UG – Research Experiments

Module 3 - Fly Crosses and Population DAM data analysis

(GMR GAL – 4 × UAS lines)

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♂ GMR-GAL4 × ♀

$$\frac{+}{Y};\ \frac{GMR\ GAL4}{GMR\ GAL4};\ \frac{+}{+}$$

1) UAS TER94 w.t Overexpression

$$\frac{+}{+};\ \frac{UAS\ TER94\ wt\ OE}{cyo};\ \frac{+}{+}$$

2) UAS TER94 RNAi

$$\frac{+}{+};\ \frac{UAS\ TER94\ RNAi}{+};\ \frac{+}{+}$$

3) UAS TER94 R152H

$$\frac{+}{+};\ \frac{UAS\ TER94\ R152H}{+};\ \frac{+}{+}$$

GMR GAL4 Homozygous eye defect

1) $\frac{+}{Y}; \frac{GMR\ GAL4}{GMR\ GAL4}; \frac{+}{+}$ × $\frac{+}{+}; \frac{UAS\ TER94\ wt\ OE}{cyo}; \frac{+}{+}$

F1: $\frac{+}{+}; \frac{\boldsymbol{G}}{\boldsymbol{wt\ OE}}$ $\frac{+}{\boldsymbol{Y}}; \frac{\boldsymbol{G}}{\boldsymbol{wt\ OE}}$ $\frac{+}{+}; \frac{\boldsymbol{G}}{\boldsymbol{cyo}}$ $\frac{+}{\boldsymbol{Y}}; \frac{\boldsymbol{G}}{\boldsymbol{cyo}}$

Results:

Total no. - 15

Males - 6 Females - 9

Balencers vs Non balencers – all cyo/red eyed

** 1 female with white eye defect

** few with eye defects – few faccets shaved

Cyo flies, one female with eye defect

2) $\frac{+}{Y}; \frac{GMR\ GAL4}{GMR\ GAL4}; \frac{+}{+}$ × $\frac{+}{+}; \frac{UAS\ TER94\ RNAi}{+}; \frac{+}{+}$

F1: $\frac{+}{+}; \frac{G}{RNAi}$ $\frac{+}{Y}; \frac{G}{RNAi}$ $\frac{+}{+}; \frac{G}{+}$ $\frac{+}{Y}; \frac{G}{+}$

Results:

Total no. - 48

Males - 19 Females - 29

- No eye defect seen, No balencers

Normal eyes with no such defect

3) $\frac{+}{Y}; \frac{GMR\ GAL4}{GMR\ GAL4}; \frac{+}{+}$ × $\frac{+}{+}; \frac{UAS\ TER94\ R152H}{+}; \frac{+}{+}$

↓

F1: $\frac{+}{+}; \frac{\boldsymbol{G}}{\boldsymbol{R}}$ $\frac{+}{\boldsymbol{Y}}; \frac{\boldsymbol{G}}{\boldsymbol{R}}$ $\frac{+}{+}; \frac{\boldsymbol{G}}{+}$ $\frac{+}{\boldsymbol{Y}}; \frac{\boldsymbol{G}}{+}$

Results:

Total no. - 30

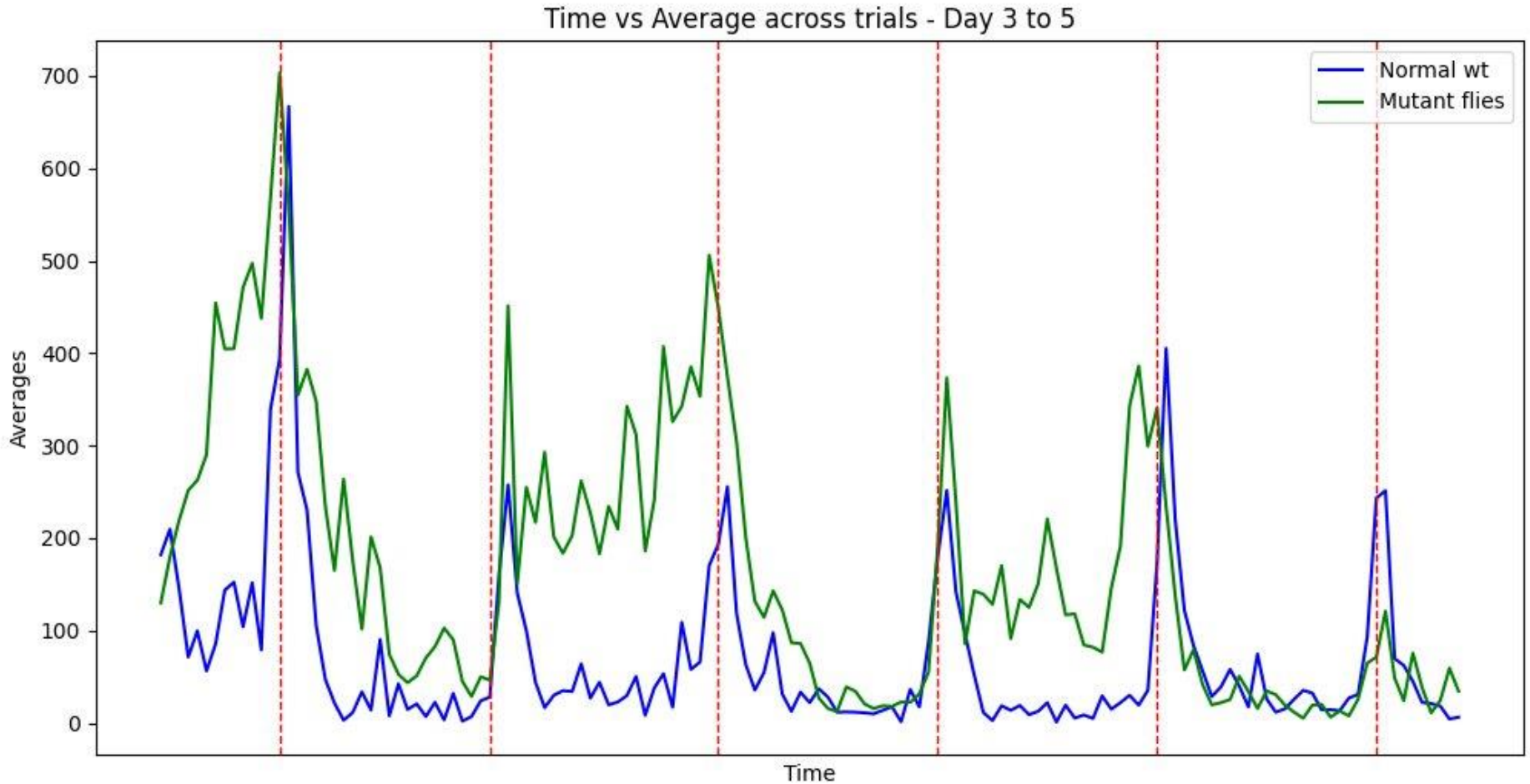
Males - 11 Females - 19

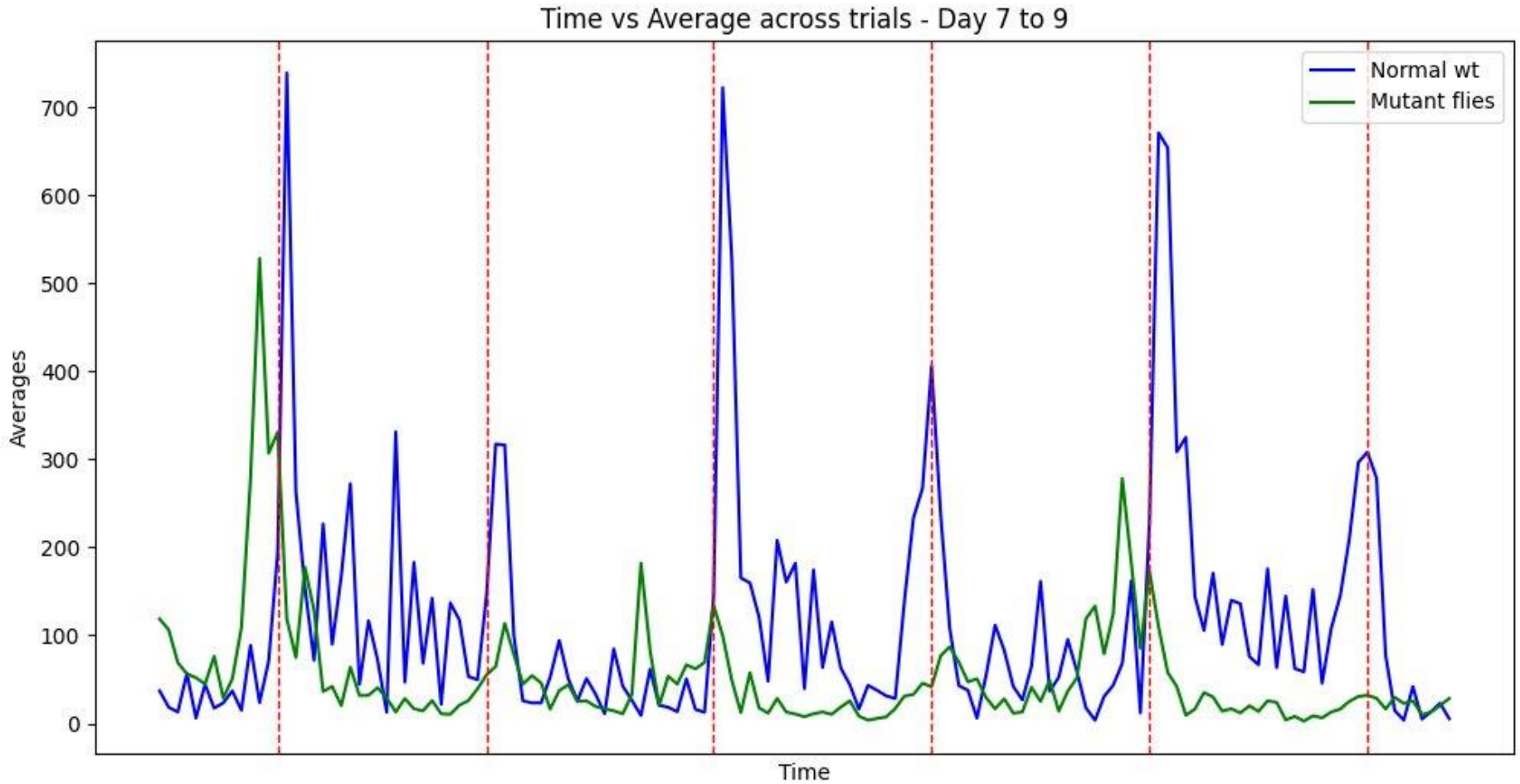
- All white eyed flies
- few dead flies in the vial

