Study of the behavior of *Culex tarsalis* in a rice field environment using a BG-Counter

Presented by :

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Roseville, CA

AMCA

Orlando, FL

March 1st 2019

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OBJECTIVES

- Document peak(s) of activity of *Culex tarsalis* using BG-Counters
- Compare data collected over 2 years at the Locust Rd site
- Analyze data from five sites with different environments

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Integrated printed circuit board which incorporates :

- An infrared sensor
- Environmental sensors for temperature, RH and ambient light
- A SD card for onboard data storage, a fan and a CO_2 valve control

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Chart Settings

Insect Type

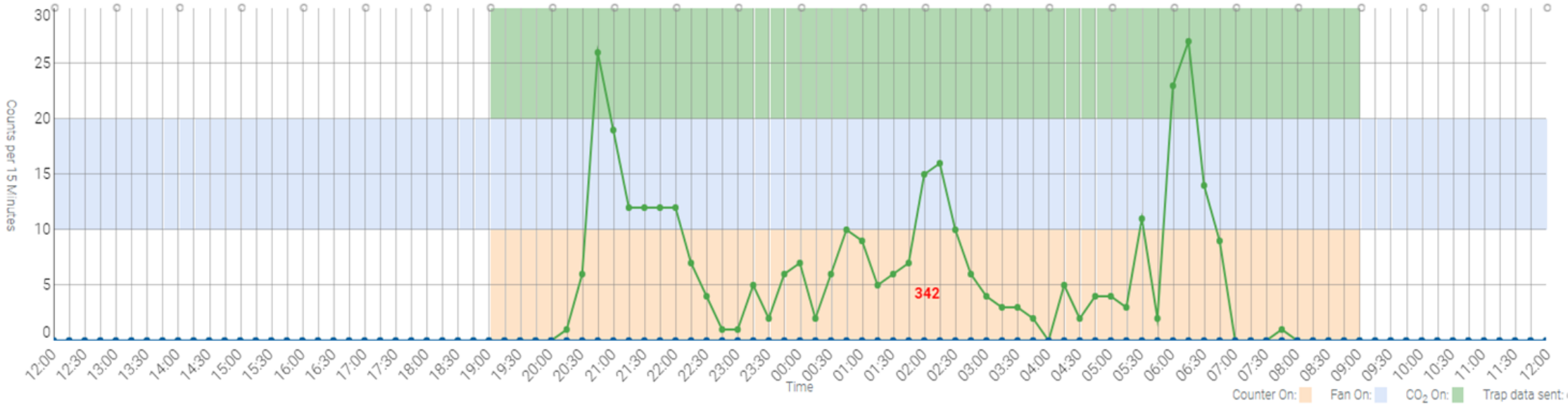
Date: 2017-08-23@12:00

Mosquito Sum: On

y-Axis Range: Auto

BeeGee1

List | Export | < Previous Day | Next Day >



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5 sites

- 3 sites mainly surrounded by rice fields

  (Locust, Philip and Pinto)

- 1 site mainly surrounded by corn (Amoruso)

- 1 site is the Sierra Pacific Industries (Log decks)

  (logs transformed into lumbers for framing and fencing)

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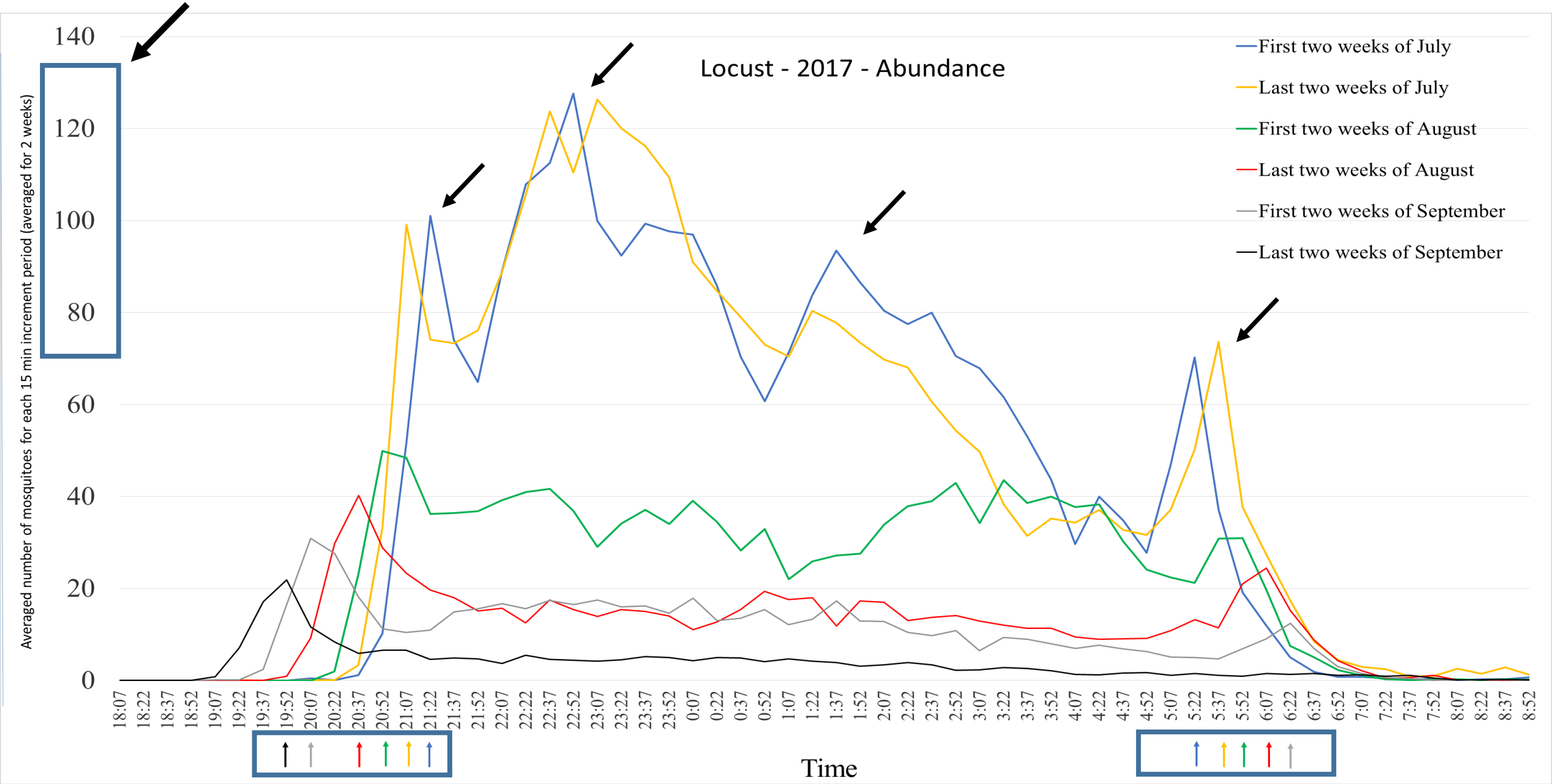
Locust Rd – 2-year comparison


