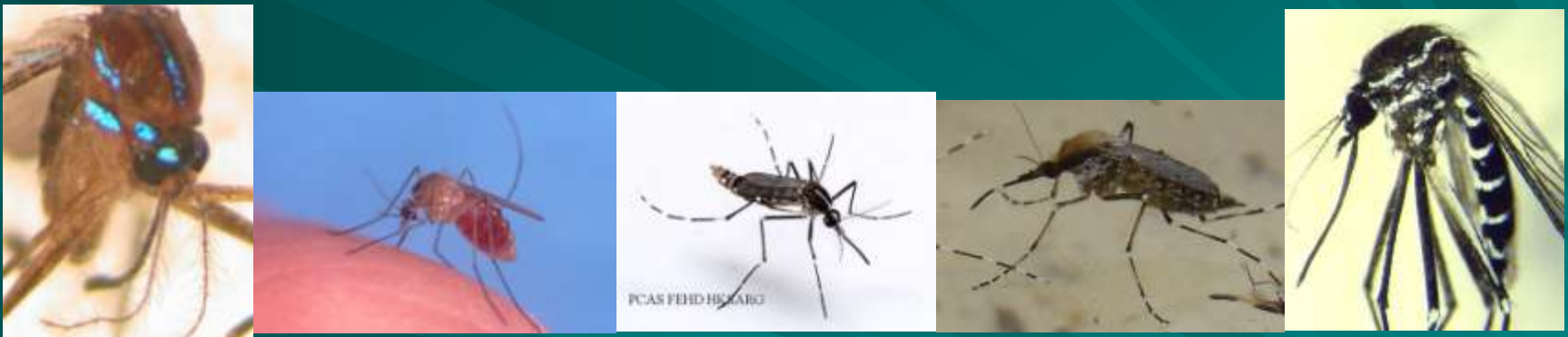


Mosquitoes & the Diseases they Transmit:

How You Can Protect Yourself



Esteban L. Cuebas-Incle, PhD.

Entomologist

*Northeast Massachusetts Mosquito Control & Wetland
Management District*

Ipswich MA Board of Health: 15 July 2013

But First:

***Thank you for the
opportunity to inform &
educate***

***Please hold your questions
until the very end of the
presentation***

Why be Concerned about Mosquitoes?



(CDC: PHIL: 4464)

Why be Concerned about Mosquitoes?

■ Their bite:

- Causes mild to severe inflammatory response
- Severe itching & scratching causing:
 - Secondary bacterial infections
 - Significant blood loss, especially to livestock
- Significant economic loss:
 - Outdoor work can be significantly curtailed
 - Tourism can be reduced in areas near huge stretches of wetlands and salt marshes

Why be Concerned about Mosquitoes?

- The diseases they transmit in North America:
 - Malaria
 - Dengue
 - “Arthropod-borne Encephalitis”:
 - in Massachusetts, their agents are:
 - West Nile Virus
 - Eastern Equine Encephalitis Virus

Why the Concern about Arboviruses?

