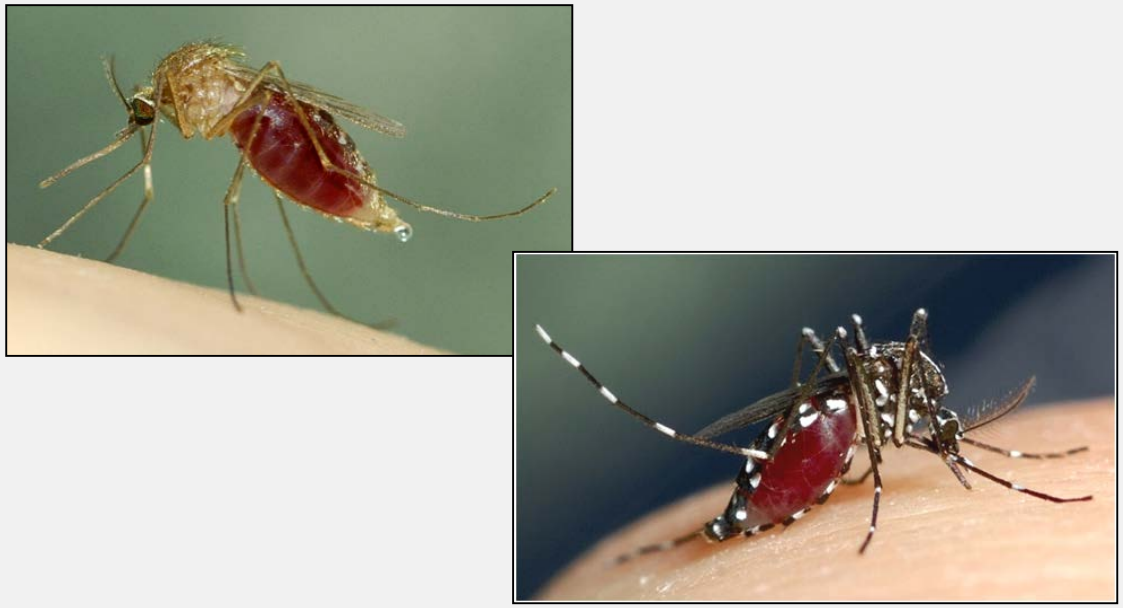
Biology, Ecology, and Feeding Behavior of Mosquitoes in Connecticut



John Shepard

Center for Vector Biology and Zoonotic Diseases
The Connecticut Agricultural Experiment Station
New Haven, CT

CAES
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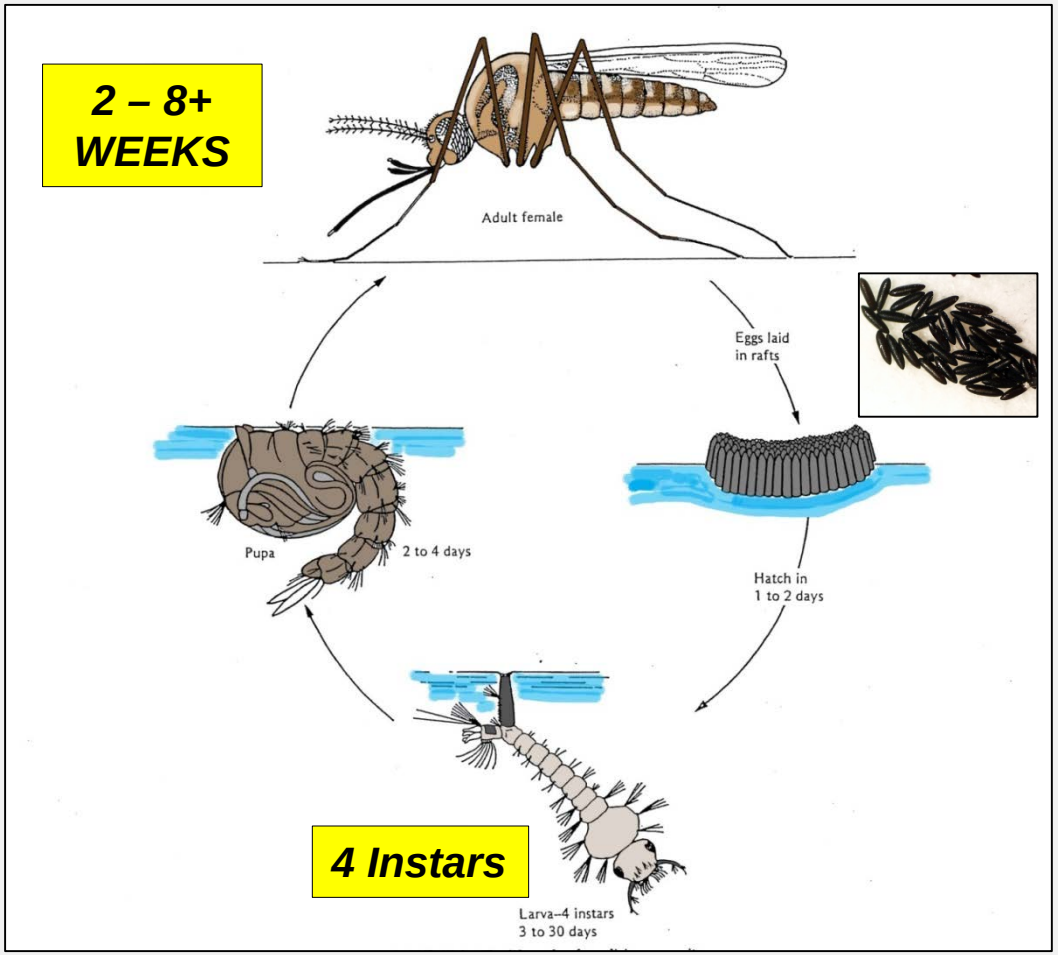
Mosquito Life Cycle



7 – 14 DAYS (Temperature Dependent)

Type of Habitat

- Temporary
  - Pools, depressions, containers
- Permanent
  - Swamps, marshes

Type of Egg

- Single (usually desiccation resistant)
- Raft (laid on water)

Seasonal Abundance (Phenology)