Locust - 2017 - Abundance
First two weeks of July
Last two weeks of July
First two weeks of August
Last two weeks of August
First two weeks of September
Last two weeks of September
Averaged number of mosquitoes for each 15 min increment period (averaged for 2 weeks)
140
120
100
80
60
40
20
0
18:07
18:22
18:37
18:52
19:07
19:22
19:37
19:52
20:07
20:22
20:37
20:52
21:07
21:22
21:37
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23:07
23:22
23:37
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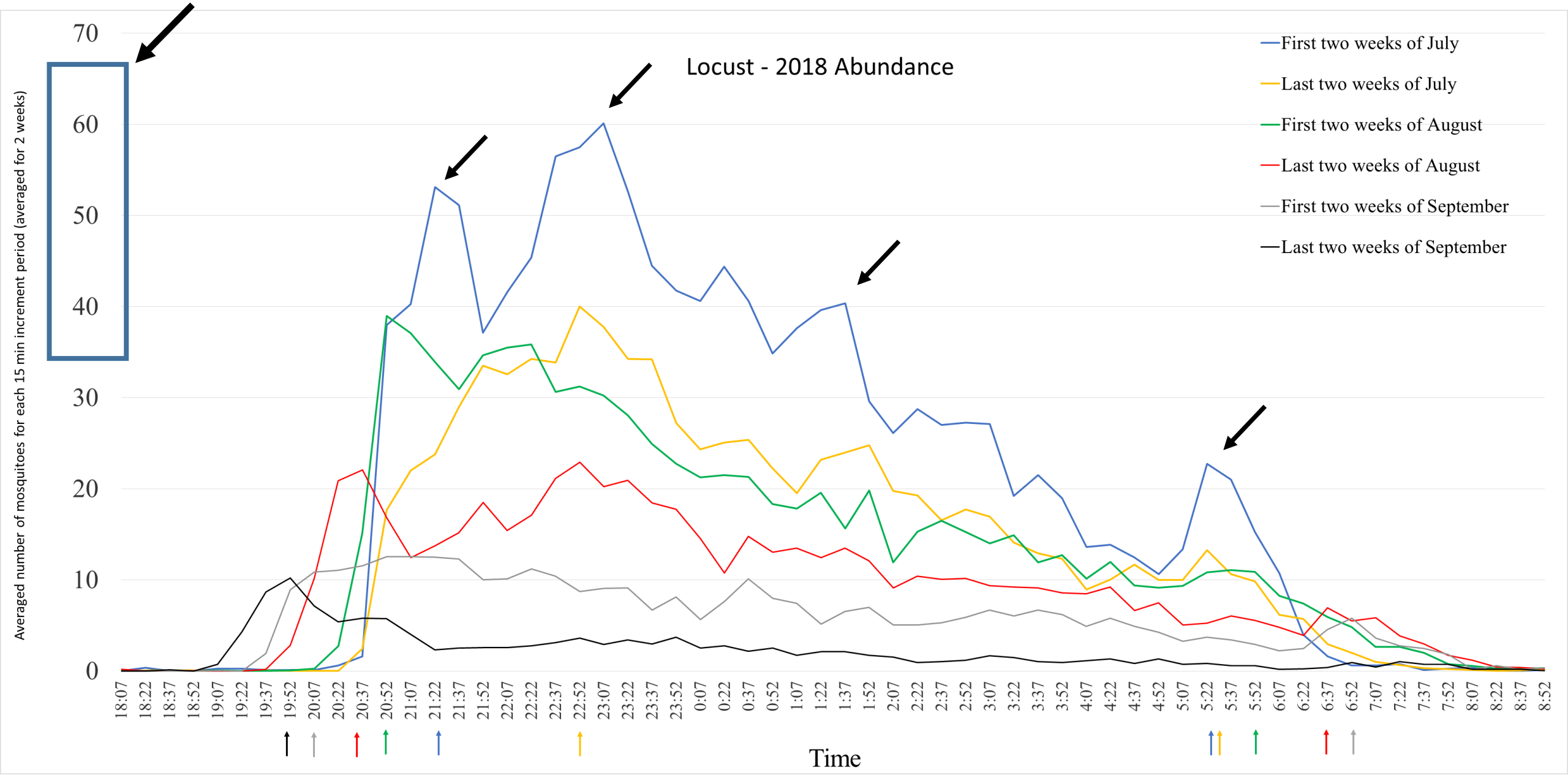
7:07
7:22
7:37
7:52
8:07
8:22
8:37
8:52
Time


Locust - 2018 Abundance
Averaged number of mosquitoes for each 15 min increment period (averaged for 2 weeks)
70
60
50
40
30
20
10
0
First two weeks of July
Last two weeks of July
First two weeks of August
Last two weeks of August
First two weeks of September
Last two weeks of September
18:07
18:22
18:37
18:52
19:07
19:22
19:37
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20:07
20:22
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20:52
21:07
21:22
21:37
21:52
22:07
22:22
22:37
22:52
23:07
23:22
23:37
23:52
0:07
0:22
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0:52
1:07
1:22
1:37
1:52
2:07
2:22
2:37
2:52
3:07
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3:37
3:52
4:07
4:22
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4:52
5:07
5:22
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6:52
7:07
7:22
7:37
7:52
8:07
8:22
8:37
8:52
Time