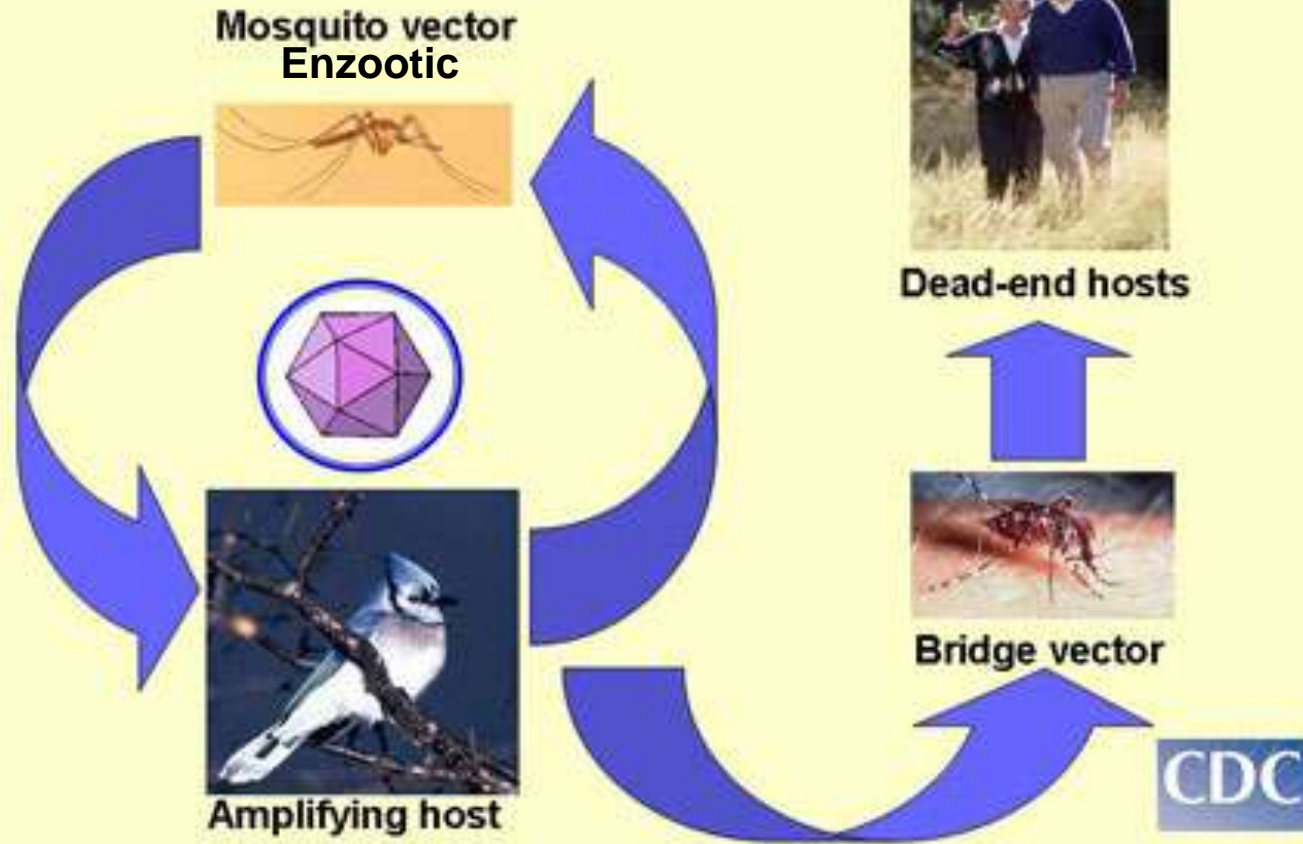
- Severity of Illnesses they cause:
 - Deaths
 - Extended (& incomplete) recovery
- People most infected are most vulnerable
- Infections occur during normal outdoor summer activities
- Medical care extensive & expensive
- No vaccine available

***EASTERN EQUINE
ENCEPHALITIS VIRUS
(EEEV)***

EEEV

- Mosquito-borne “bird” virus
- Number of Cases:
 - Cases / year in USA (1964-2012): range 0 to 21
 - 2005: 7 in NH
 - MA: (1938-2012): 100 cases with 55 deaths
 - 35 cases with 25 deaths in 1938-39
 - 16 cases with 9 deaths in 1955-56
 - Lead to formation of Mosquito Control Projects in MA
 - 2012: 7 cases in MA with 3 deaths (2 in Essex Co.)
- Two major foci in MA:
 - Historical: Southeast MA (Hockomock Swamp)
 - Newly-emerged: Northeast MA (MA-NH border)

Transmission cycle of EEEV and WNV



- “Enzootic” = animal-to-animal vector or “carrier”
- “Bridge” = animal to human vector
- “Dead-end hosts” = virus never leaves this host (“it’s a dead end for the virus”)
- Humans do not get infection directly from horses

Symptoms of EEEV in Humans:

- Symptoms displayed (3 -10 days after infection):
 - high fever, stiff neck, headache of increasing severity, & lack of energy
- Most dangerous symptom: Inflammation and swelling of the brain (encephalitis):
 - some become comatose & die within a week after onset
- 35% of surviving symptomatic cases exhibit mild to severe neurological disease
- Case Fatality Rate OVERALL is 35%