Generations per year

- Single
- Multiple

Feeding Behavior

- Females only

Connecticut Mosquitoes

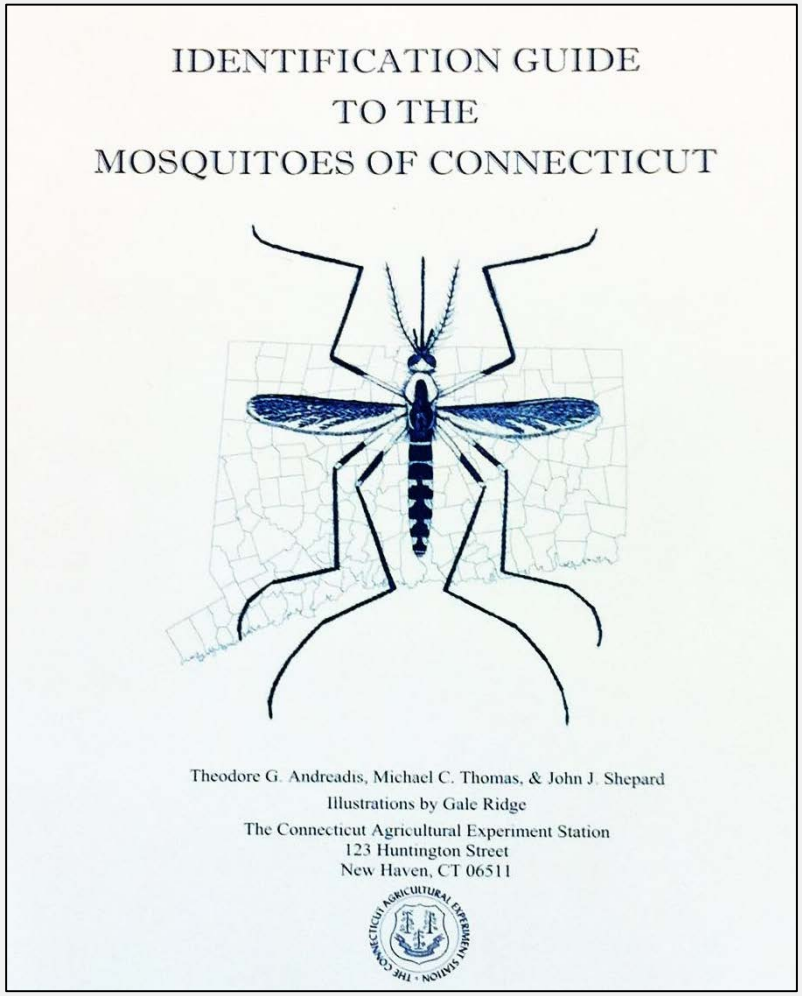
48 species documented in 2005

- Dichotomous Keys
  - 4th instar larvae
  - Adults

Species Descriptions

- Larvae
- Adults
- County Records
- Larval Habitat
- Overwintering Stage
- Host Preference
- Virus Isolates
- Phenology

54 species documented as of 2018



Available as PDF

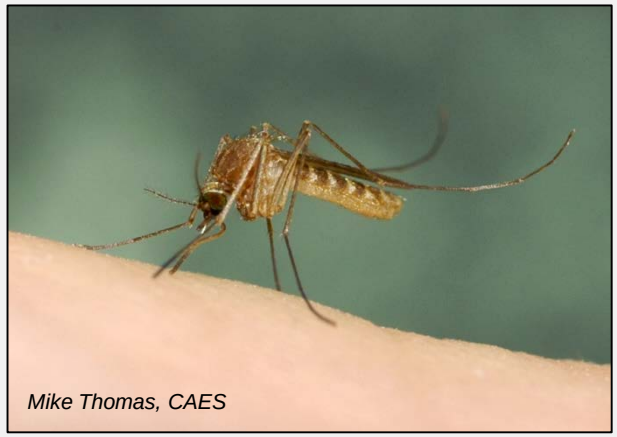
www.ct.gov/caes

Bulletin 996

Vectors

- ***Maintenance* or *Amplifying***

- ***"Bridge"* – transmit from vertebrate host to human, horse, etc.**


Mike Thomas, CAES

Nuisance

- ***Primarily Seek Blood from Mammals***

- ***Occasionally Infected with* WNV, EEE**
  - **Seasonal Abundance Important**

Mosquito-Borne Virus Cycle

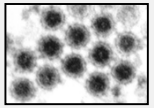
Maintenance Cycle
Amplification Cycle

Transmission Cycle

Incidental Infection

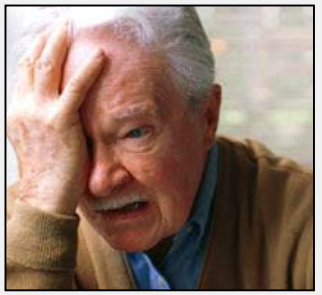
"Bridge"

Mosquito



Virus

Vertebrate Host



Culex pipiens and Culex restuans

- Main vector of **West Nile virus (WNV)**

  Maintenance and Amplification

  - *Cx. pipiens* = Urban and Suburban habitats
  - *Cx. restuans* = Suburban and Rural habitats