Locust 2017

Placer

Sutter

Locust 2018

Placer

Sutter

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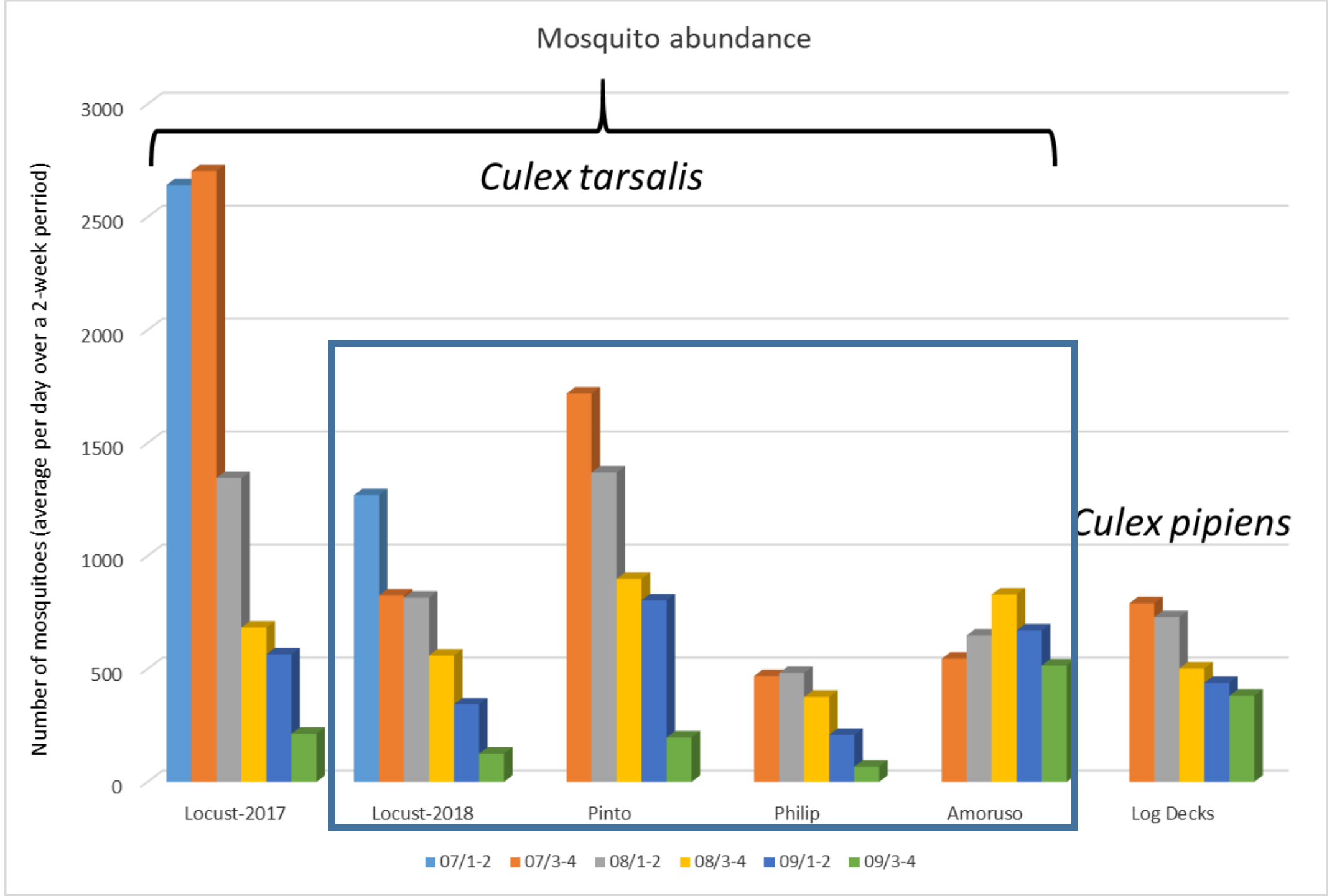
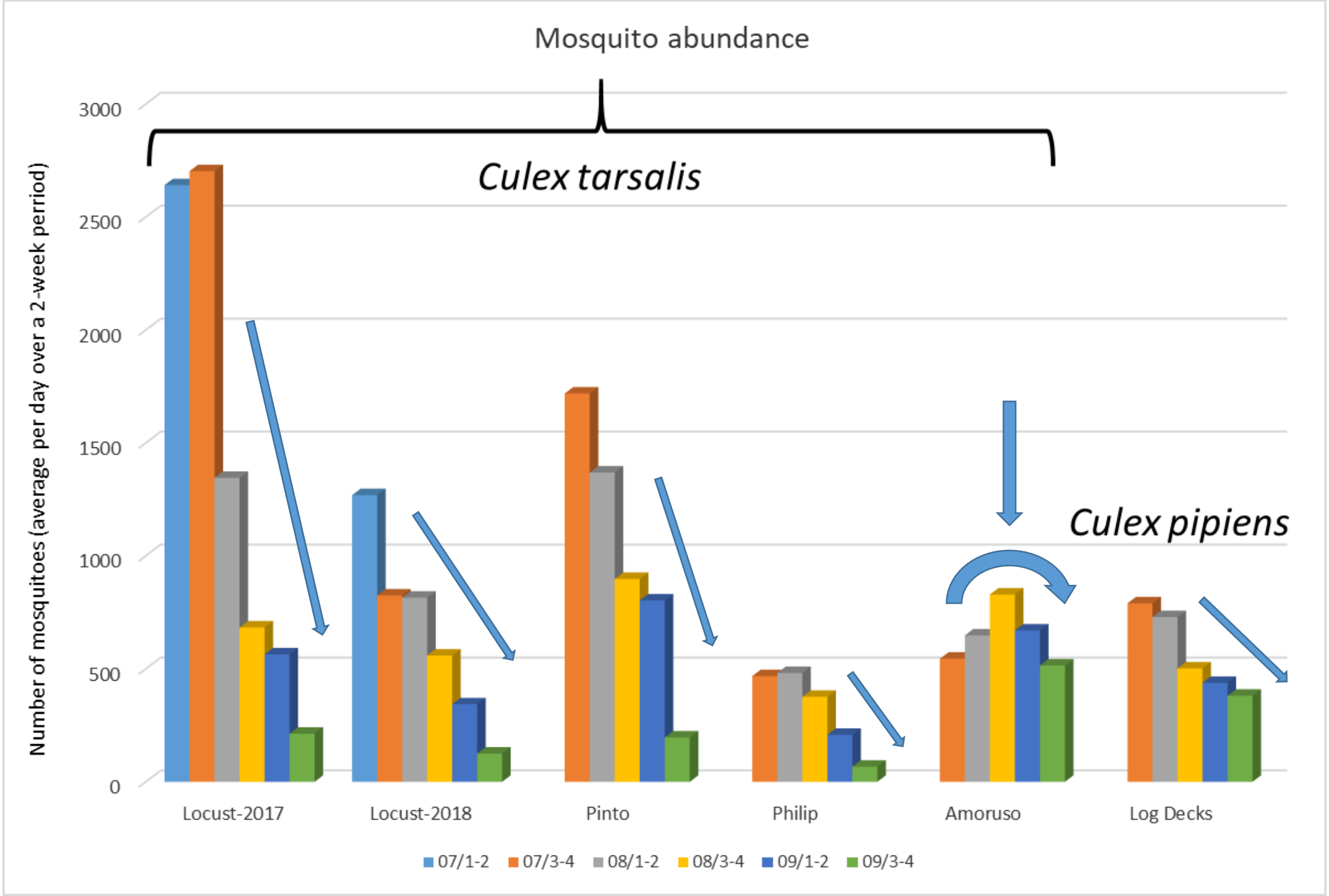
Abundance