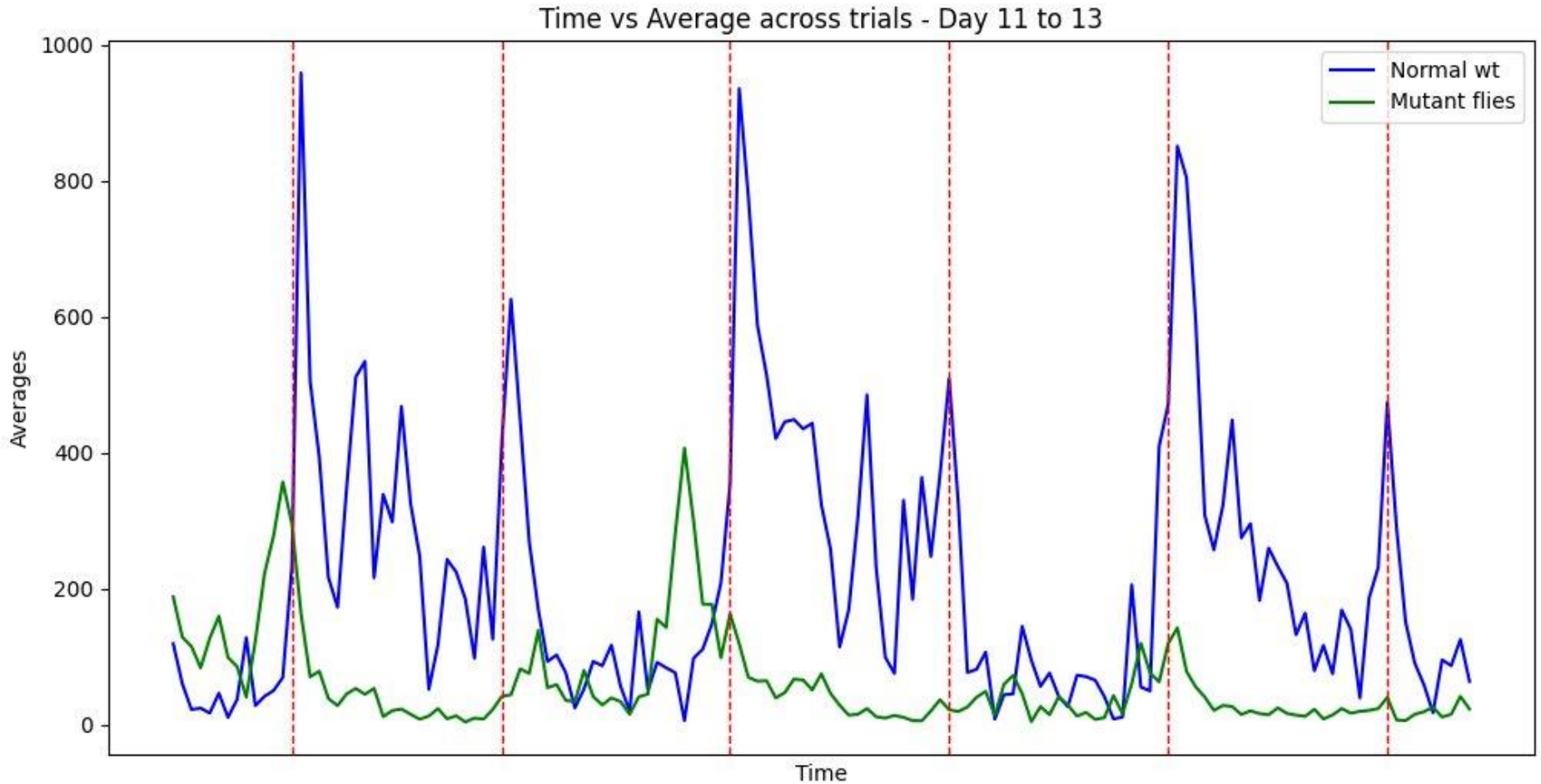


White eyed, few with wing defects

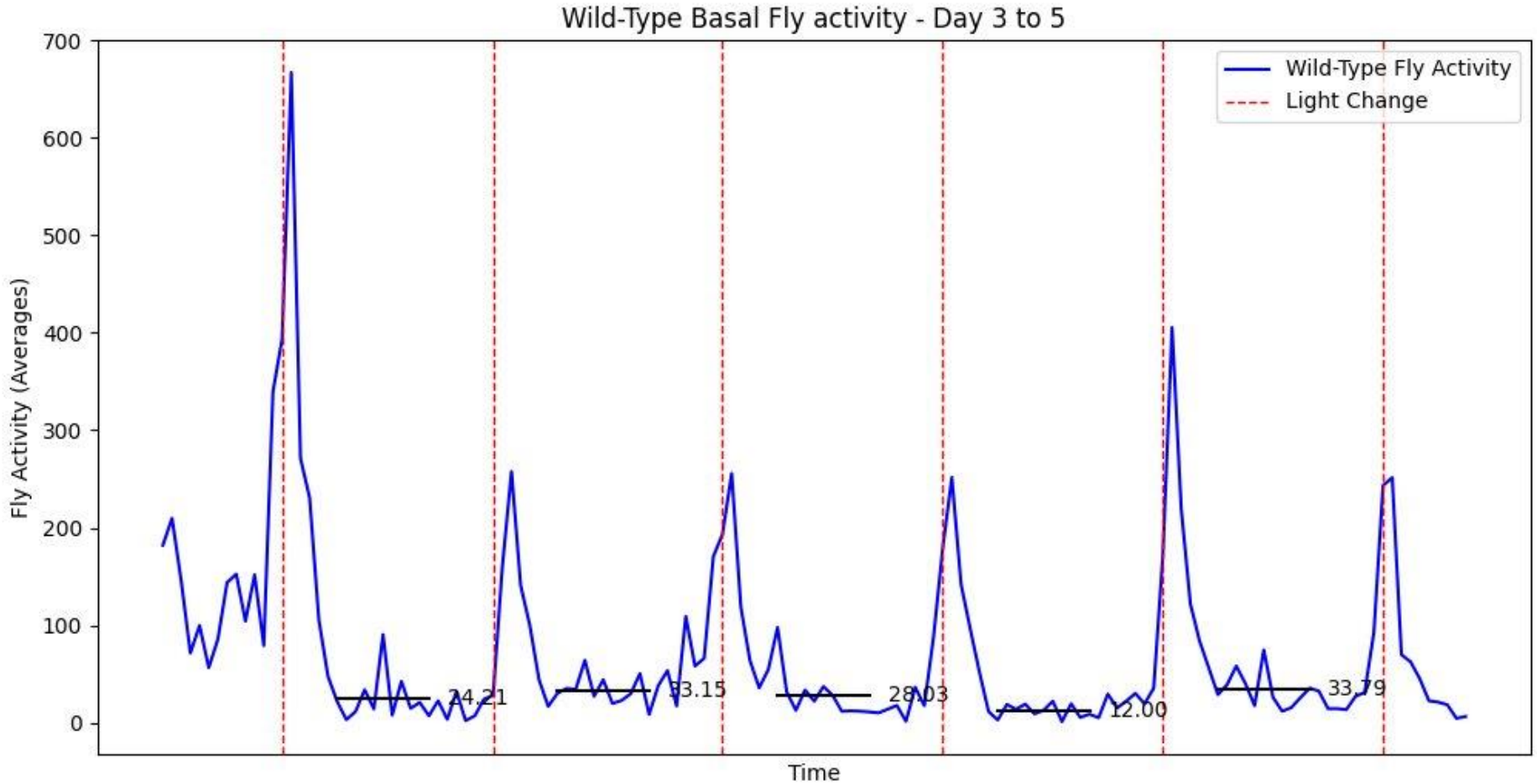
DAM Data Analysis

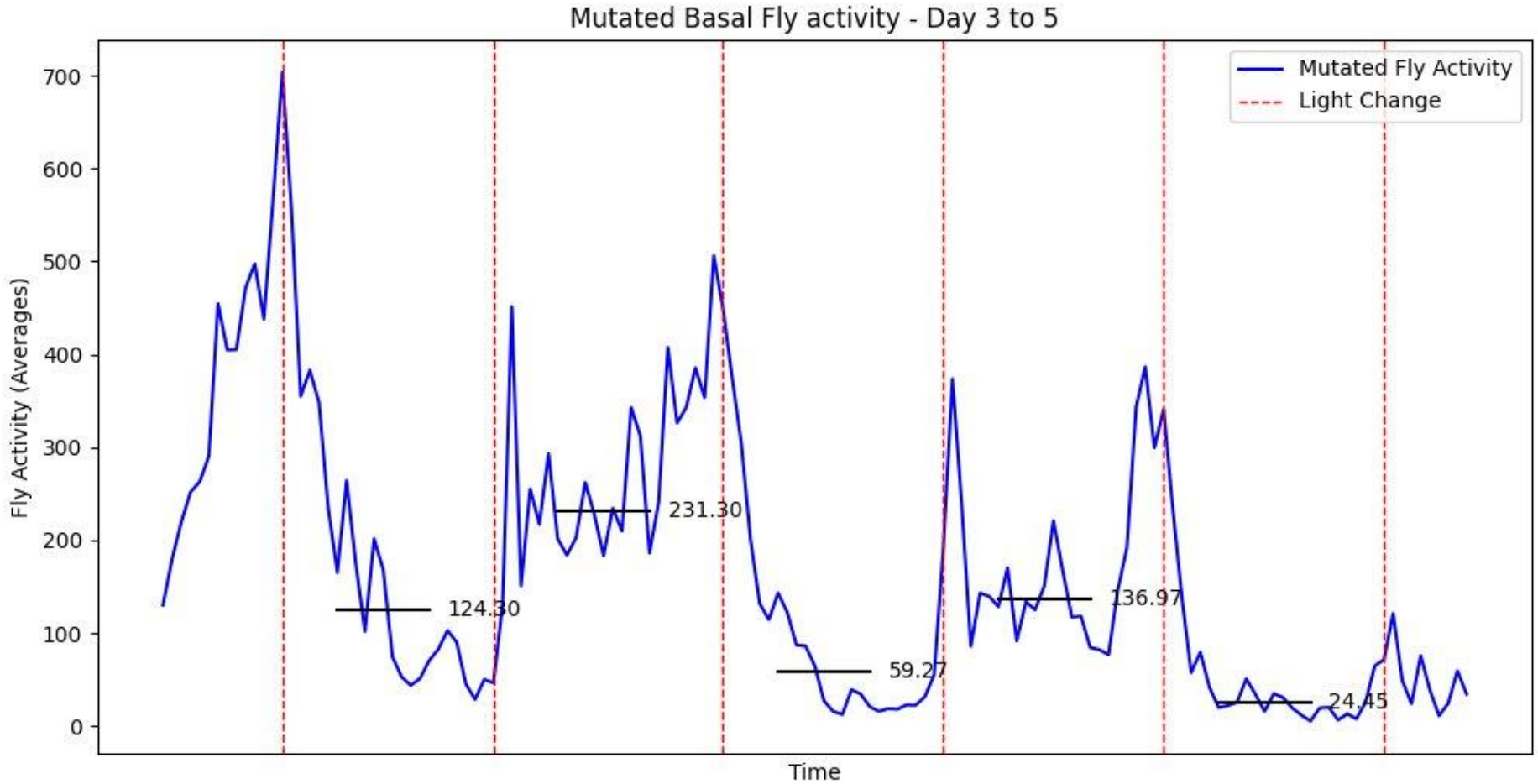

Time vs Average across trials - Day 3 to 5
Normal wt
Mutant flies
Averages
Time
0
100
200
300
400
500
600
700

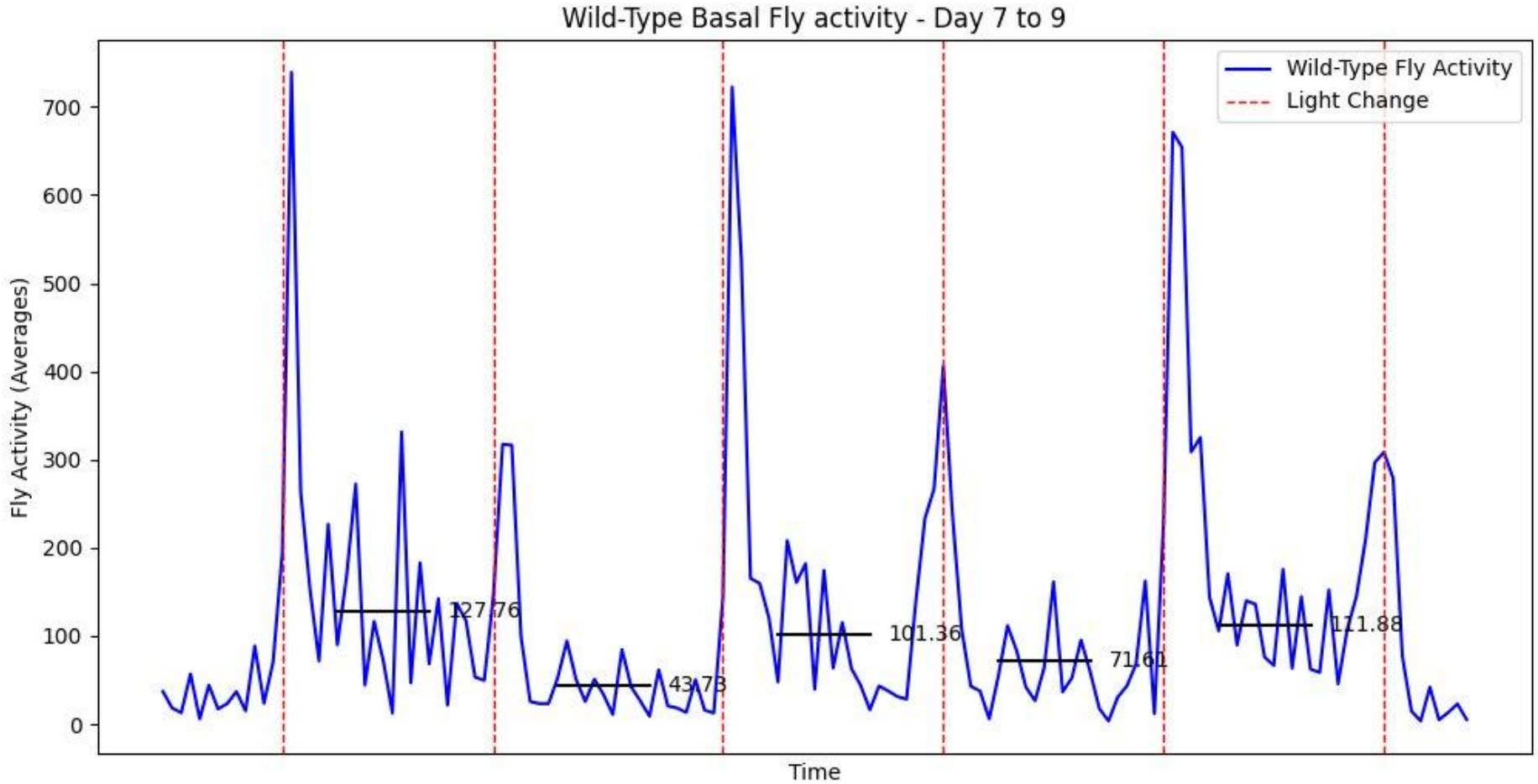

Time vs Average across trials - Day 7 to 9
Normal wt
Mutant flies
Averages
Time
0
100
200
300
400
500
600
700