- Egg Rafts
  - High organic content
  - "Containers", Temporary pools

- Multiple generations per year

- Peak numbers in early-mid summer

- Primarily feed on **BIRDS**
  - Occasionally on mammals

Arbovirus Isolates

Culex pipiens: **WN (1,647), EEE (10)**

Culex restuans: **WN (330), EEE (3), JC (1)**

Culex pipiens and Culex restuans

- *Larvae and pupae are found in a variety of habitats*

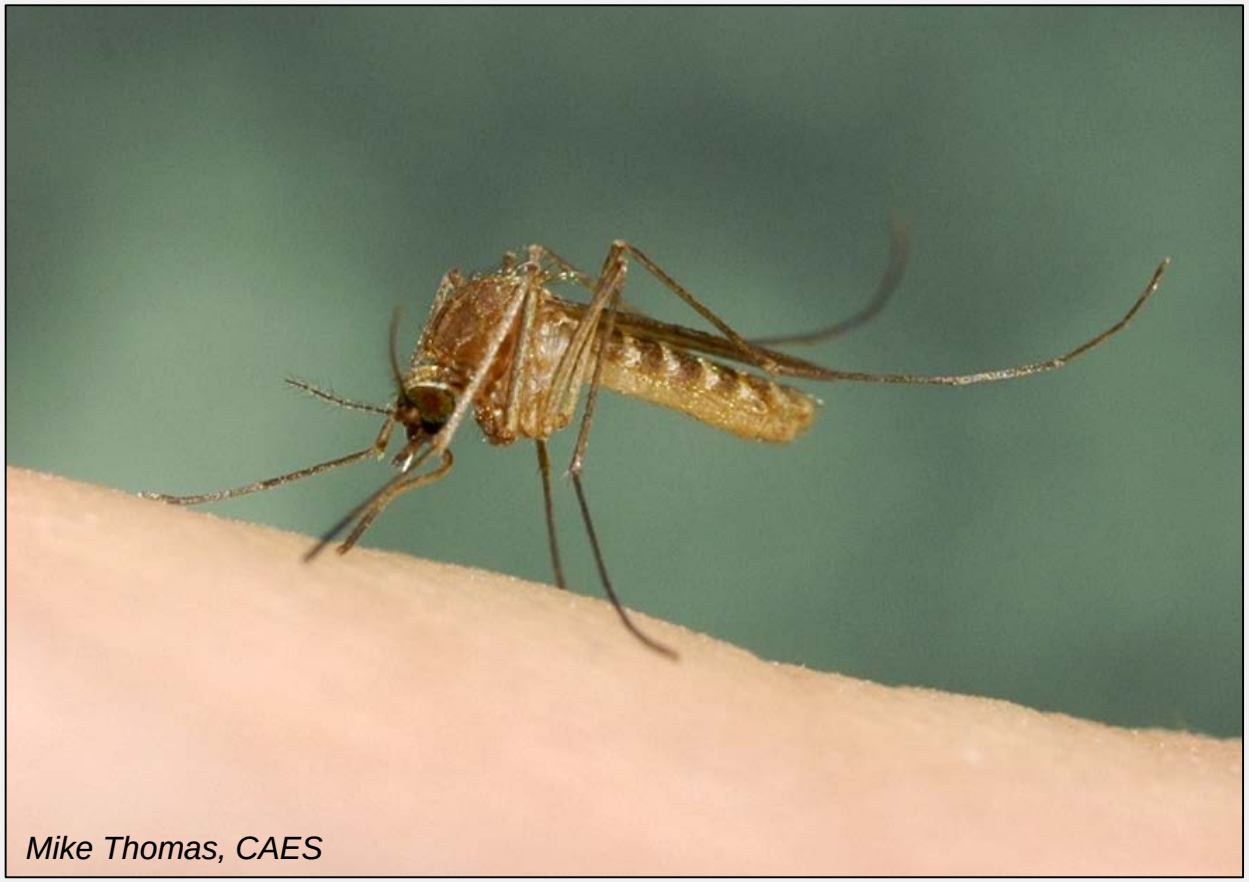







Culex pipiens and Culex restuans

- Adults appear similar
  - can be distinguished



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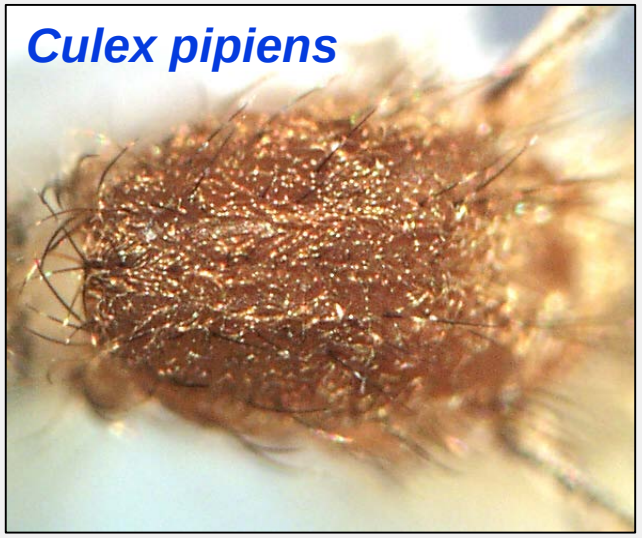
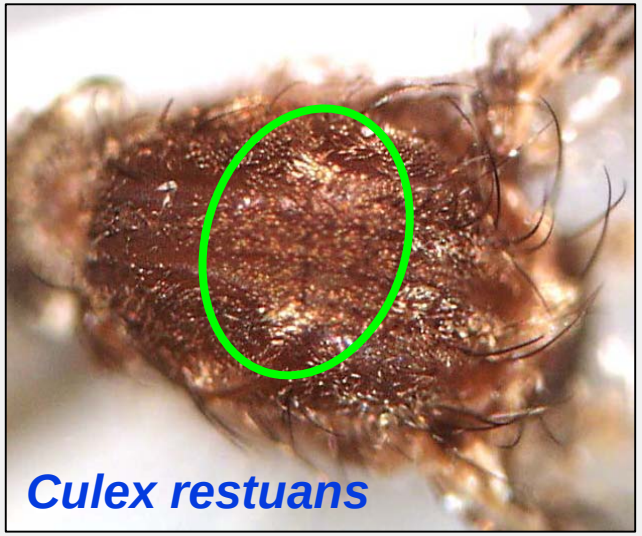
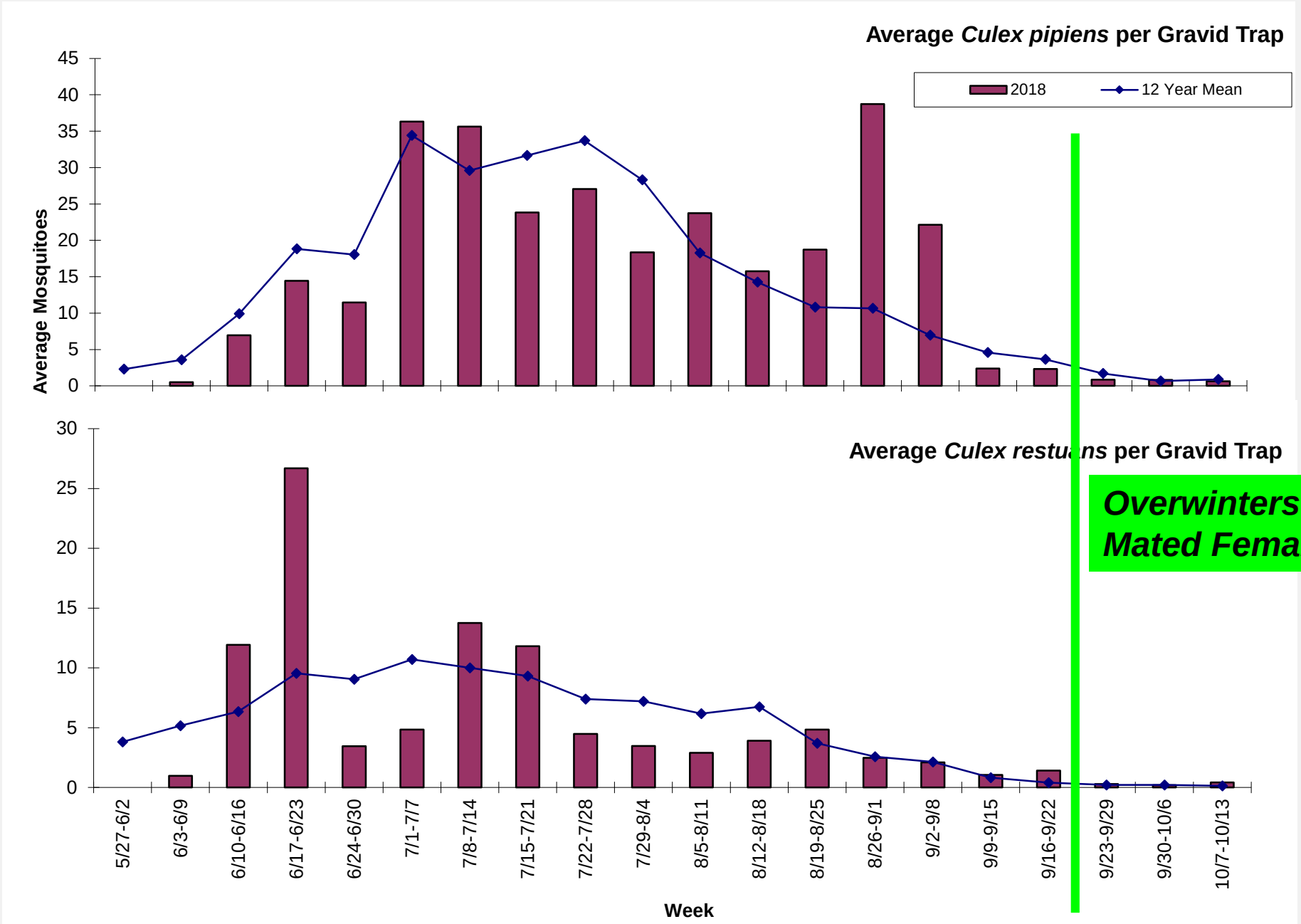


Culex pipiens



Culex restuans

Culex pipiens and *Culex restuans*



Culiseta melanura

- Main vector of **Eastern Equine Encephalitis (EEE)**
  - ***Maintenance and Amplification***
    - Atlantic white cedar, red maple swamps

- Egg Rafts
  - Underground “crypt” habitat, formed by tree roots
  - Sphagnum moss mats