Mosquito abundance
Culex tarsalis
Culex pipiens
Number of mosquitoes (average per day over a 2-week perriod)
3000
2500
2000
1500
1000
500
0
Locust-2017
Locust-2018
Pinto
Philip
Amoruso
Log Decks
07/1-2
07/3-4
08/1-2
08/3-4
09/1-2
09/3-4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07/3-4
08/1-2
08/3-4
09/1-2
09/3-4

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- The abundance of mosquitoes can vary greatly per site
  - Location of the site
  - Larvicide treatments
  - Productivity of the surrounding sites (food, water temperature, etc.)
  - Movement of mosquito populations
  - Temperature, relative humidity (to be determined)

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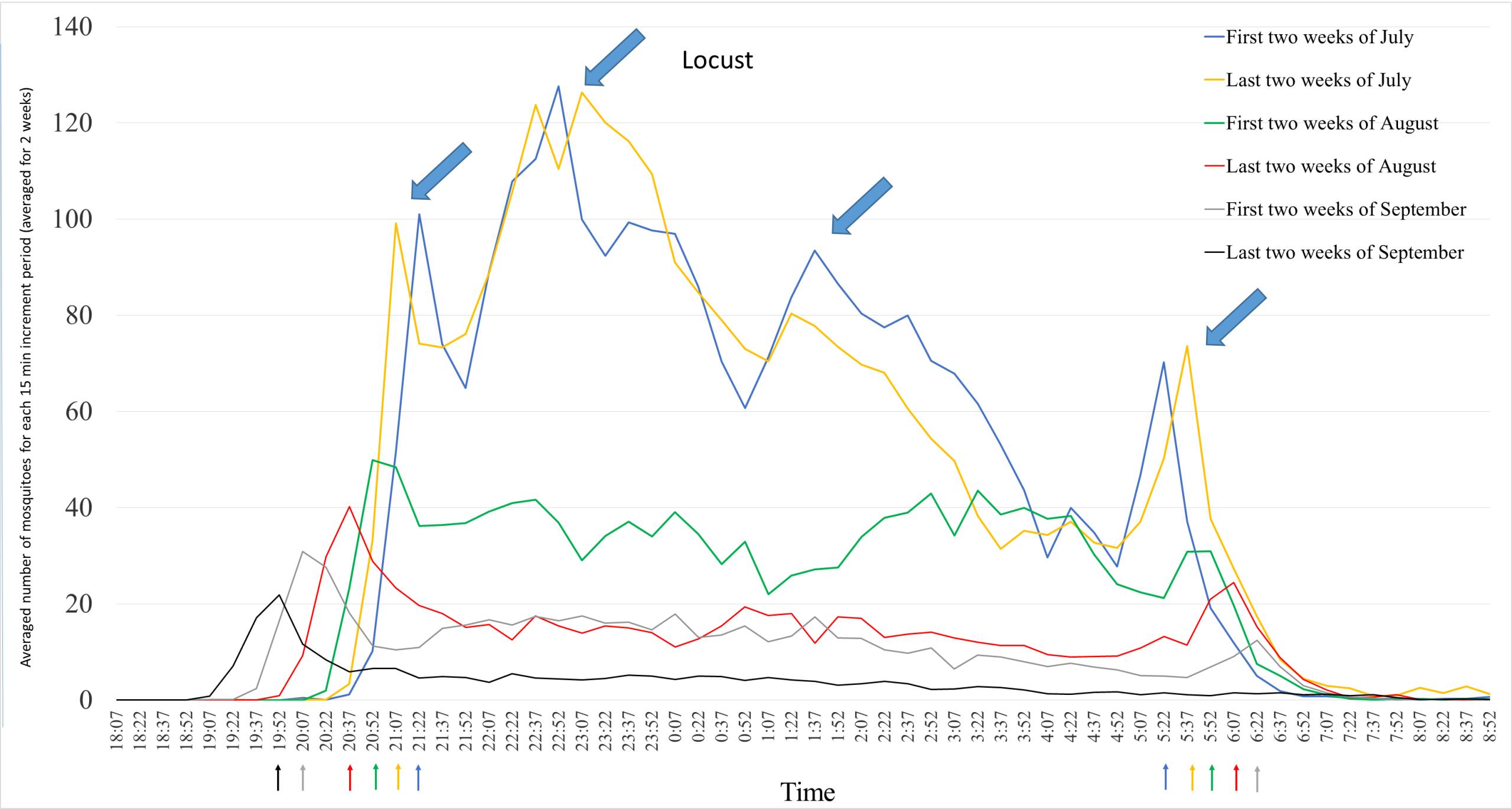
Patterns