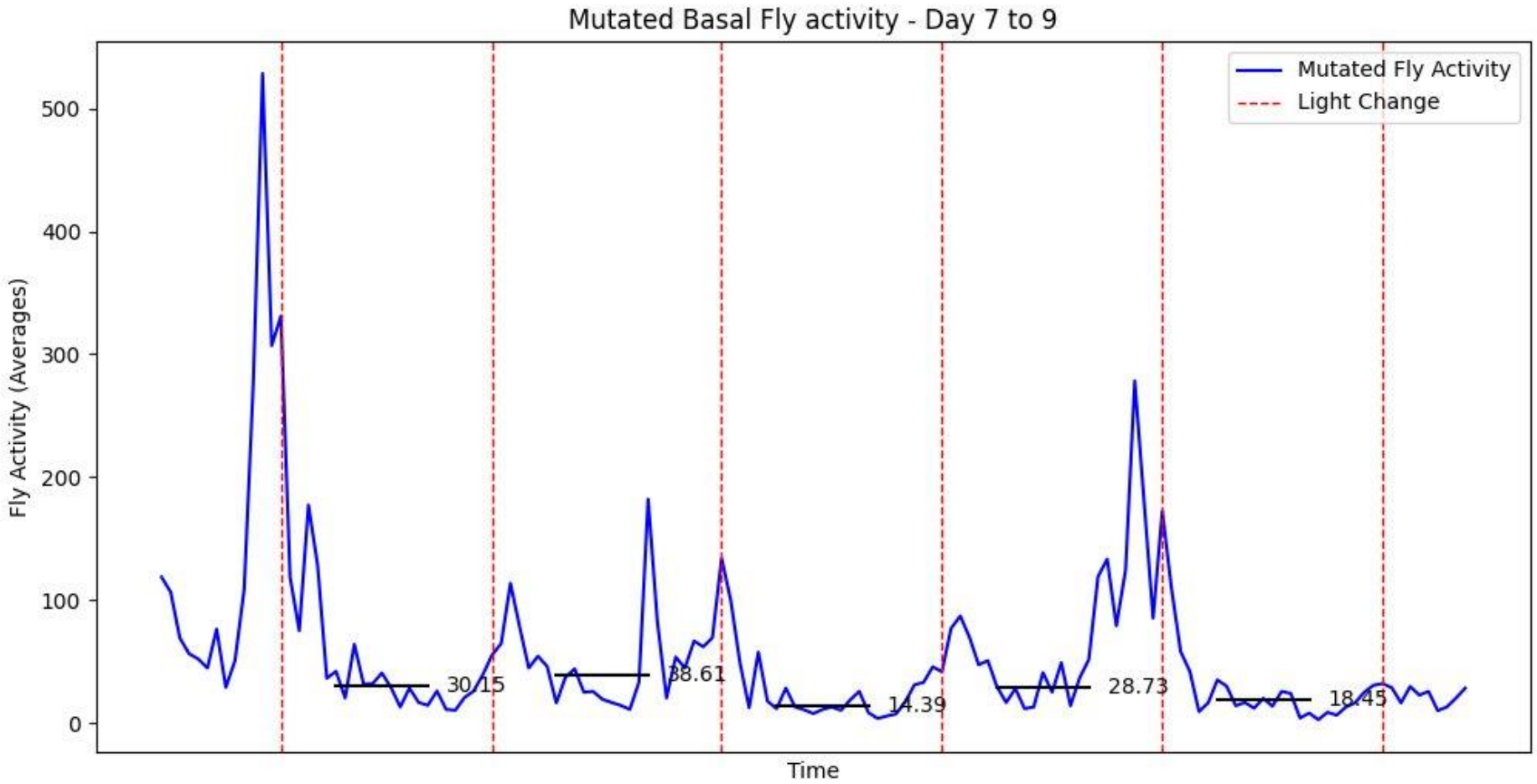

Time vs Average across trials - Day 11 to 13
Normal wt
Mutant flies
Averages
Time
0
200
400
600
800
1000