- 2 -3 generations per year

- Peak numbers in mid summer

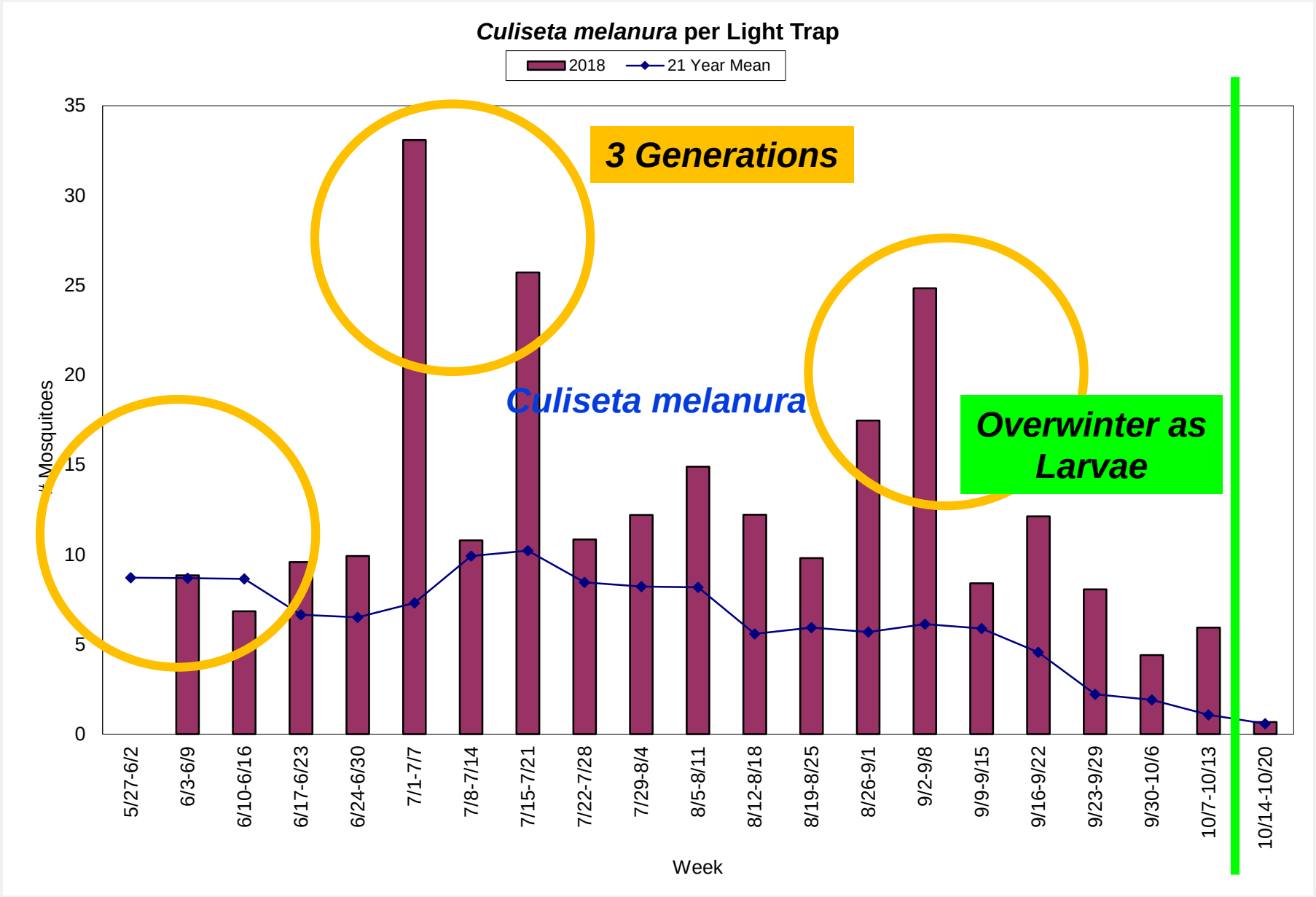
- Primarily feed on **BIRDS**
  - Occasionally on mammals

Arbovirus Isolates

WN (108), EEE (264), JC (2)

Culiseta melanura

Culiseta melanura



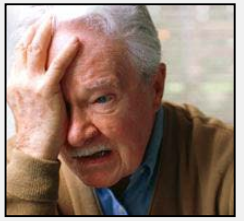
Culex salinarius

- Bridge Vector of **West Nile virus (WNV)**

Transmission to Humans and Horses

- Egg rafts laid on water in brackish and freshwater habitats
  - Shallow pools associated with *Phragmites sp.*
- Multiple generations per year
- Generalist Feeder
  - Obtains blood from many bird and mammal species



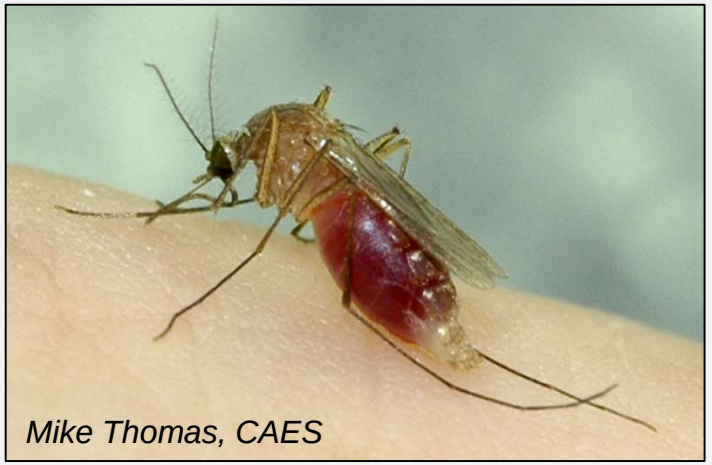



Arbovirus Isolates

WN (166), EEE (12), JC (3)