Humans at Risk for EEEV:

- Residents in & visitors to endemic areas
- People regularly engaged in outdoor work & recreation (especially in endemic areas)
- People younger than 15 and over 50 are at greatest risk for more serious disease

***WEST NILE
ENCEPHALITIS VIRUS
(WNEV or WNV)***

Symptoms of WNV in Humans

(3 to 14 days after infection):

- **"Mild infections"** manifested as fever, headache, body aches, some skin rash & swollen lymph glands
- **"More severe"** symptoms include:
 - severe headaches & high fever for longer periods
 - stiff neck
 - stupor & disorientation
 - uncontrollable nervous tremors & convulsions
 - muscle weakness to paralysis
 - coma & death
- **Case Fatality Rate of 1-5%**
- **CDC differentiates "More Severe" symptoms:**
 - West Nile Fever ("benign" or "Less serious")
 - West Nile Neuroinvasive Disease ("malignant"/"virulent" or "More serious" to "Deadly")

West Nile Neuroinvasive Disease:

■ Meningitis and encephalitis:

- 20% of encephalitis survivors cannot properly eat, walk, dress, bath after 1 year
- 39% of survivors clinically depressed, over 50% difficulty in speaking after 1 year

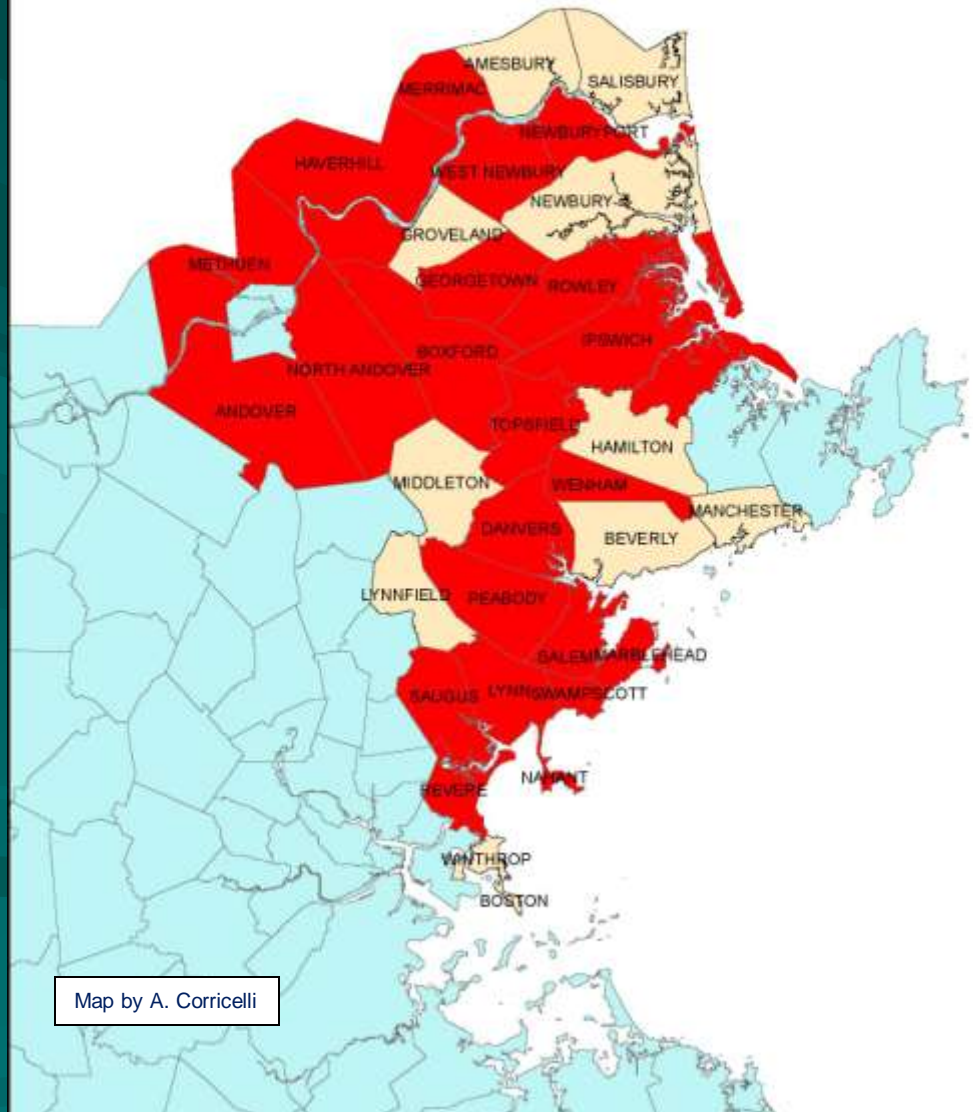
■ Acute asymptomatic paralysis & poliomyelitis:

- Affect 12% of all WNV neuroinvasive patients
- 1/3 of such patients exhibit little to no recovery after 1 year

Humans at Risk for WNV:

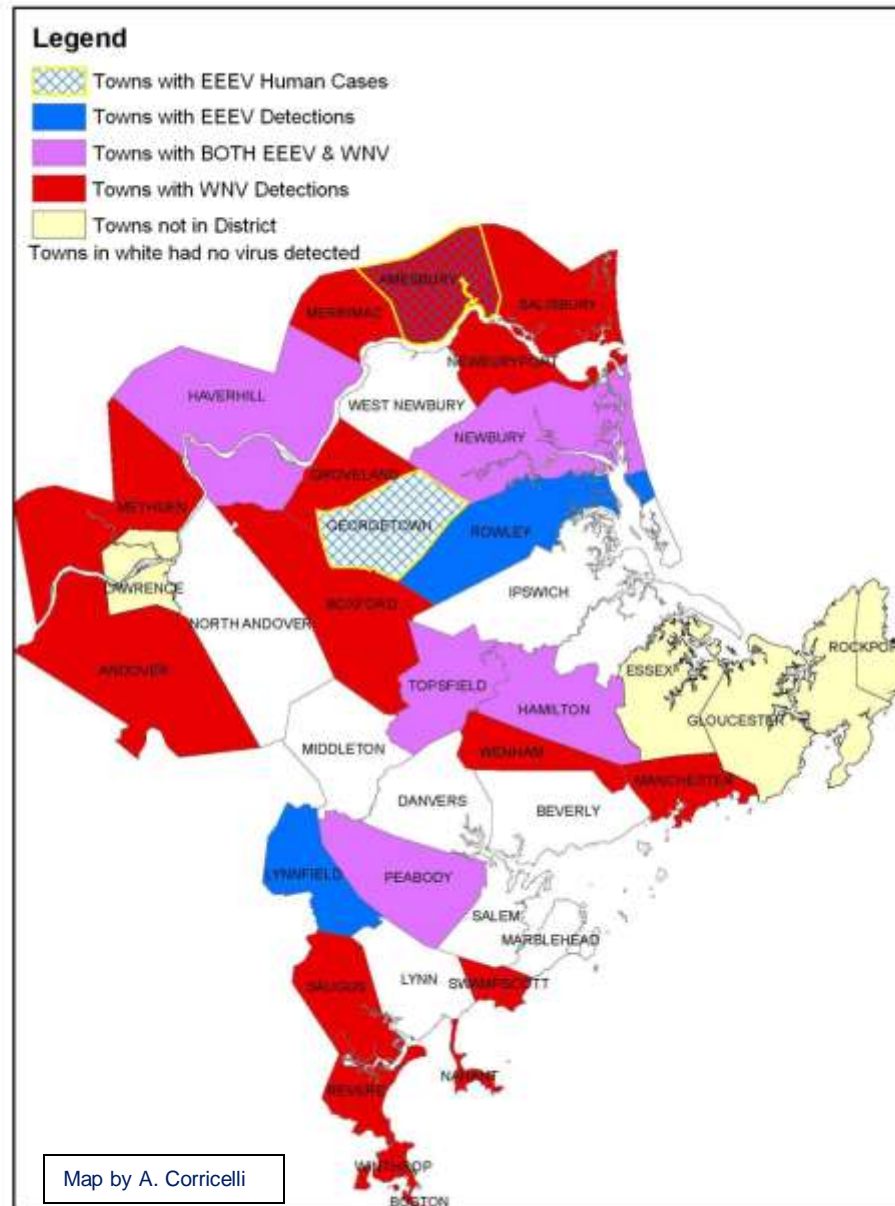
- Children under the age of 5
- Adults over the age of 70
- “Weakened” or “Compromised” Immune Systems
- Additional risk factors:
 - history of alcohol abuse
 - respiratory failure
 - stroke