Locust
First two weeks of July
Last two weeks of July
First two weeks of August
Last two weeks of August
First two weeks of September
Last two weeks of September
Averaged number of mosquitoes for each 15 min increment period (averaged for 2 weeks)
Time
0
20
40
60
80
100
120
140
18:07
18:22
18:37
18:52
19:07
19:22
19:37
19:52
20:07
20:22
20:37
20:52
21:07
21:22
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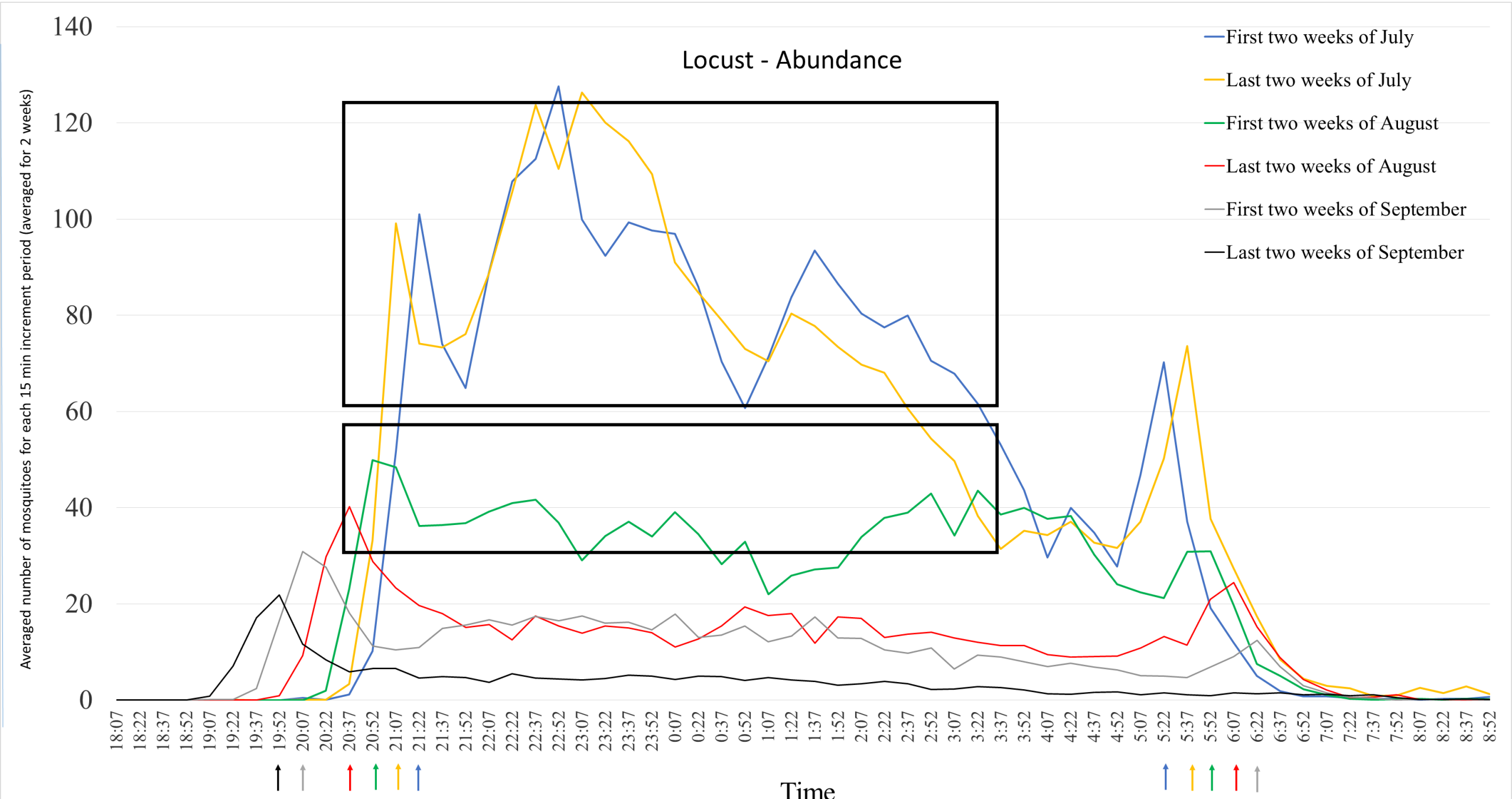
8:52


Locust - Abundance
First two weeks of July
Last two weeks of July
First two weeks of August
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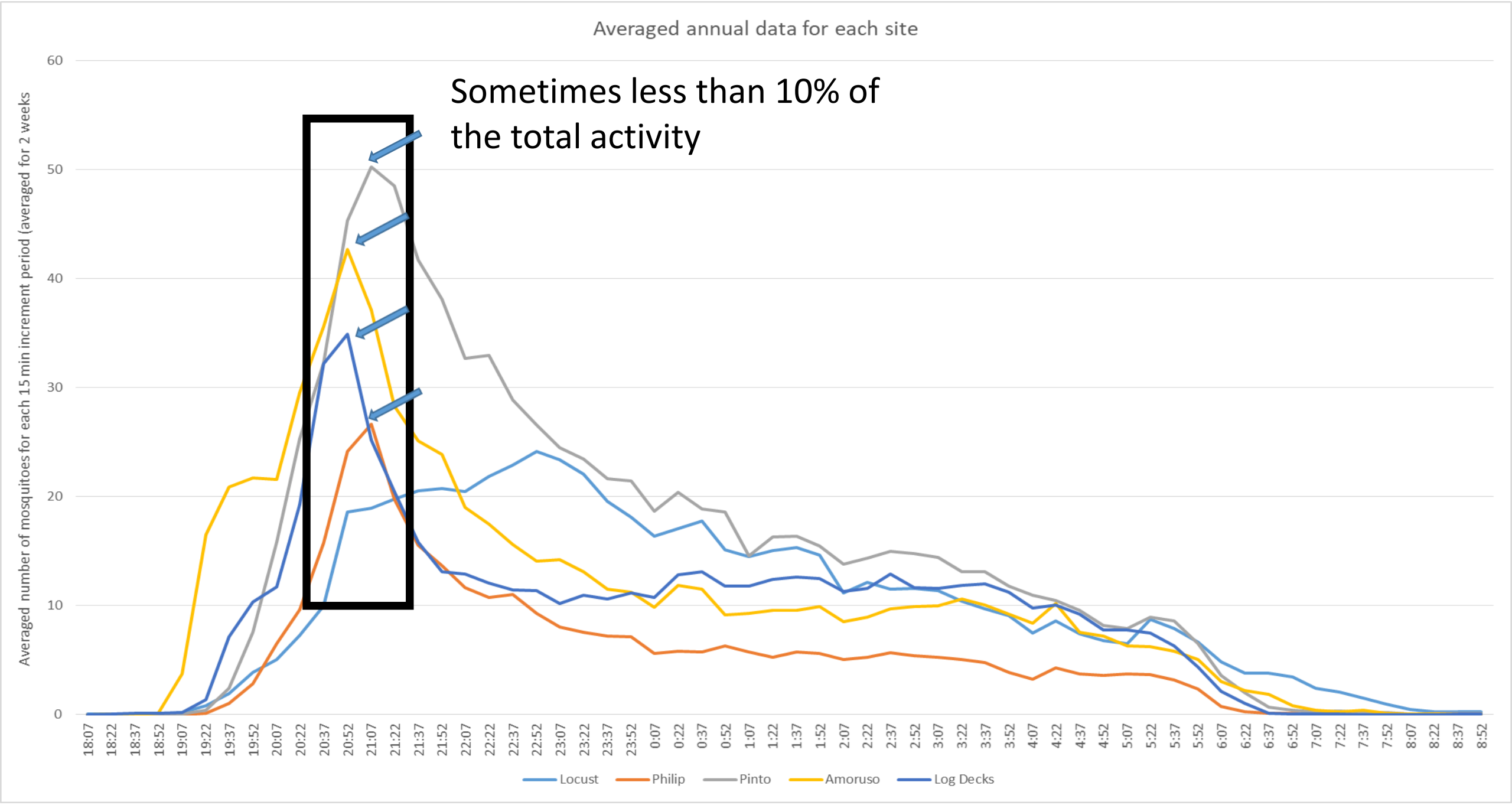
8:52
Time