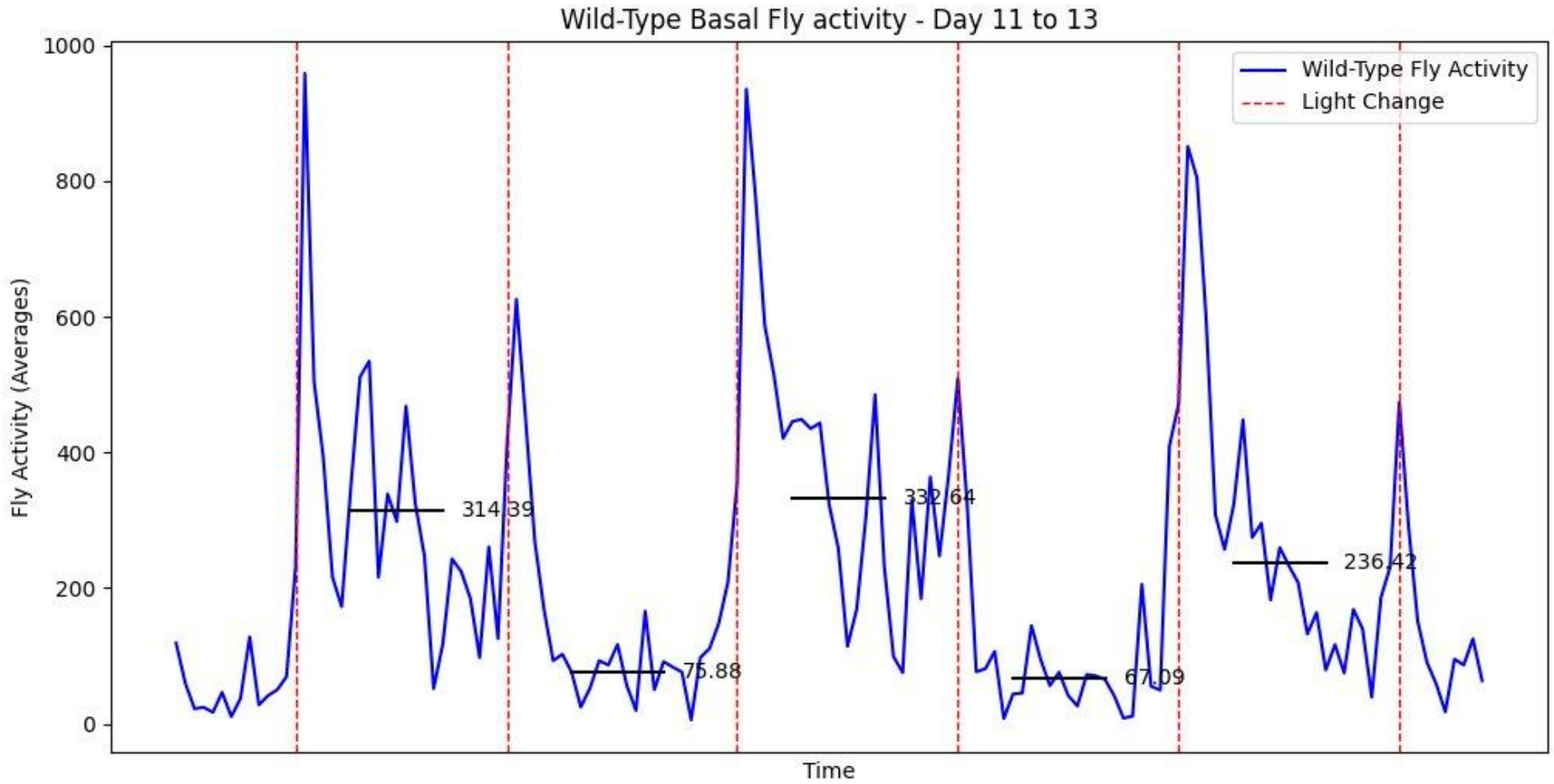
Basal fly activity

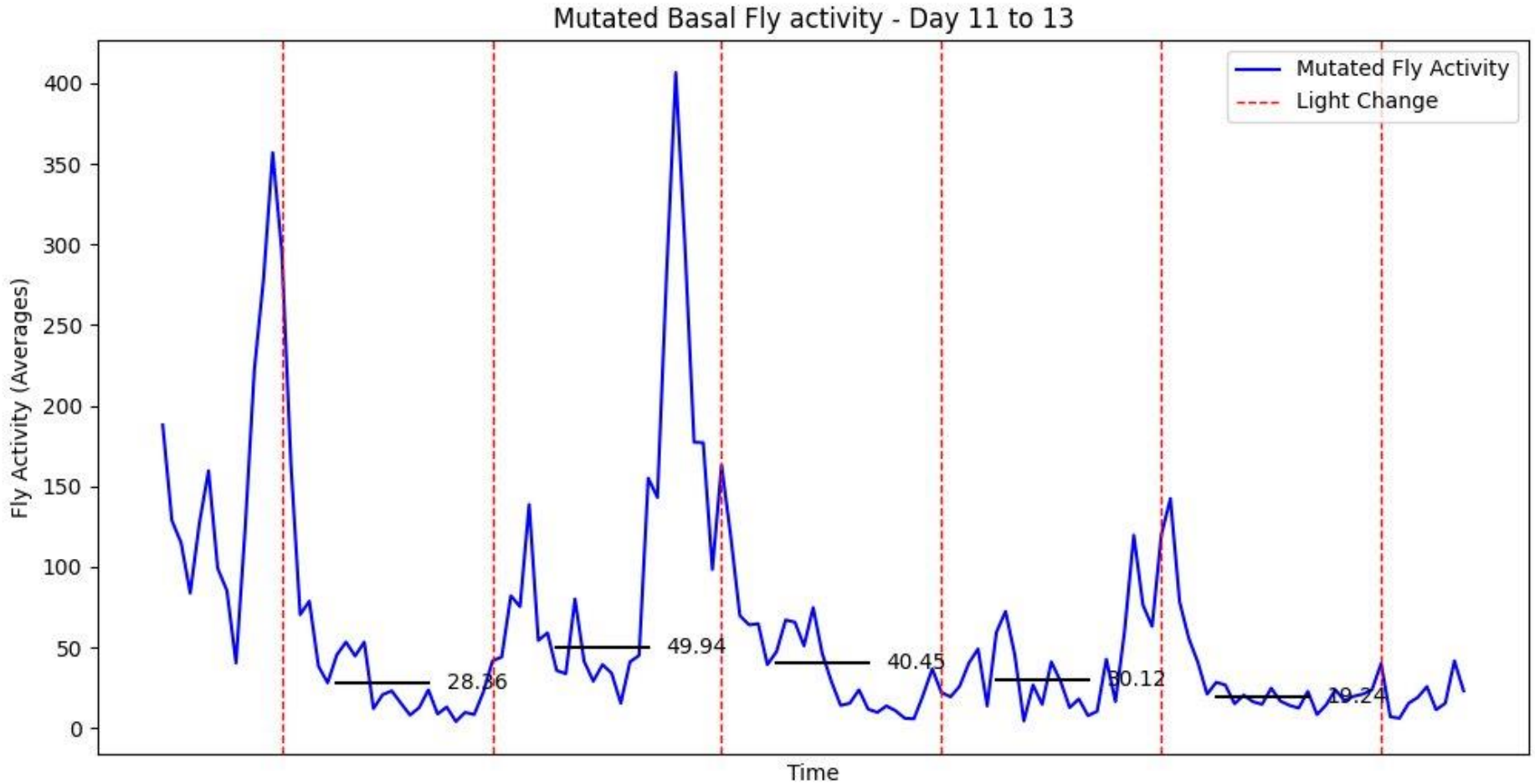

Wild-Type Basal Fly activity - Day 3 to 5
Wild-Type Fly Activity
Light Change
Fly Activity (Averages)
Time
700
600
500
400
300
200
100
0
24.21
33.15
28.03
12.00
33.79

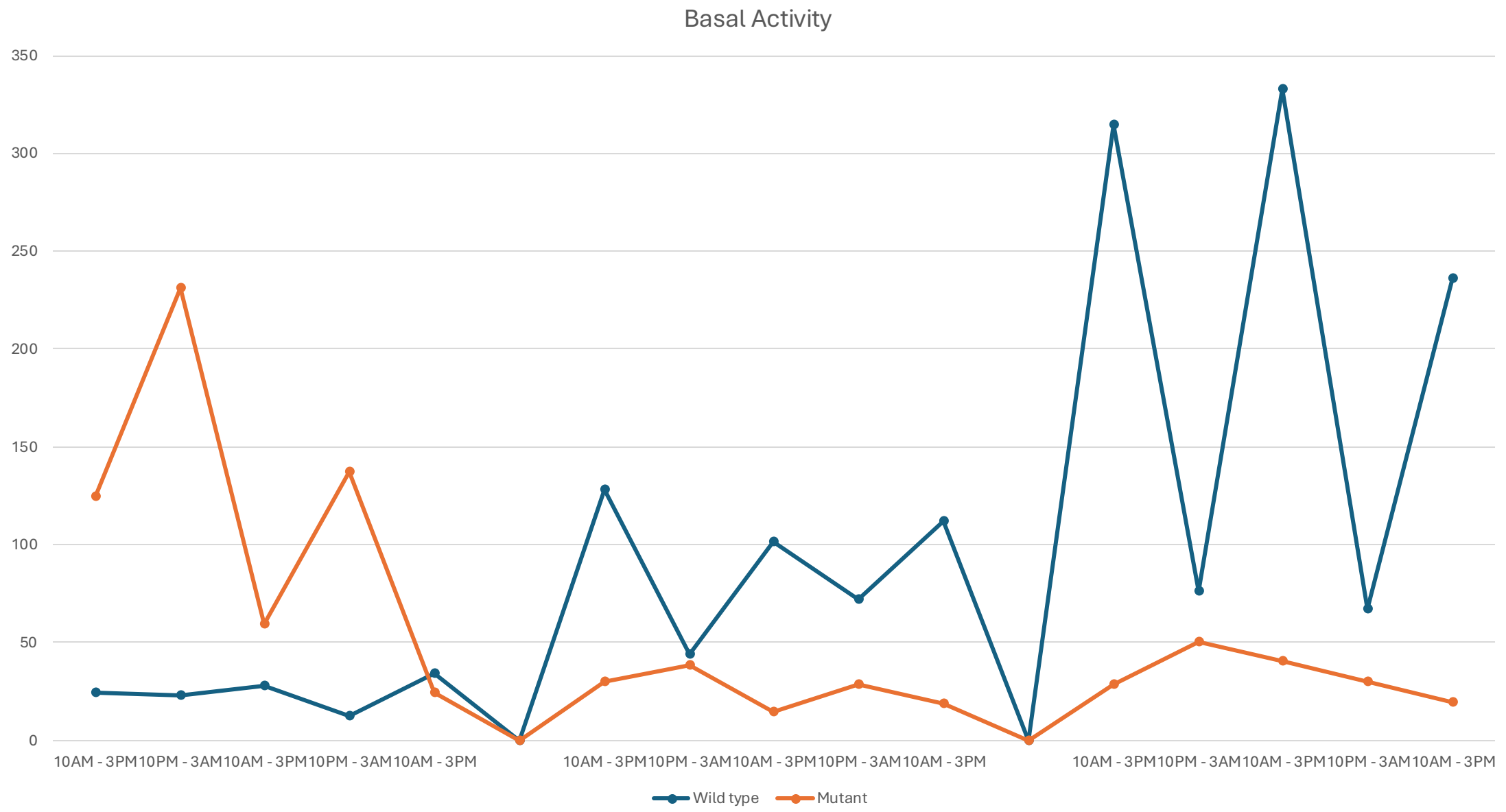

Mutated Basal Fly activity - Day 3 to 5
