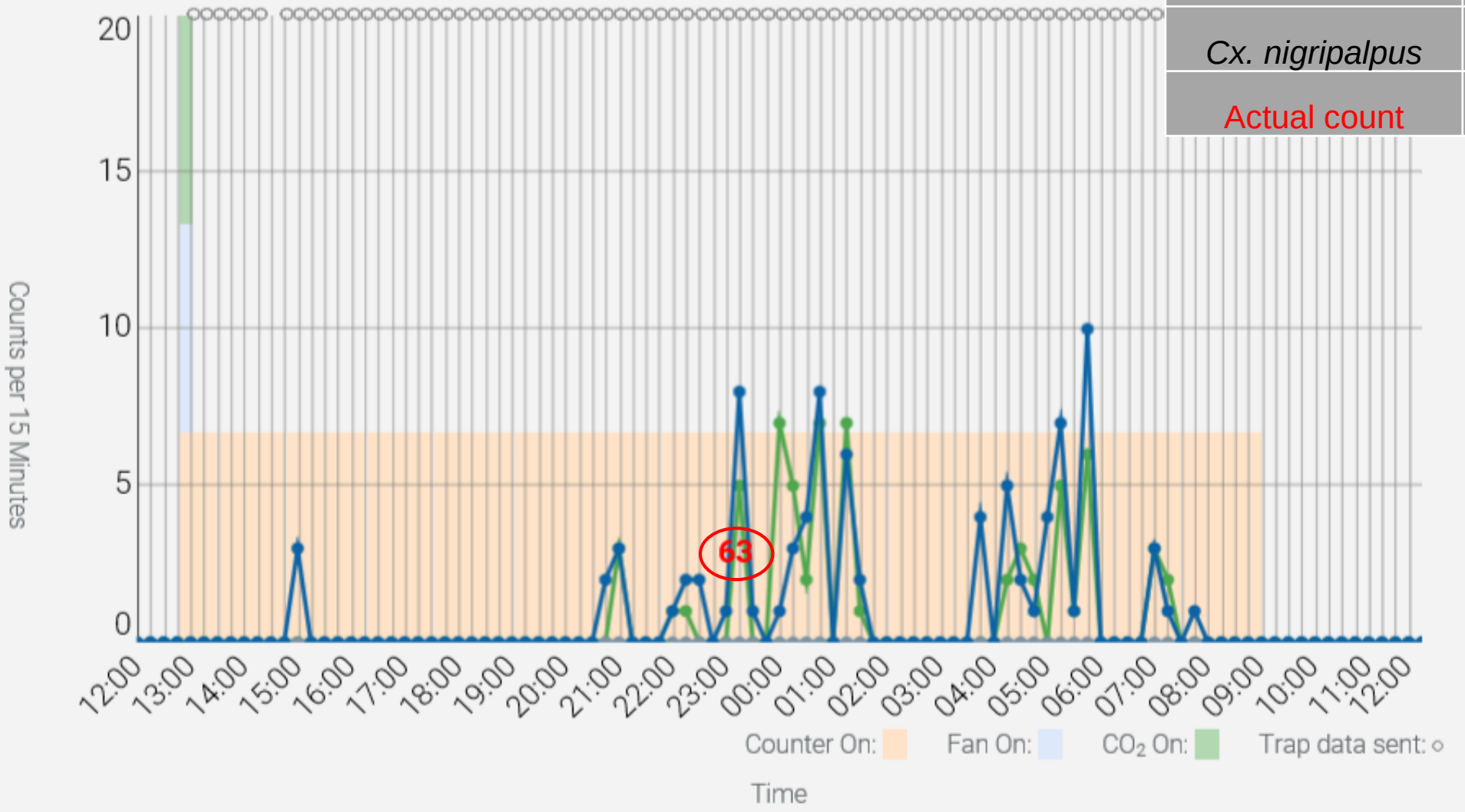


Could the counter be modified to fit onto a CDC light trap?

Are we conducting our spray missions at the most effective time?