Averaged annual data for each site
Sometimes less than 10% of the total activity
Averaged number of mosquitoes for each 15 min increment period (averaged for 2 weeks
60
50
40
30
20
10
0
18:07
18:22
18:37
18:52
19:07
19:22
19:37
19:52
20:07
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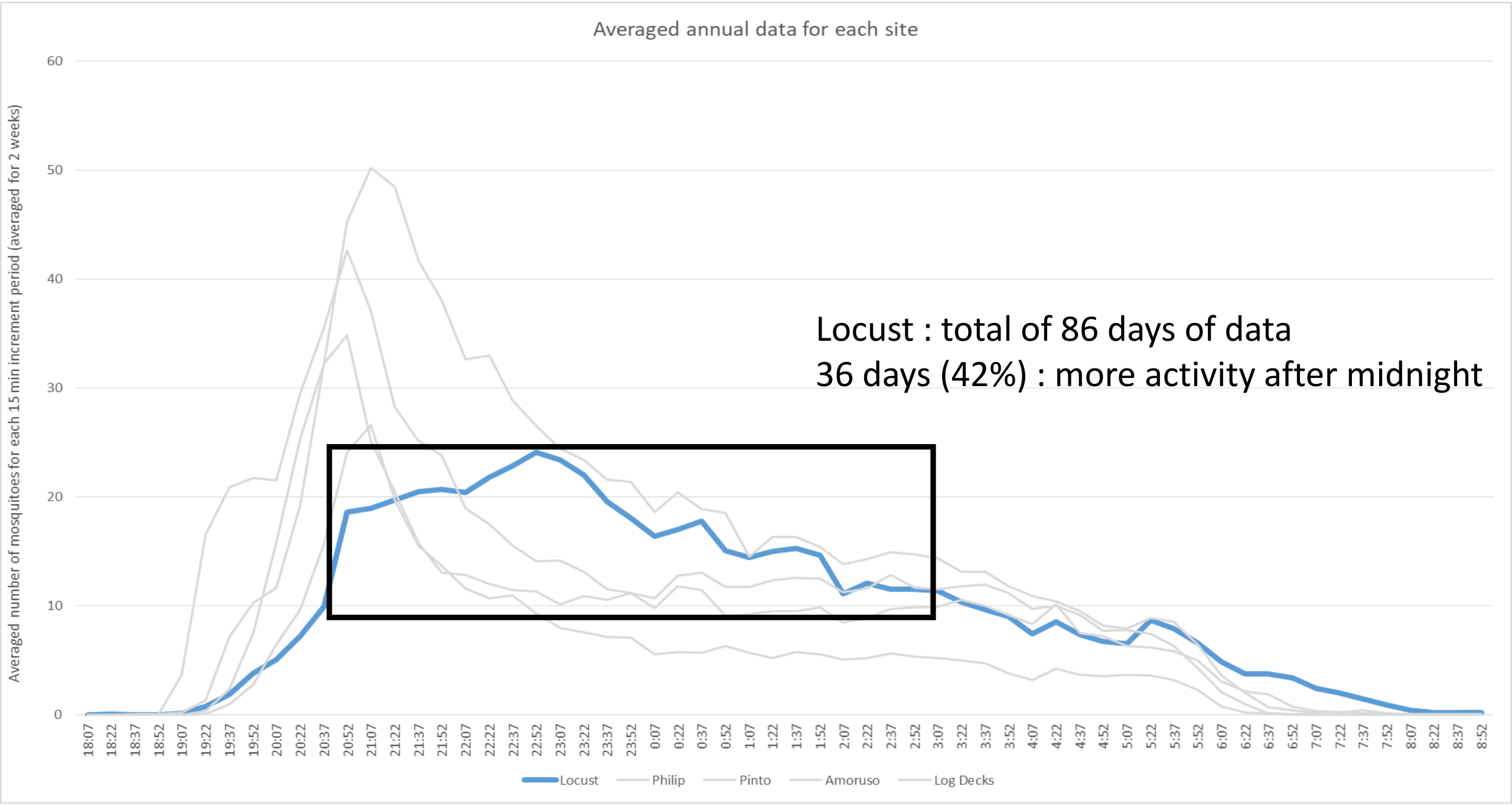
8:37
8:52
Locust
Philip
Pinto
Amoruso
Log Decks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60
50
40
30
20
10
0
18:07
18:22
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18:52
19:07
19:22
19:37
19:52
20:07
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8:52
Locust
Philip
Pinto
Amoruso
Log Decks
Locust : total of 86 days of data
36 days (42%) : more activity after midnight