NE MA MCD Municipalities reporting one or more WNV-infected mosquito pools in 2011 (“infected” towns in RED).



Map by A. Corricelli

Northeast MA in 2012



The Mosquito



(<http://bugguide.net>; Photo#49277)



<http://m2.i.pbase.com>



Insects of Wisconsin ©2006 Pete DeVries

Life Cycle of Mosquitoes:

Example: WNV-vector Culex pipiens

(AKA: “Northern HOUSE Mosquito”)

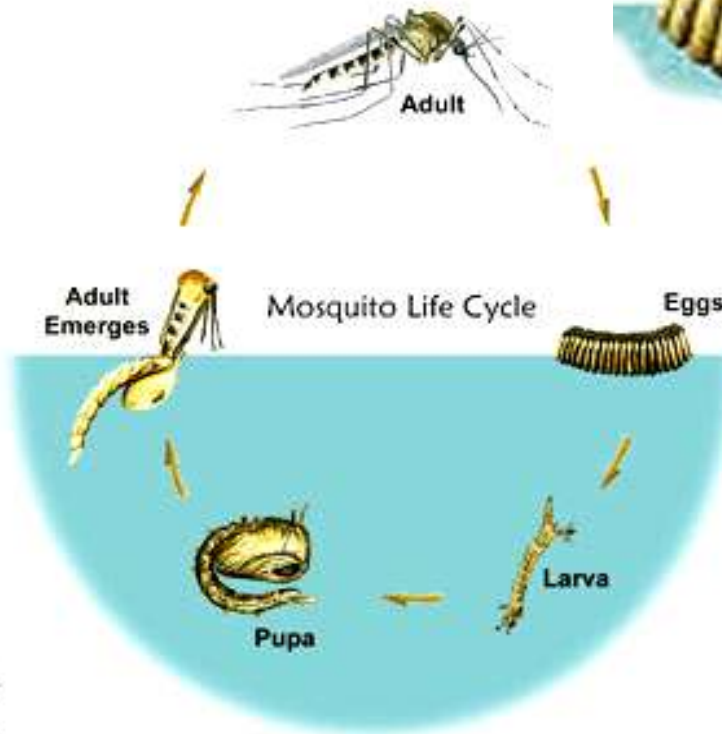


Adult

Pupa



Eggs



Larva





© 2000 Richard C. Russell

Mosquito larvae



Male adult mosquito

**Is this a
mosquito?**



Minimizing the Risks of Infection (How Do We Protect Ourselves?)

Three types of protection:

■ **Personal:**

- On your person

■ **“Property”:**

- Homes & yards

■ **“Peripheral”:**

- From neighbor’s yard to your neighborhood to your entire town

Personal Protection

- Avoid going outside when mosquitoes are most active:
 - For WNV vectors, biting time is late afternoon to mid-evening
- When outside during “biting-time”, wear insect repellent:
 - “DEET”:
 - The most effective broad-spectrum repellent
 - 30-40% DEET works best
 - Effective for **at least an hour**;
 - must be periodically reapplied
 - Can be used against ticks



Personal protection (cont.)

■ Insect Repellents cont.