We had to ensure that modifications to the CDC light trap and counter weren't permanent and could be reverted back to original use, easily and quickly

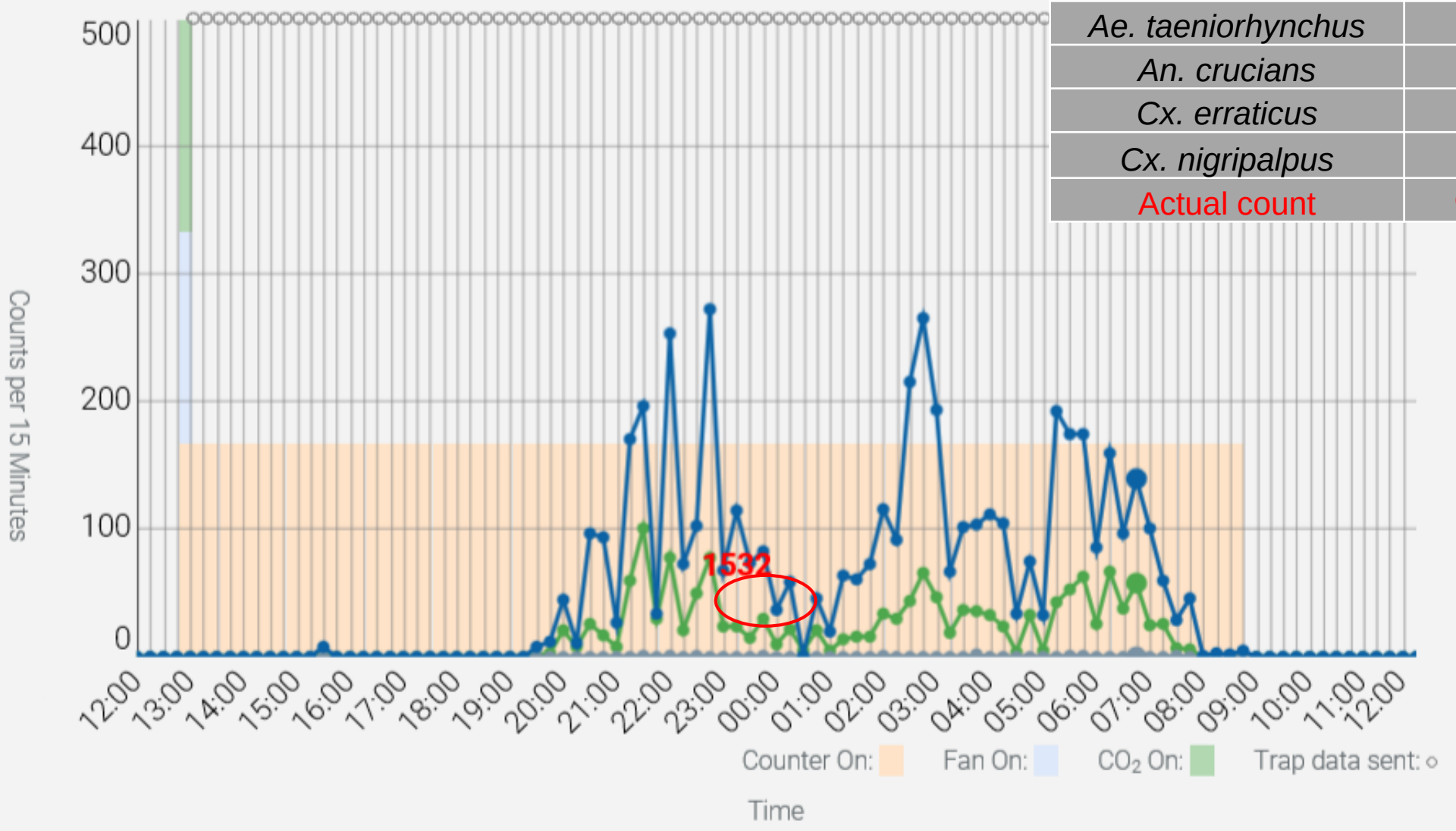
Species	Total #
Cx. erraticus	7
Cx. nigripalpus	5
Actual count	12