Mutated Fly Activity
Light Change
Fly Activity (Averages)
Time
700
600
500
400
300
200
100
0
124.30
231.30
59.27
136.97
24.45

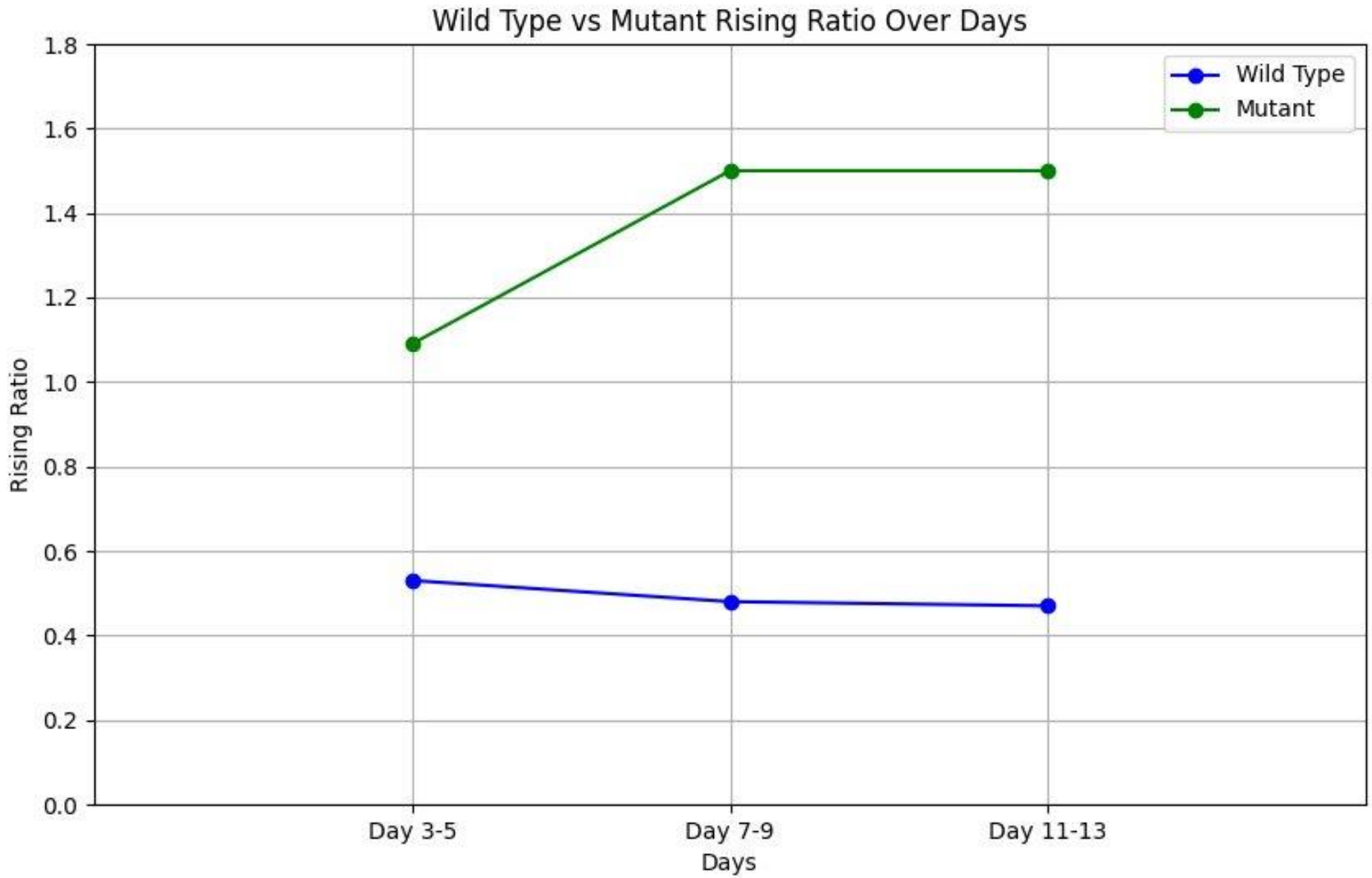

Wild-Type Basal Fly activity - Day 7 to 9
Wild-Type Fly Activity
Light Change
Fly Activity (Averages)
Time
0
100
200
300
400
500
600
700
127.76
43.73
101.36
71.61
111.88