- IR3535 & Picardin

- Apply to skin & clothes
- Effective comparable to higher concentrations of DEET



■ Repeat applications especially during extreme heat &/or activity

■ Botanical, herbal, “naturally-based” repellents not recommended (no scientific data)

■ If you do not like repellent:

- Go “fully clothed”
- Wear net-hat



“Property Protection”

- Reduce their presence on your property:
 - Keep them from biting & infecting you
- Eliminate mosquito breeding:
 - Keep them from reproducing and biting you later

“Property Protection”

- Reduce their presence on your property:
 - Screen your windows & porches
(Be sure there are no holes in screens!)



“Property Protection”

■ *Reduce their presence on your property (cont.):*

– “Mosquito Magnets”?

- *“Mosquito Magnets work, they work very well, but they do not solve your mosquito problems!” Why not?*
- *Attract **ALL** the mosquitoes in your neighborhood*
- *Ideal use: everyone in your neighborhood with one*
- *Best Use: place at corners away from home, keep “on” for several days before event, then shut off during event*



***Range: \$250-\$700
Also accessories***

“Property Protection”

■ *Eliminate mosquito breeding:*

– Eliminate standing water from permanent receptacles regularly :

■ Bird baths, urns, inactive fountains, gutters, unused swimming pools must be drained!





“Property Protection”

■ *Eliminate mosquito breeding:*

- Drain standing water from grounds
- Remove obstacles preventing water from flowing
- Drain water from tree holes



**Standing Water
from Irrigation Leak**

Joe Boggs





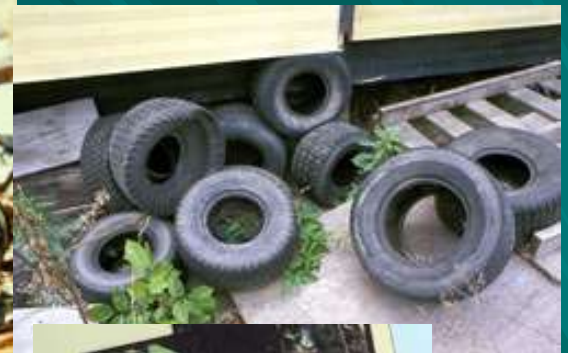


“Property Protection”

■ *Eliminate mosquito breeding:*

– Eliminate any container that can hold water:

- Jars
- Bottles
- Cans
- Discarded tires
- Kiddy pools
- Pool covers









“Property Protection”

■ *Eliminate mosquito breeding:*

– Search, drain, and clean any structures “accidentally” holding water:

■ uncovered/stored boats

■ rain gutters





“Property Protection”

■ *Eliminate mosquito breeding:*

– Preventing larvae from developing in structures:

■ Keep fountains active:

– mosquitoes do not breed
in moving water

■ Keep fish ponds stocked
WITH FISH!!



“Property Protection”

■ *Eliminate mosquito breeding:*

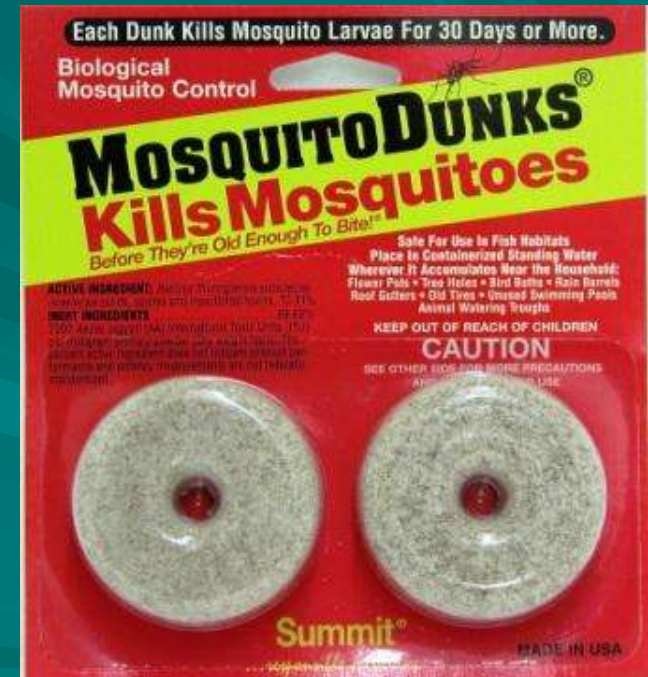
– Preventing larvae from developing in structures:

■ Add commercially available biological agents that kill only mosquito larvae (“Mosquito Dunks”)

– Add regularly to:

■ Bird baths

■ Rain barrels



“Peripheral Protection”

(Protection beyond your property)

- Because no matter how well you have your property under control:
 - You have little control of what is going on:
 - street in front of your house
 - your neighbor's yard
 - your community
 - Areas of concern:
 - wetlands & pond boundaries
 - junkyards & tire piles
 - foreclosed homes (w' abandoned swimming pools)
 - retention ponds
 - catch basins

“Peripheral Protection”

- Therefore, you need help from professionals:
 - Private companies:
 - Operate at the individual home level
 - Public/community-supported operations:
 - Operate at home to neighborhood to community levels
 - Massachusetts Mosquito Control Projects & Districts
 - State-overseen but community-supported
 - In Northeast MA, municipalities subscribe for services

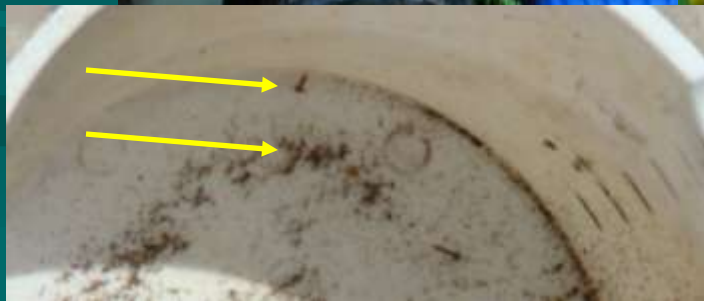
Northeast MA Mosquito Control District

- Keep track of “what’s out there”:
 - Offer property inspection services
 - Property mosquito control services:
 - Larviciding at residence requests
 - Adulticiding at request of Ipswich BoH
 - Active Surveillance program:
 - Bi-weekly collections (May through September)
 - All mosquitoes ID’ed, tallied, & trends monitored
 - Unusual trends detected
 - Recommendations based on data
 - Vector species sent to DPH for testing
 - If EEEV &/or WNV detected, recommendations on responses made to Ipswich BoH

Abandoned Property









Northeast MA Mosquito Control

(continued)

- Town-wide Larviciding Operations:
 - Selected freshwater wetlands
 - Salt marsh (Aerial with helicopter)
 - Catch basins, Retention ponds, etc.

Catch basins are a principal source for breeding mosquitoes that transmit West Nile Virus

(www.dcwasa.com)



(www.chagrinvalleypaving.com)



(www2.burlingame.org)



(www.storm-drain-structures.com)



(oaklandpark.govoffice2.com)

Northeast MA Mosquito Control (continued)

■ Town-wide Adulticiding:

- Ground-based truck spraying
- Primarily in response to virus detections
- Applications from neighborhoods to entire town
 - **ONLY** by approval of Ipswich Board of Health
 - Goal is to reduce mosquito populations to **reduce risk of infections** (not ELIMINATE ALL MOSQUITOES)
 - Personal protection measures **MUST STILL BE FOLLOWED!**
 - Modern (ULV) **QUIET** equipment producing **NO** smoke
 - All adulticiding applications done at night:
 - By law (state regulations & instructions on label)
 - Impact to bees extremely minimal

Ancient Truck Spraying



Modern truck spraying with ULV



Fine mist released (particulate size 15-20 microns)
Less than one fluid ounce covers an acre
Applications done at night

Take Home Messages:

- Remember that we are invaders/squatters in “Their World”
- Take the time to insure you & loved ones are protected when outside
- Pay attention to mosquito activity (real or potential) on your property and take necessary action to eliminate breeding
- Stay informed on mosquito & arbovirus announcements in your town and support efforts for control

*My time is over.
I thank you for yours!*



**Contact us at:
978-463-6630**

and

www.northeastmassmosquito.com