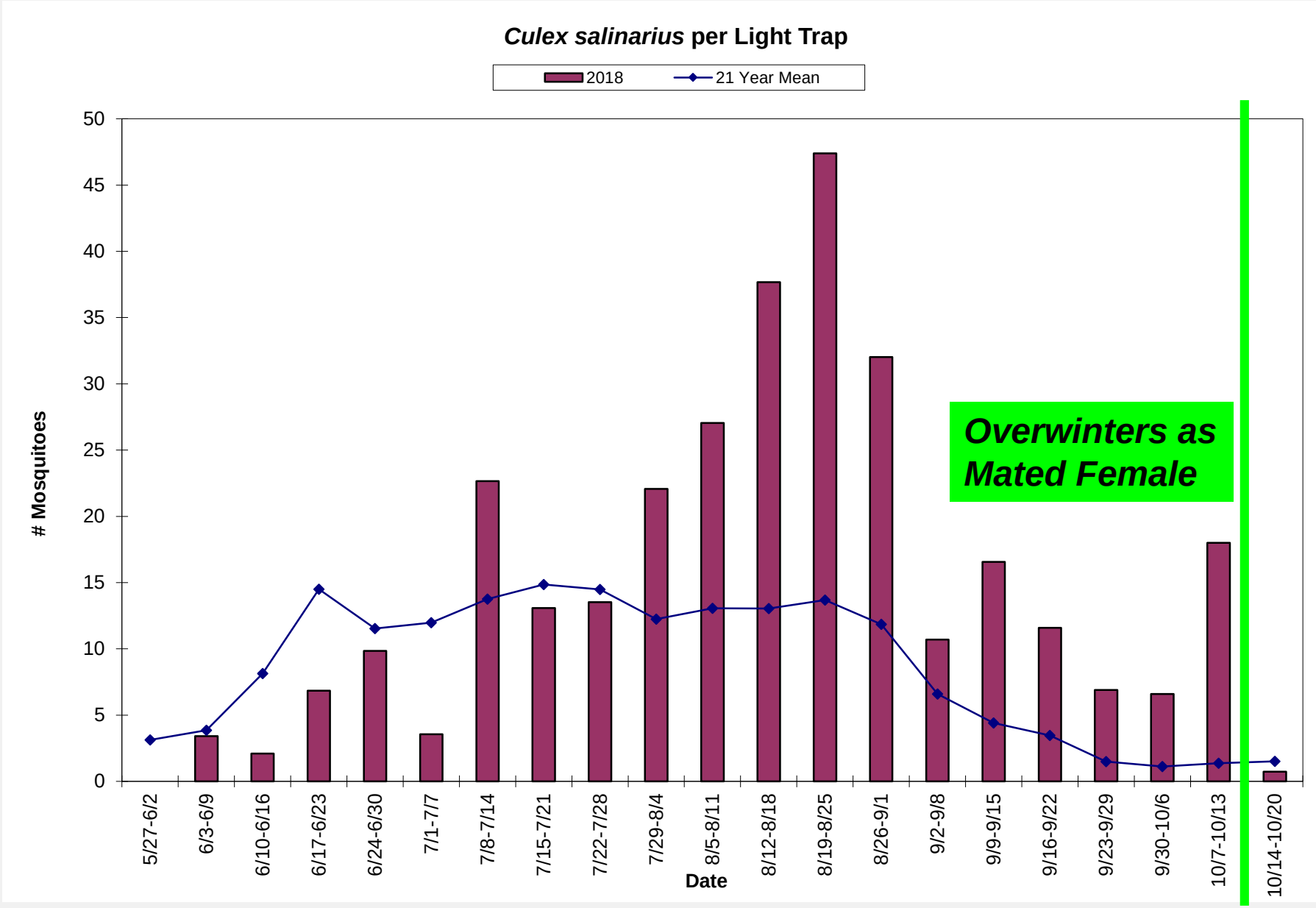
Culex salinarius


Roger Wolfe, CT DEEP


Mike Thomas, CAES


UConn, CLEAR

Culex salinarius

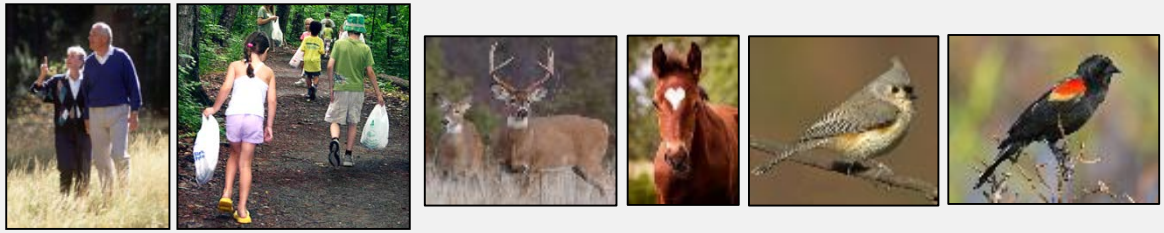


Coquillettidia perturbans

- Bridge Vector of **Eastern Equine Encephalitis (EEE)**

Transmission to Humans and Horses

- Single eggs laid directly on water
- Larvae attach to aquatic vegetation in freshwater habitats
- One extended generation per year
- Generalist Feeder