Additional changes were made to reduce the void between the fan and the counter

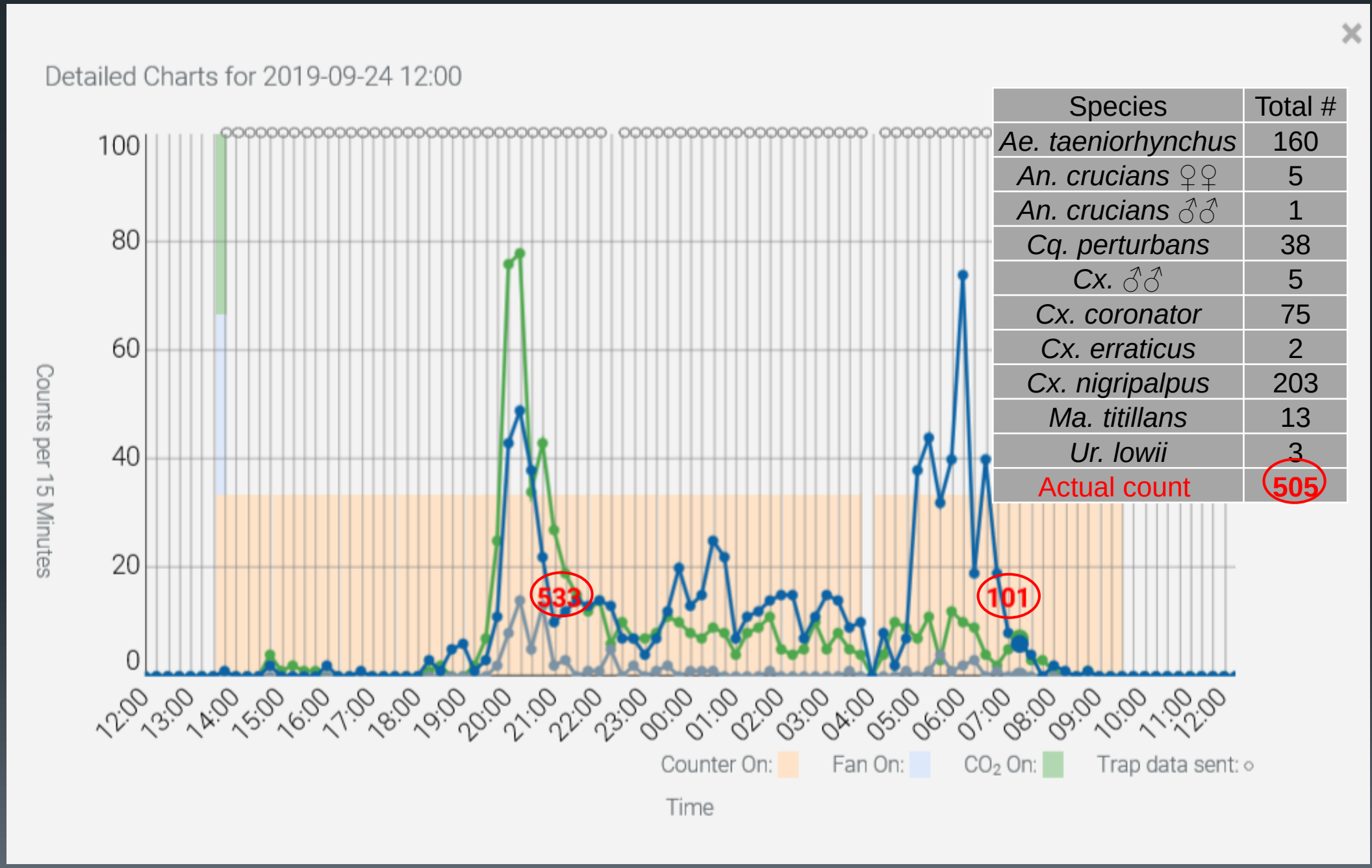
- Rubber sleeve had to be removed
- Increased voltage
- Fabricated a mounting plate

Species	Total #
Ae. atlanticus	23
Ae. infirmatus	2
Ae. taeniorhynchus	1
An. crucians	8
Cx. erraticus	8
Cx. nigripalpus	23
Actual count	**43**