Mutated Basal Fly activity - Day 7 to 9
Mutated Fly Activity
Light Change
Fly Activity (Averages)
Time
0
100
200
300
400
500
30.15
38.61
14.39
28.73
18.45

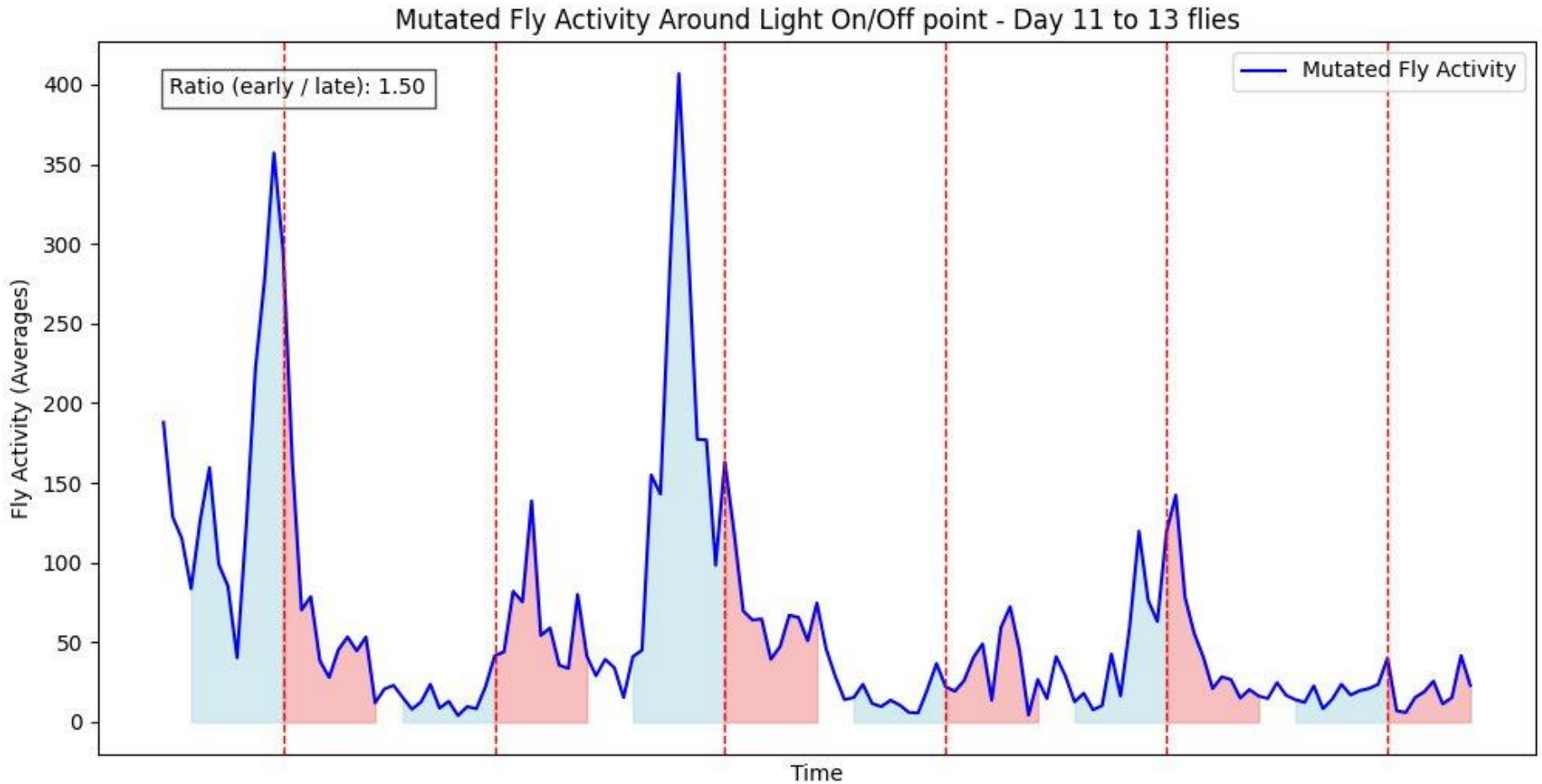

Wild-Type Basal Fly activity - Day 11 to 13
Wild-Type Fly Activity
Light Change
Fly Activity (Averages)
Time
1000
800
600
400
200
0
314.39
75.88
332.64
67.09
236.42

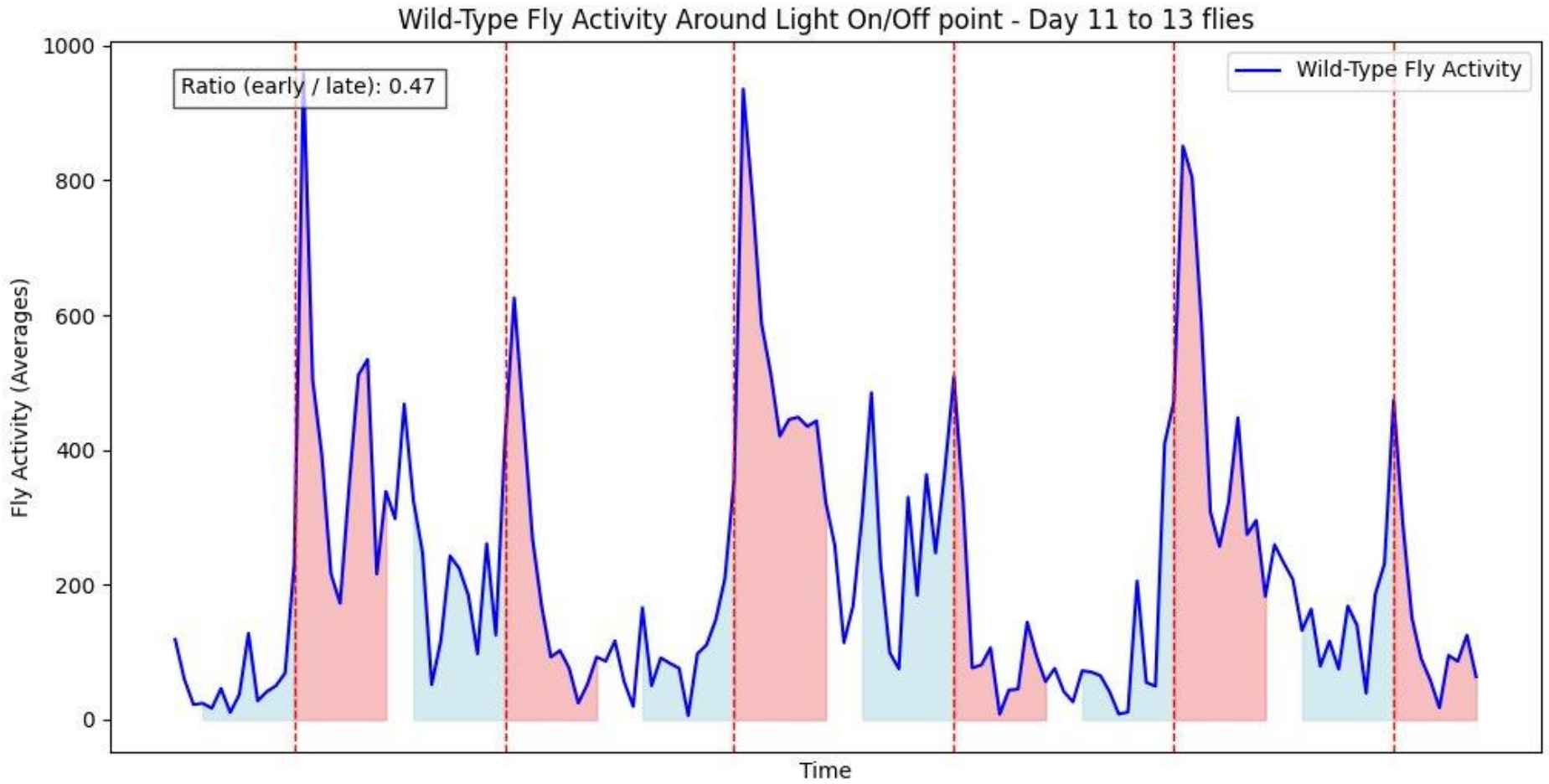

Mutated Basal Fly activity - Day 11 to 13
Mutated Fly Activity
Light Change
Fly Activity (Averages)
Time
400
350
300
250
200
150
100
50
0
28.36
49.94
40.45
30.12
19.24