Arbovirus Isolates

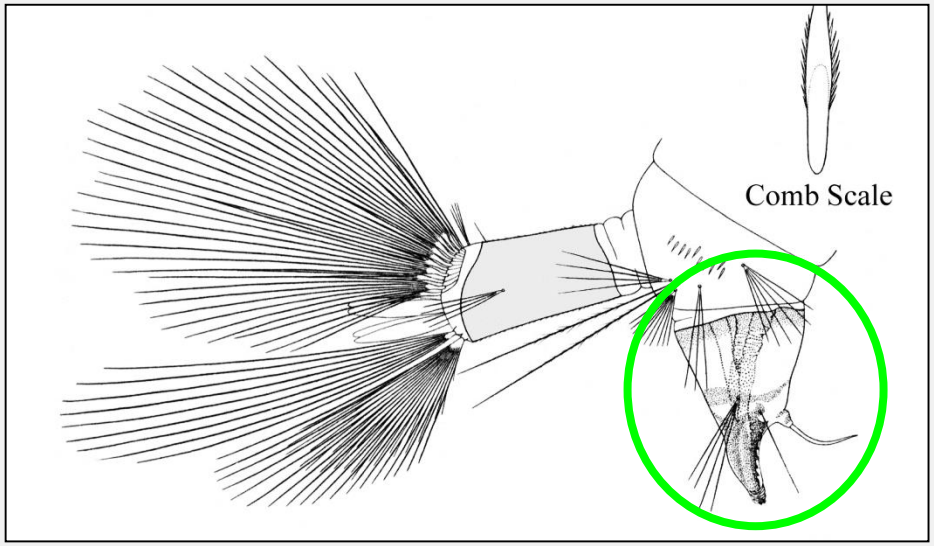
WN (7), EEE (4), JC (22),

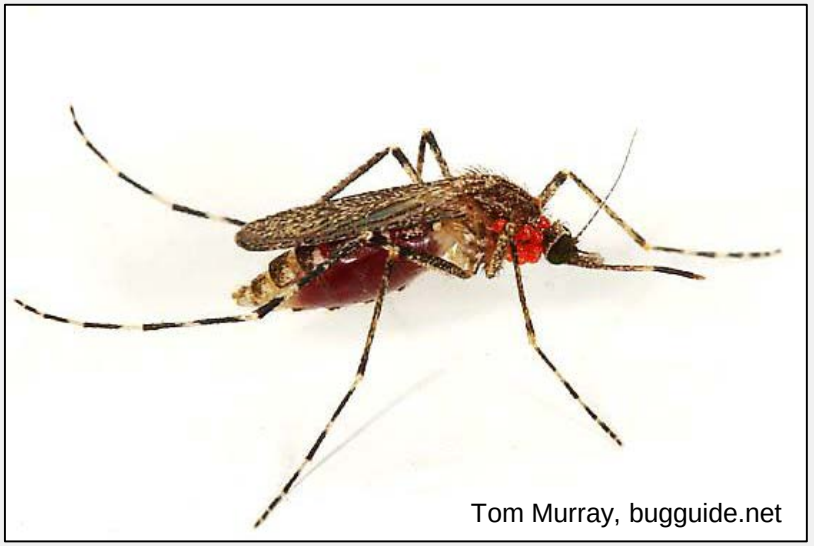
2012 MA

7 human EEE cases

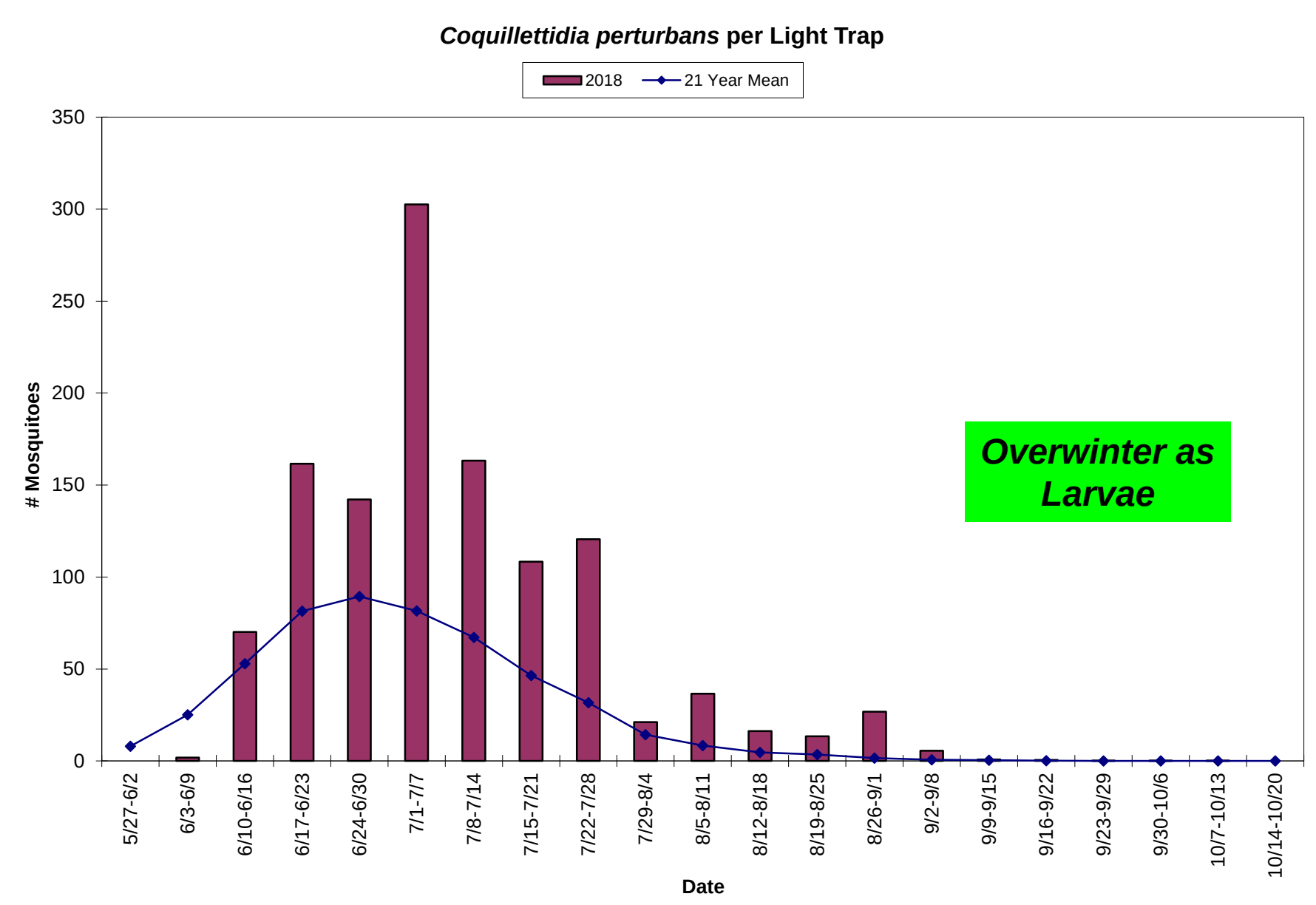
62 (+) pools from *Cq. perturbans*

Coquillettidia perturbans



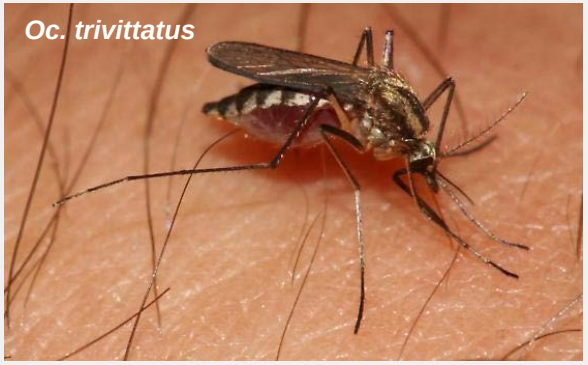


Coquillettidia perturbans



"Floodwater" Species

- Primarily Nuisance mosquitoes
- Desiccation-resistant eggs
- Larvae develop in a variety of transient water habitats
- Multiple generations per year; RAINFALL dependent
- Primarily Feed on Mammals
  - Occasionally on Birds



Bugguide.net

<u>Arbovirus Isolates</u>

***Aedes vexans* = WN (18), EEE (15), JC (16)**

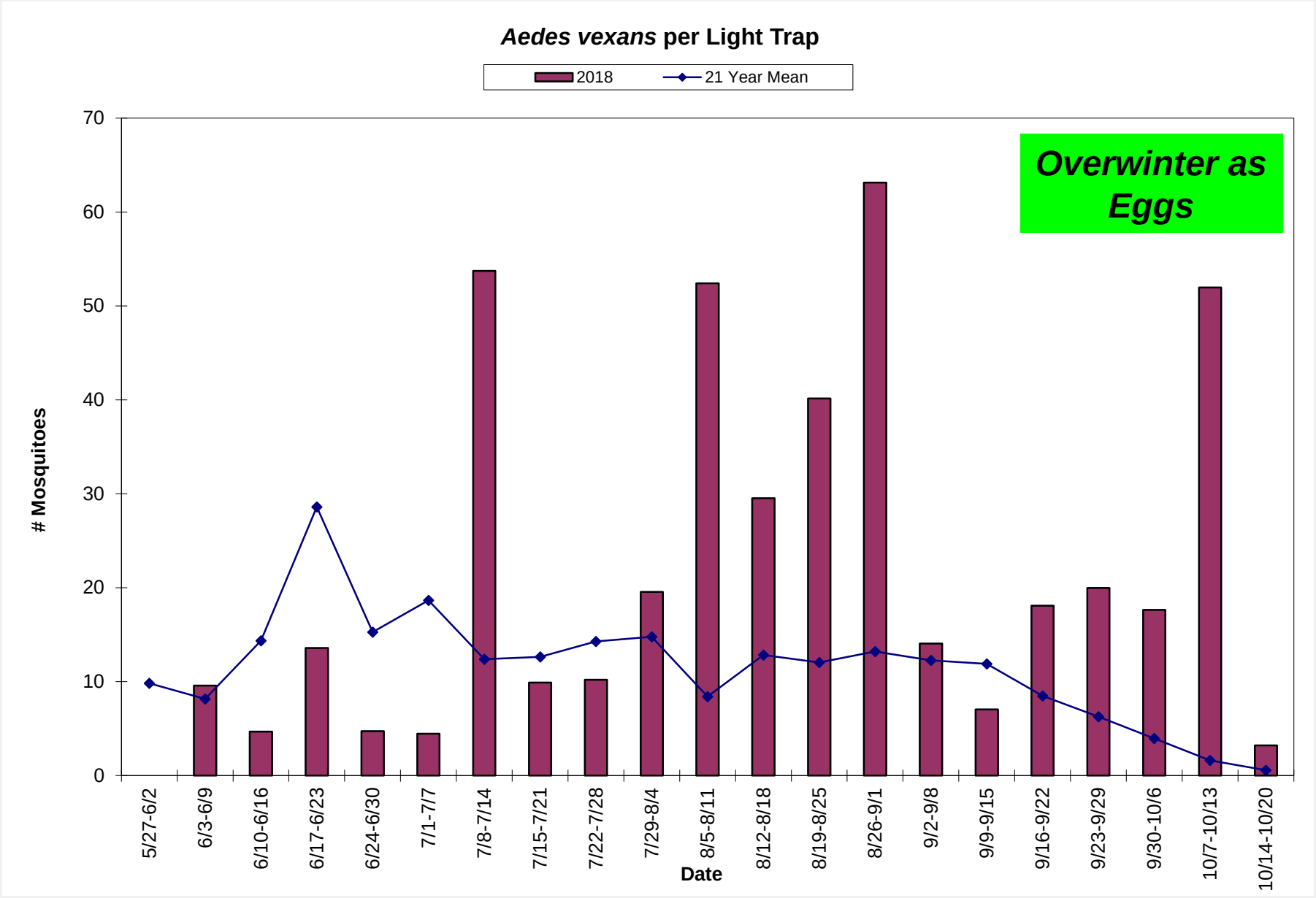
***Ochlerotatus trivittatus* = WN (4), EEE (9), JC (19)**