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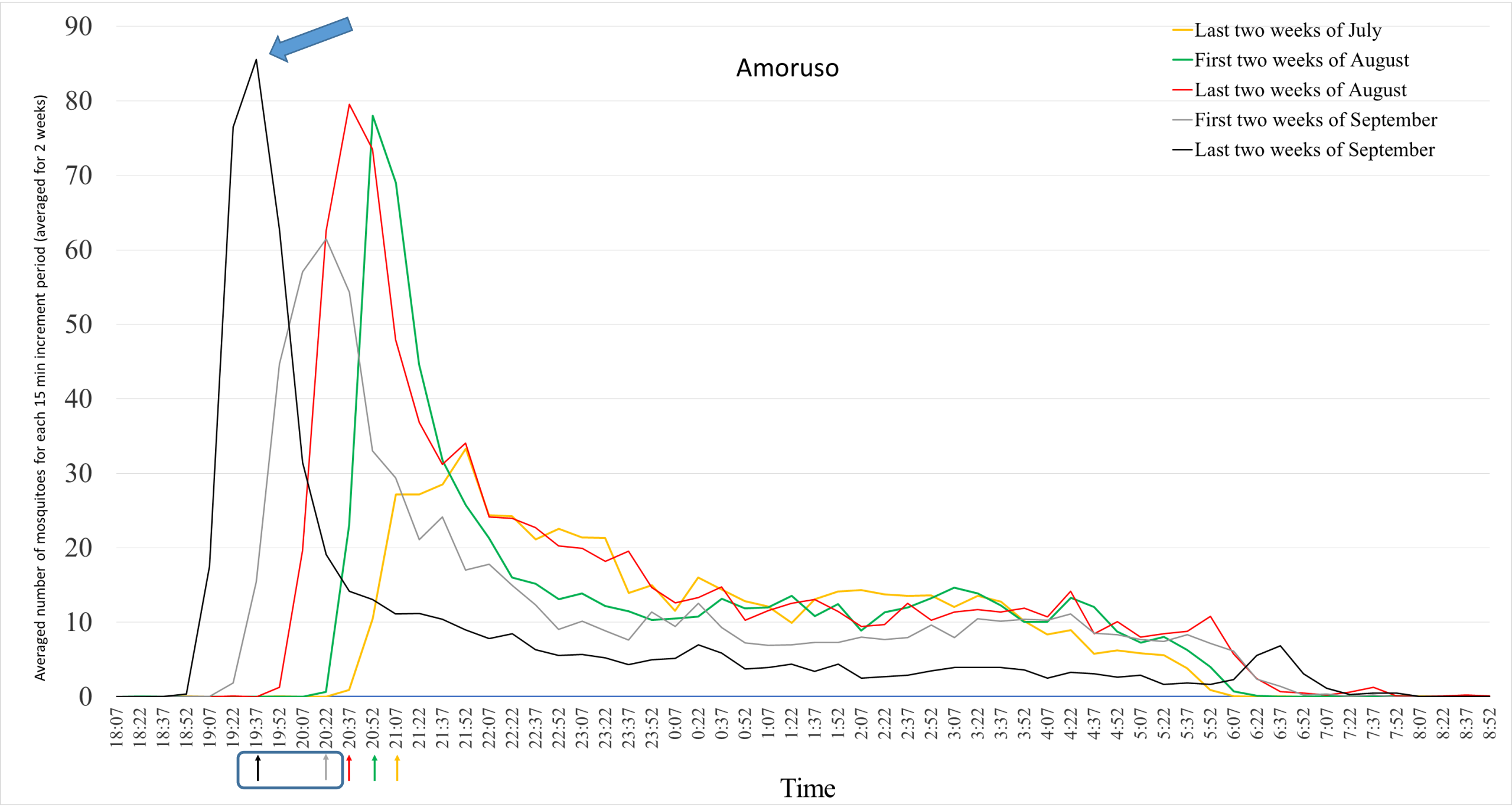
First peak of activity

Peaks of activity

- **Linear regression was used to determine if the time of the first peak (minutes after sunset) changed over the summer within a same site**

	P-value / Intercept	Data
Locust	0.32	86
Philip	0.08	68
Pinto	0.01	60
Amoruso	0.007	72
Log Decks	0.30	74