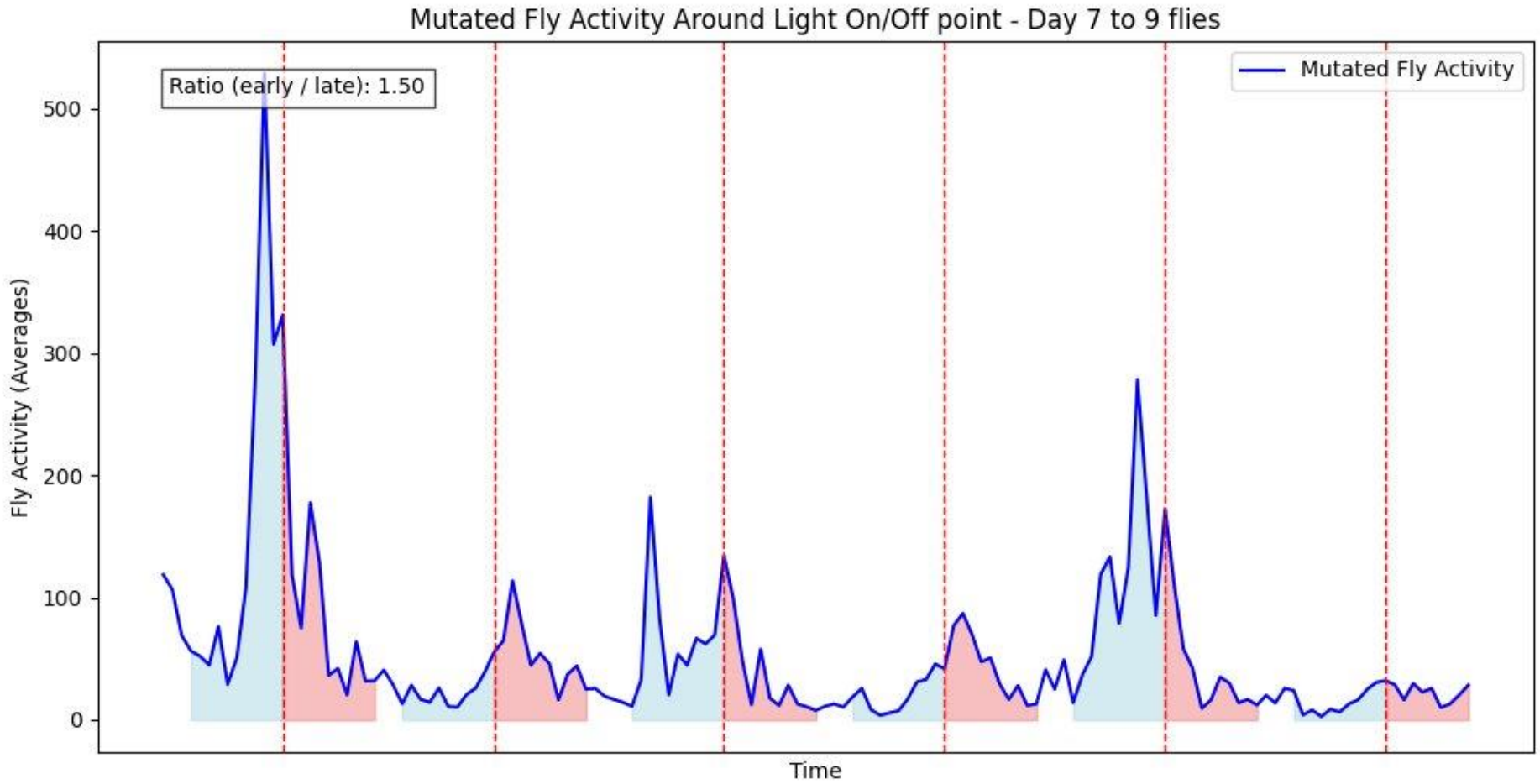

Basal Activity
350
300
250
200
150
100
50
0
10AM - 3PM
10PM - 3AM
10AM - 3PM
10PM - 3AM
10AM - 3PM
10AM - 3PM
10PM - 3AM
10AM - 3PM
10PM - 3AM
10AM - 3PM
10AM - 3PM
10PM - 3AM
10AM - 3PM
10PM - 3AM
10AM - 3PM
Wild type
Mutant

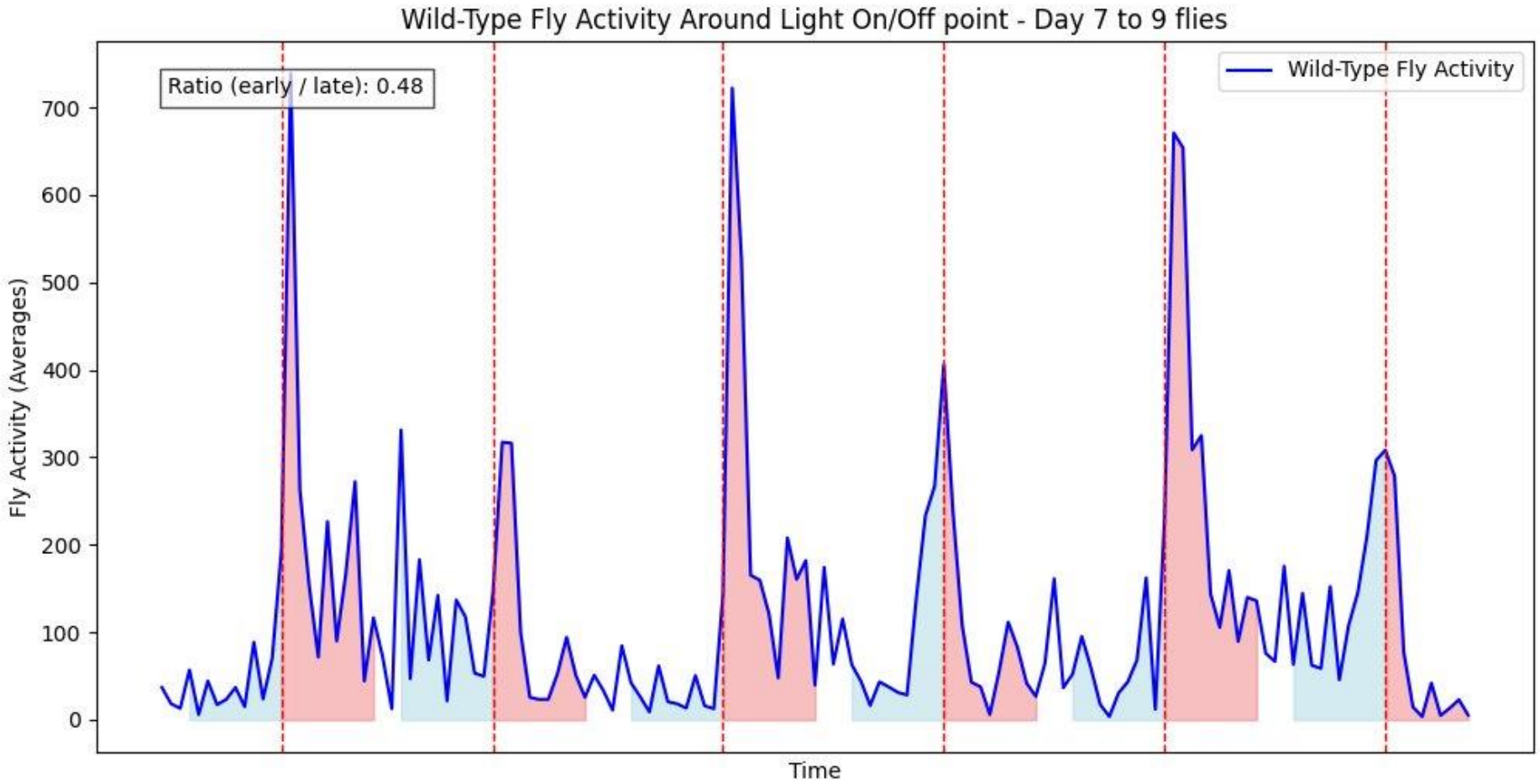

Wild Type vs Mutant Rising Ratio Over Days
Wild Type
Mutant
Rising Ratio
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Day 3-5
Day 7-9
Day 11-13
Days