***Psorophora ferox* = WN (5), EEE (2), JC (1)**

“Floodwater” Species

Over 11,000 *Ps. ferox & Ae. vexans*
Sept. 22, 2011

“Floodwater” Species



"Vernal Pool" and "Snow-pool" Species

- Nuisance mosquitoes
  - Most diverse group of mosquitoes in CT
  - Some potential to transmit **WNV** and **EEE**
  - **Jamestown Canyon** isolated frequently


Sean McCann, Bugguide.net

- Eggs are desiccation resistant

- Larvae develop in a wide variety of seasonal freshwater habitats


Tom Murray, Bugguide.net

- Major generation in spring
  - Peak abundance in early summer
  - Some species with 2-3 generations

- Strong Mammalian Association
  - Occasionally on Birds

"Vernal Pool" and "Snow-pool" Species

Arbovirus Isolates

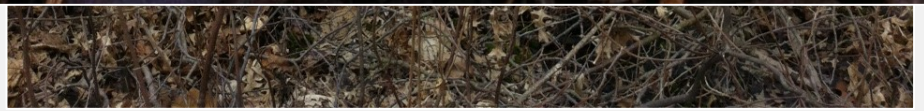
2-3 Generations

Oc. canadensis = **WN(10), EEE(32), JC(118)**
Ae. cinereus = **WN(13), EEE(13), JC(12), LAC (2)**
Oc. sticticus = **WN(2), EEE(1), JC(25),**

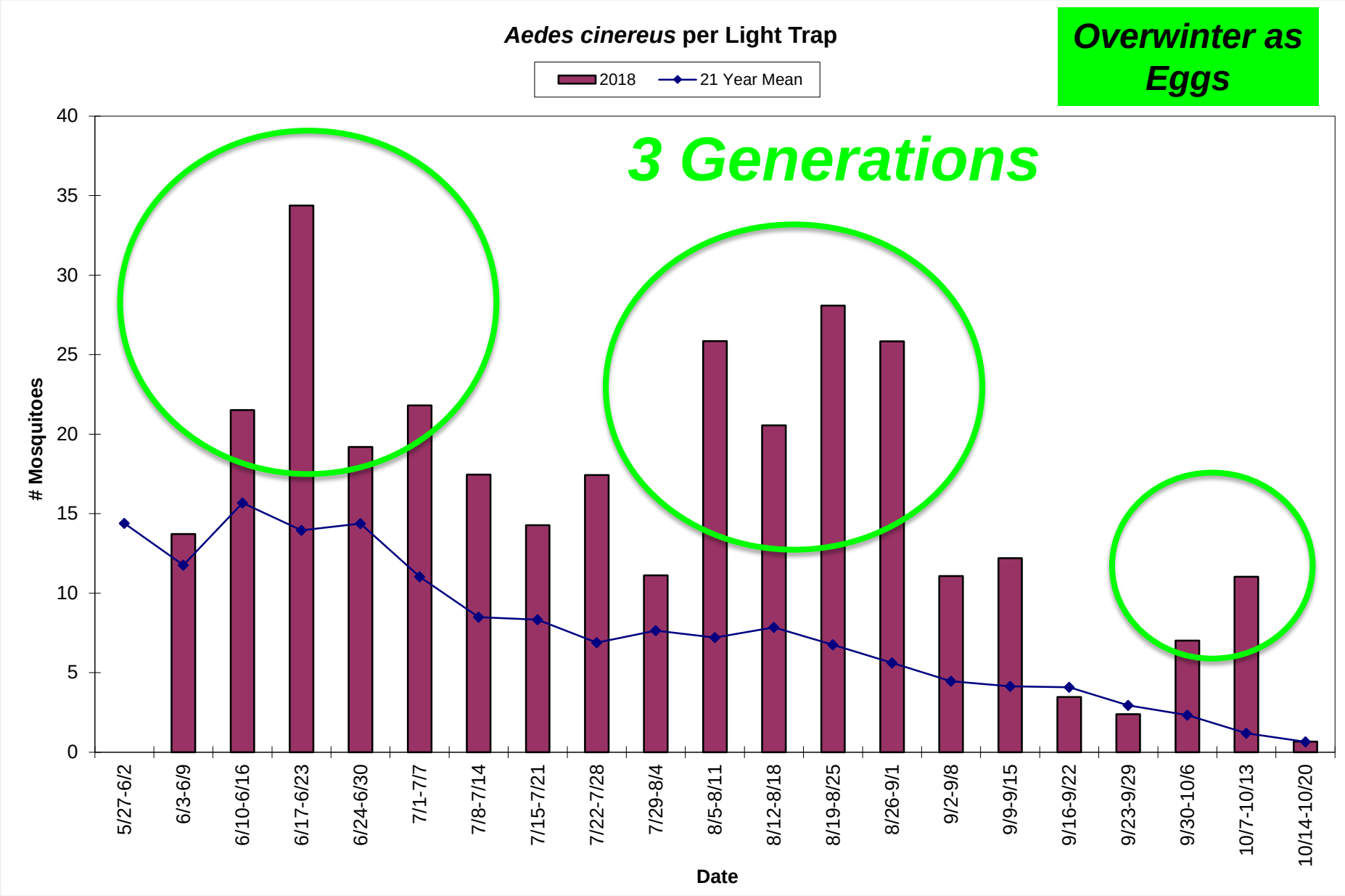
1 Generation

Oc. abserratus = **JC (51)**
Oc. aurifer = **JC (51)**
Oc. excrucians = **JC (15)**
Oc. provocans = **JC (20)**
Oc. stimulans = **WNV (2), JC (22),**
Oc. thibaulti = **JC(2)**

“Vernal Pool” and “Snow-pool” Species



“Vernal Pool” and “Snow-pool” Species



"Container" Species

- Primarily Nuisance Mosquitoes
- Desiccation-resistant eggs laid above waterline in containers
- Larvae develop in an wide range of natural and artificial containers
- Multiple generations per year
- Strong Mammalian Association