Amoruso
Last two weeks of July
First two weeks of August
Last two weeks of August
First two weeks of September
Last two weeks of September
Averaged number of mosquitoes for each 15 min increment period (averaged for 2 weeks)
0
10
20
30
40
50
60
70
80
90
18:07
18:22
18:37
18:52
19:07
19:22
19:37
19:52
20:07
20:22
20:37
20:52
21:07
21:22
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21:52
22:07
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23:52
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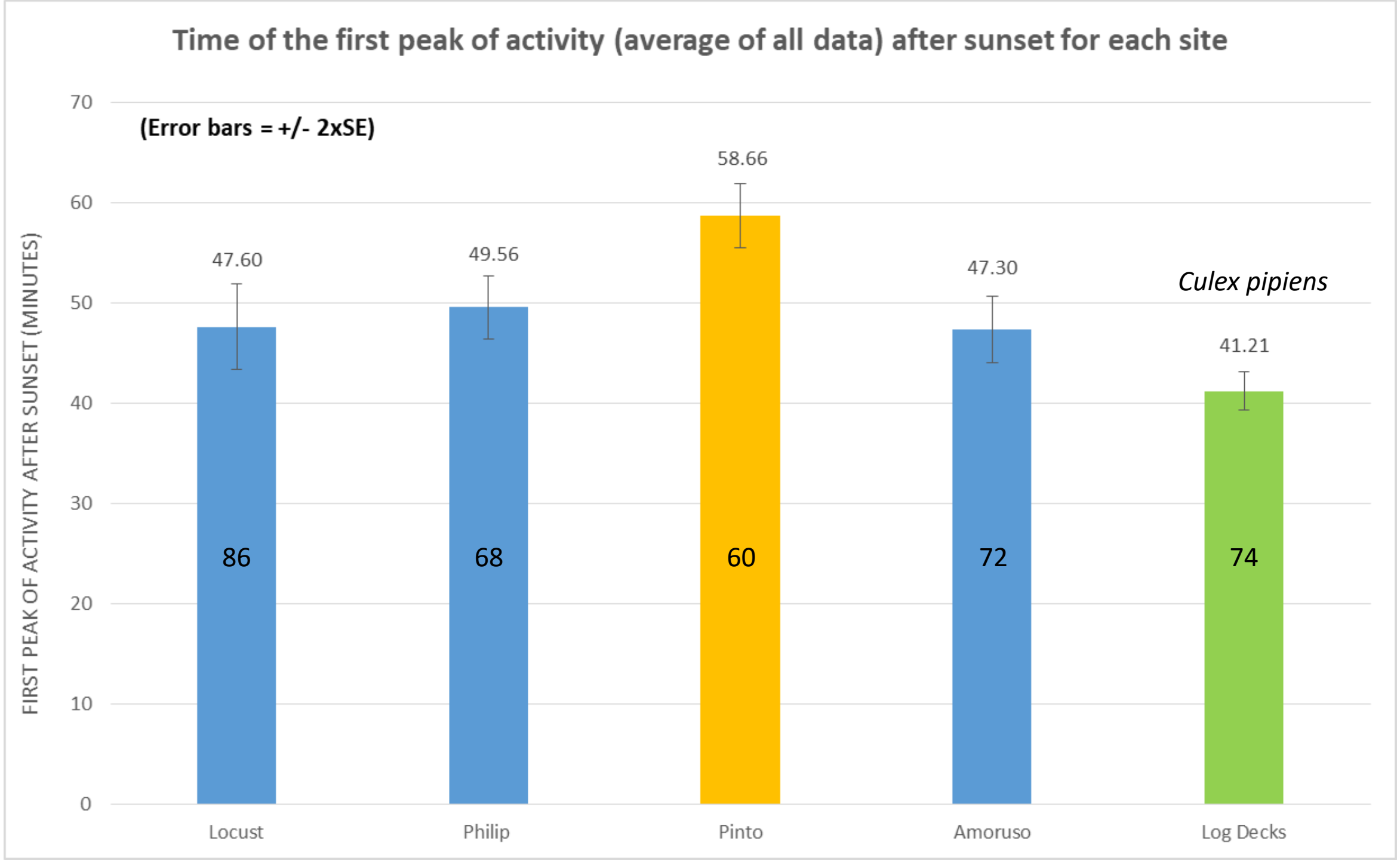
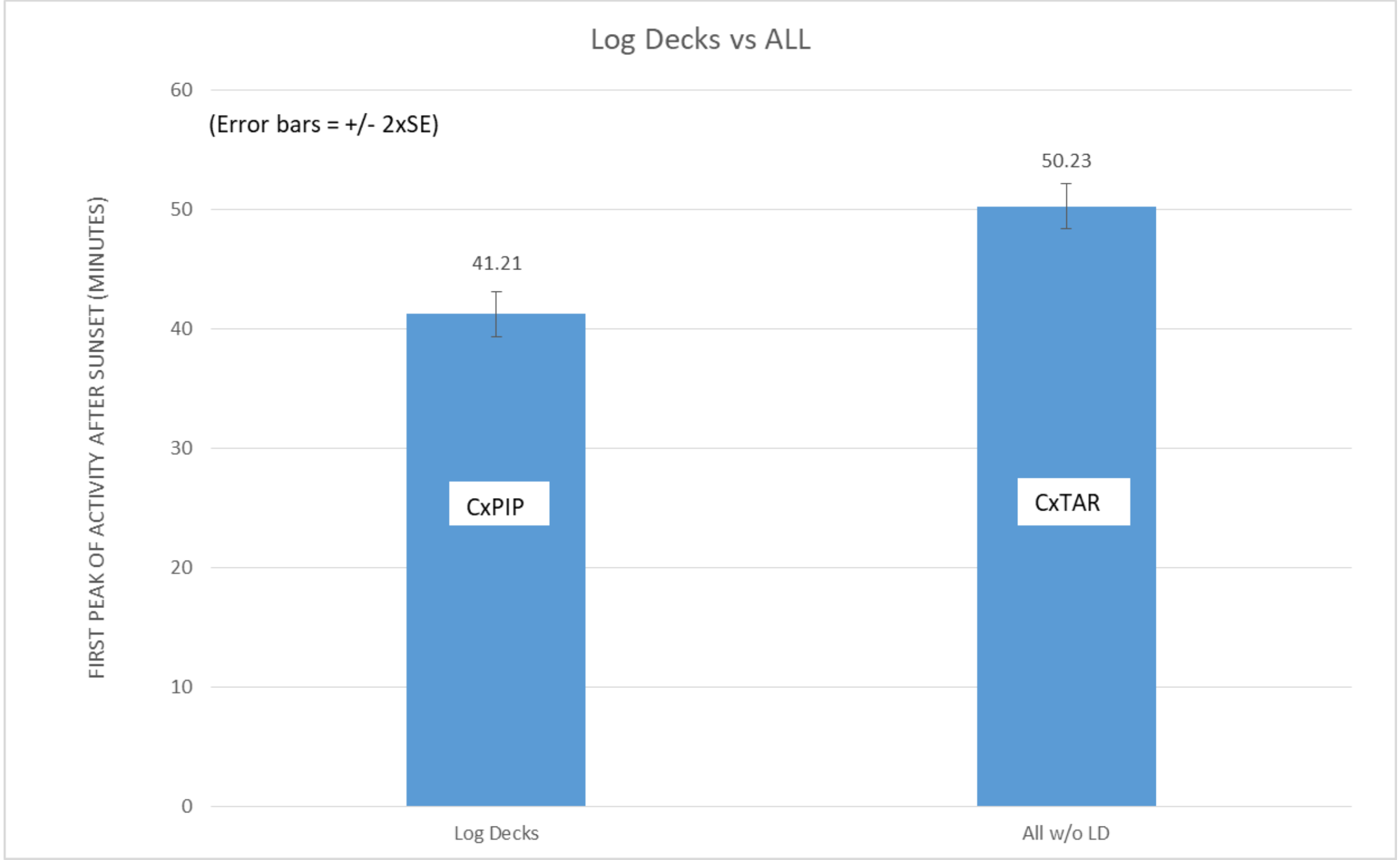
6:52
7:07
7:22
7:37
7:52
8:07
8:22
8:37
8:52
Time


Time of the first peak of activity (average of all data) after sunset for each site
(Error bars = +/- 2xSE)
FIRST PEAK OF ACTIVITY AFTER SUNSET (MINUTES)
70
60
50
40
30
20
10
0
47.60
49.56
58.66
47.30
41.21
86
68
60
72
74
Culex pipiens
Locust
Philip
Pinto
Amoruso
Log Decks

Log Decks


Log Decks vs ALL
(Error bars = +/- 2xSE)
FIRST PEAK OF ACTIVITY AFTER SUNSET (MINUTES)
60
50
40
30
20
10
0
41.21
50.23
CxPIP
CxTAR
Log Decks
All w/o LD

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Conclusion

- Locust showed similar data (patterns, peaks) over the 2-year trial
- The abundance of mosquitoes can vary greatly per site
- **Within a same site**, the time of the first peak (minutes after sunset) can change over the summer

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Conclusion

- The time of the first peak of activity can vary from **different sites**
- Can we expect similar results with the other sites over a 2-year trial?

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Conclusion

- Can get a lot of information on mosquitoes using the BG-Counters
  - Peaks of activity
    - First peak after sunset
    - Peaks during the season (many peaks of activity for Locust in July)
  - Behavior of mosquitoes
    - Curve patterns
    - Activity throughout the evening and night

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Thank you

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