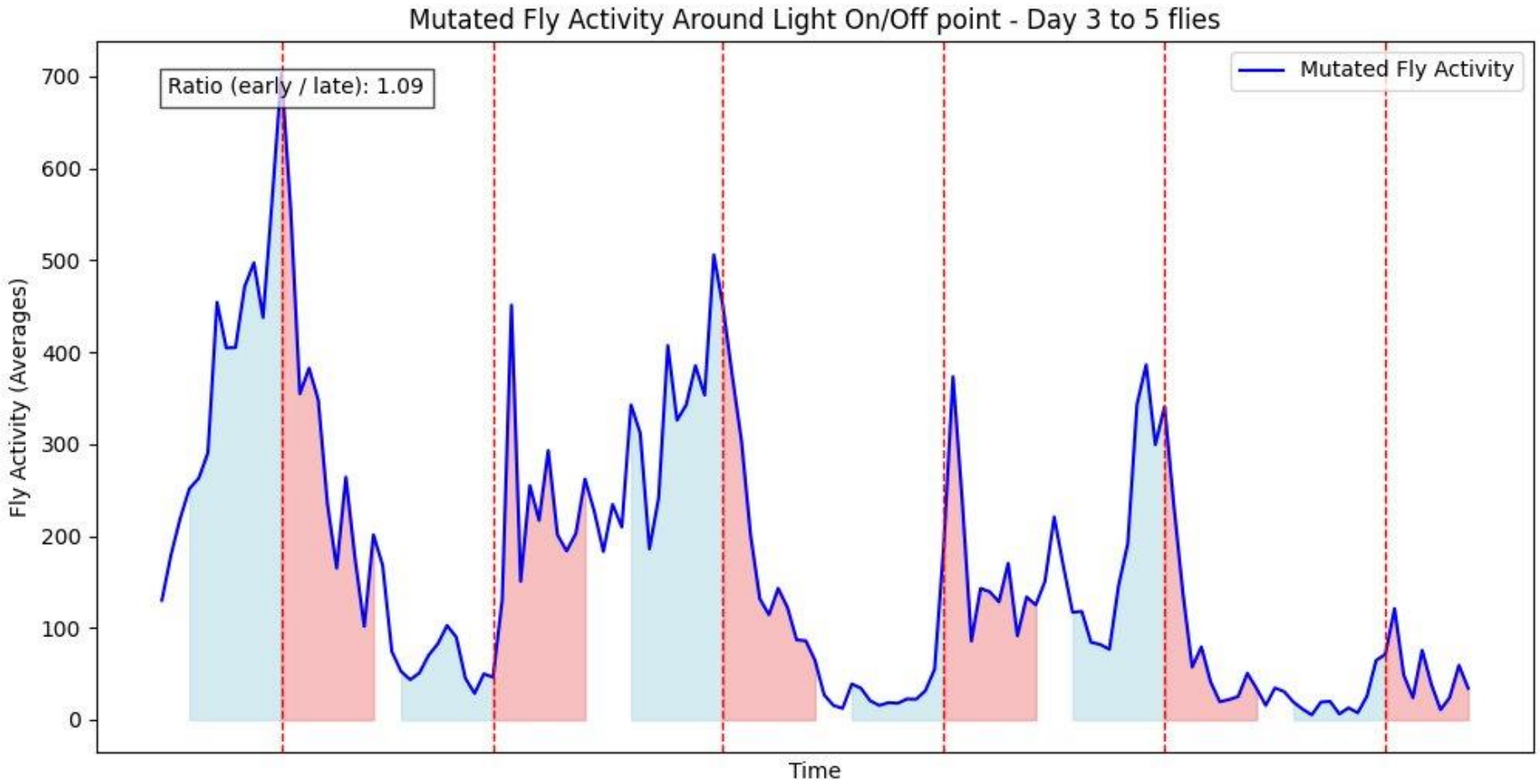
Early risers vs Late risers

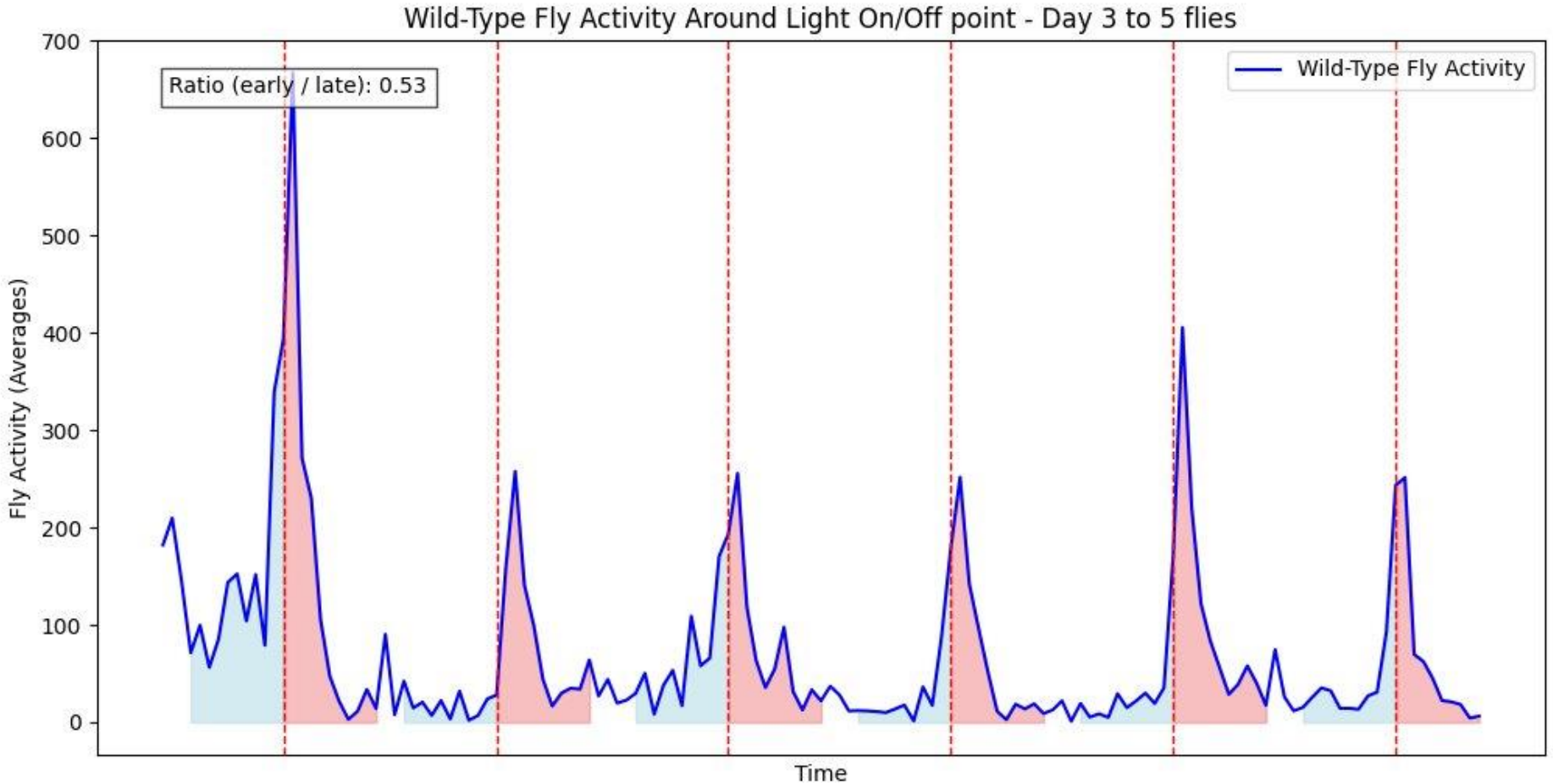

Mutated Fly Activity Around Light On/Off point - Day 11 to 13 flies
Ratio (early / late): 1.50
Mutated Fly Activity
Fly Activity (Averages)
Time
0
50
100
150
200
250
300
350
400


Wild-Type Fly Activity Around Light On/Off point - Day 11 to 13 flies
Ratio (early / late): 0.47
Wild-Type Fly Activity
Fly Activity (Averages)
Time
0
200
400
600
800
1000


Mutated Fly Activity Around Light On/Off point - Day 7 to 9 flies
Ratio (early / late): 1.50
Mutated Fly Activity
Fly Activity (Averages)
500
400
300
200
100
0
Time


Wild-Type Fly Activity Around Light On/Off point - Day 7 to 9 flies
Ratio (early / late): 0.48
Wild-Type Fly Activity
Fly Activity (Averages)
0
100
200
300
400
500
600
700
Time


Mutated Fly Activity Around Light On/Off point - Day 3 to 5 flies
Ratio (early / late): 1.09
Mutated Fly Activity
Fly Activity (Averages)
Time
0
100
200
300
400
500
600
700


Wild-Type Fly Activity Around Light On/Off point - Day 3 to 5 flies
Ratio (early / late): 0.53
Wild-Type Fly Activity
Fly Activity (Averages)
Time
0
100
200
300
400
500
600
700

Thank you

References -

- A broad expression profile of the GMR-GAL4 driver in Drosophila melanogaster - W-Z Li, S-L Li, et al
- How to Design a Genetic Mating Scheme: A Basic Training Package for Drosophila Genetics John Roote* and Andreas Prokop