<u>Arbovirus Isolates</u>

***Oc. triseriatus* = WN(5), EEE (4), JC (2), LAC (3)**

***Oc. japonicus* = WN(10)**

***Ae. albopictus* = WN(2)**

"Container" Species

Ochlerotatus triseriatus

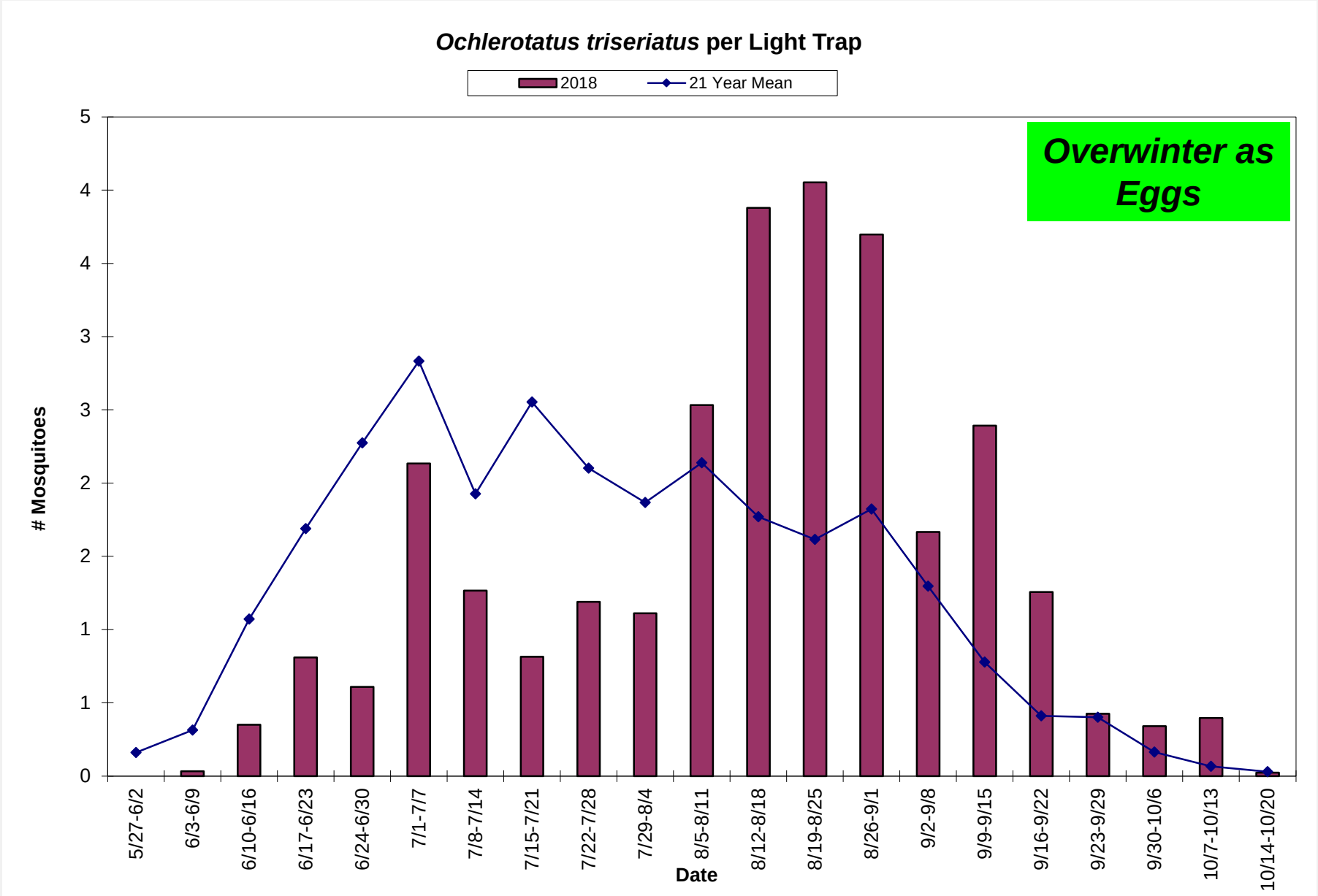
Ochlerotatus japonicus

Aedes albopictus

Artificial Containers

Natural Containers

“Container” Species



"Salt Marsh" Species

- Nuisance Mosquitoes
- Larvae develop in salt mash pools
- Desiccation-resistant eggs laid in areas flooded by lunar tides
- Multiple generations per year
- Strong Mammalian Association

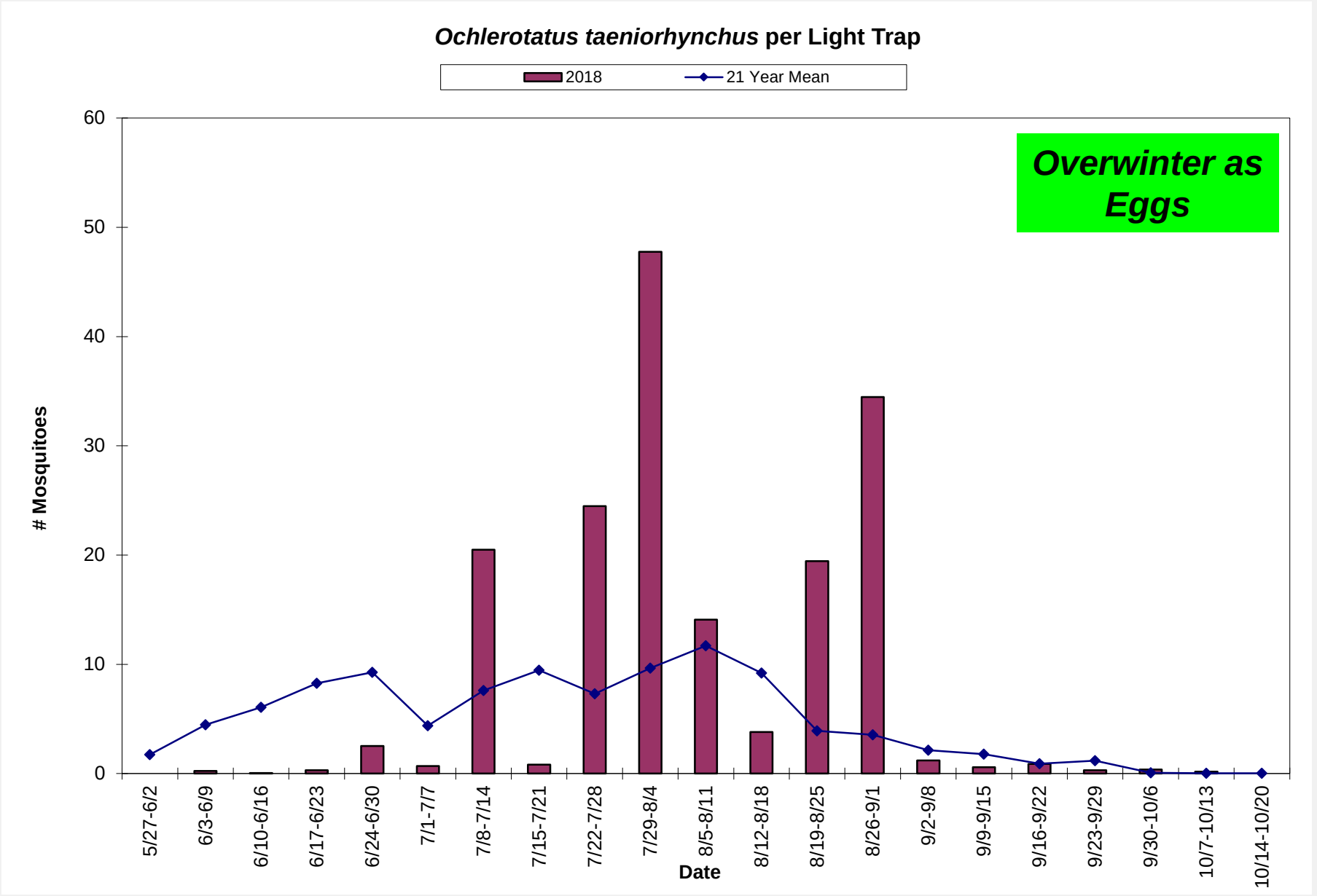
Roger Wolfe, CT DEEP

<u>Arbovirus Isolates</u>

Oc. sollicitans = **WN (1), EEE (3), JC (6),**
Oc. cantator = **EEE (5), JC (72)**
Oc. taeniorhynchus = **WN (6), JC (17)**

“Salt Marsh” Species

“Salt Marsh” Species



Questions?