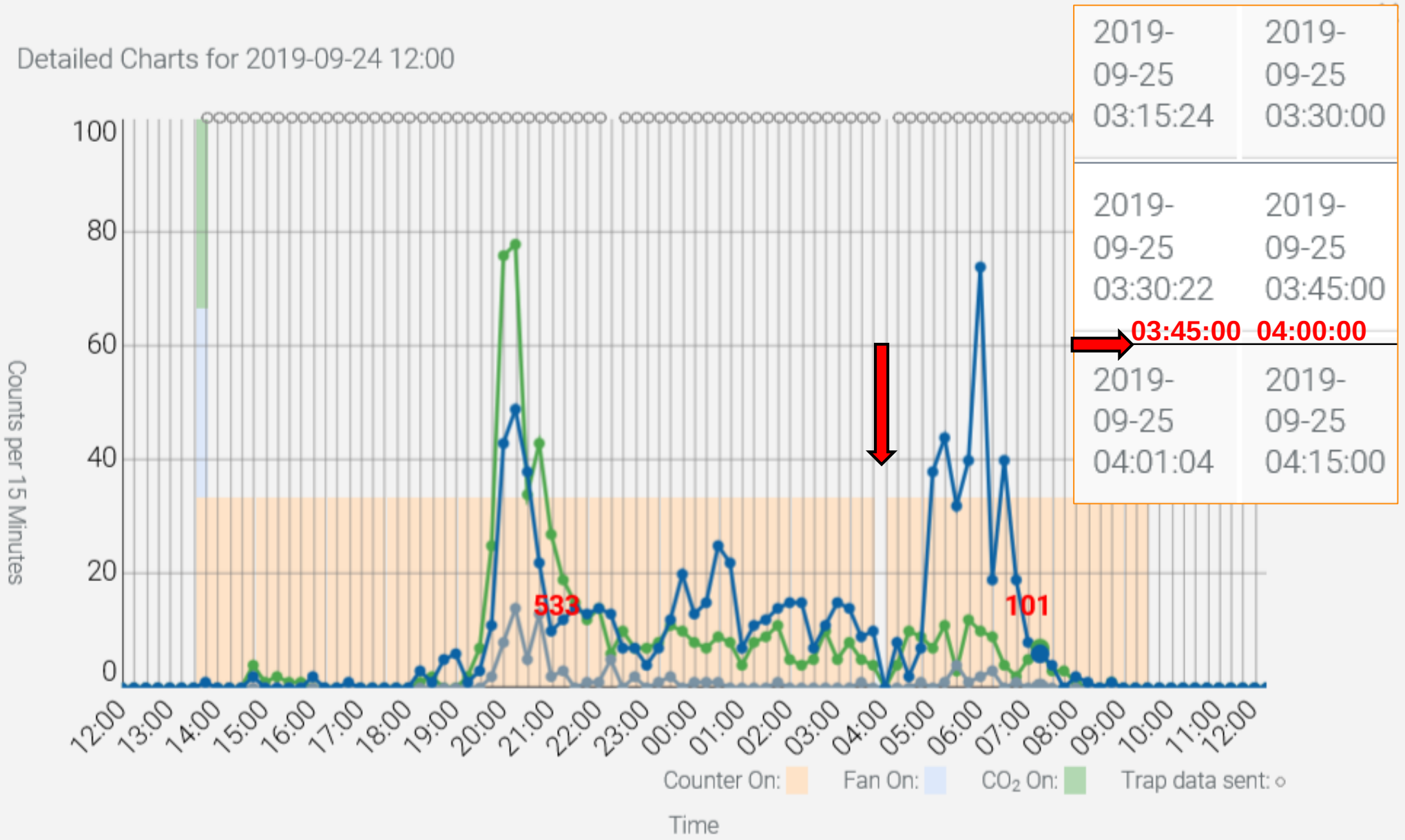


Final assembly of counter mounted to a CDC Light trap

- Counter moved above the fan
- 6 volt battery running 6 volts to light and added a 12 volt fan
- 12 volt car battery running counter



Species	Total #
Ae. taeniorhynchus	160
An. crucians ♀♀	5
An. crucians ♂♂	1
Cq. perturbans	38
Cx. ♂♂	5
Cx. coronator	75
Cx. erraticus	2
Cx. nigripalpus	203
Ma. titillans	13
Ur. lowii	3
Actual count	505


Detailed Charts for 2019-09-24 12:00
2019-09-25 03:15:24
2019-09-25 03:30:00
2019-09-25 03:30:22
2019-09-25 03:45:00
03:45:00
04:00:00
2019-09-25 04:01:04
2019-09-25 04:15:00
533
101
Counts per 15 Minutes
Time
Counter On:
Fan On:
CO2 On:
Trap data sent:

What we have learned

- BG II with the Counter will not run on standard 12 volt 6 amp battery
- Improved collection jar was needed
- Much more equipment out in the field – 2 people setup
- Increased man hours for modifications

Upcoming goals for the use of Smart Traps

- Put BG II Counter on other traps
- Run CO2 cylinder for increase collection days
- Implement a dimmer switch for different voltages
- Solar-trickle charger for 12 volt battery
- Research other smart traps i.e. ID capabilities, viral analysis

Acknowledgements

Pam Thompson for her organization of our archives and historical documents

Douglas Nelson for modifications made to the counter and engineering input

Questions?