

MOSQUITO CONTROL IN CENTRAL MASSACHUSETTS

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Executive Director

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ORGANIZATIONAL STRUCTURE



- Mosquito control in Mass. is organized through M.G.L. Chapter 252
- Each district has its own enabling legislation: Chapter 583 of the Acts of 1973



- Districts operate under the authority of the State Reclamation & Mosquito Control Board (SRMCB)
- SRMCB has members from MDAR, DCR & MassDEP



- Districts have important partnerships



- Districts are overseen by a Board of Commission appointed by SRMCB
- CMMCP Board of Commission meets monthly on the 2nd Wednesday of each month



MOSQUITO BIOLOGY



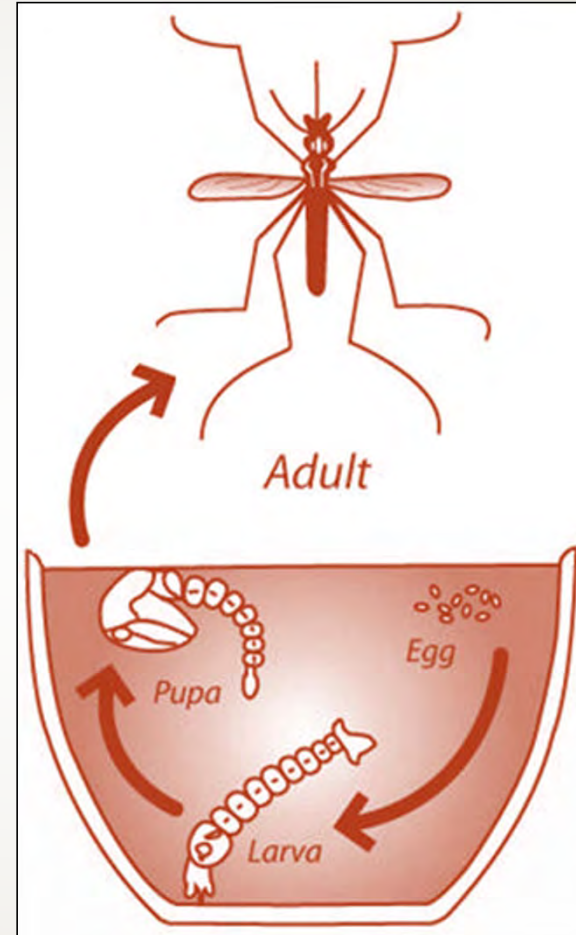
4 stages of development

- Egg
- Larvae
- Pupae
- Adult



First 3 stages are aquatic

- Egg
- Larvae
- Pupae



Mosquito Eggs

- Damp soil
- Containers
- Permanent water
- Emergent vegetation
- Location dependent on species



Mosquito Larvae

- 4 stages called “instars”
- 1/8” – 1/4” long
- Breathes air
- Can develop in as few as 5 days into pupae



Mosquito Pupae

- Does not eat
- Breathes air like larvae
- Fully developed mosquito inside
- Final stage before adult



Mosquito Adult

- 2,600 species, ~162 in USA
- 52 species in Mass.
- Vector of several diseases in the Northeast
- Flight range <100 yds. to 25 miles



LARVAL MOSQUITO HABITAT IN MASSACHUSETTS



Habitat Types

- Retention/Detention areas
- Woodland pools & Reflood areas
- White cedar/Red maple swamps
- Permanent water
- Degraded ditches
- Artificial containers
- Salt marsh



Retention/Detention areas

- Mandated by Stormwater Phase II

Common Mosquito Species:

- *Cq. perturbans* (w/emergent vegetation)
- *Ae. vexans*
- *Anopheles spp.*
- *Culex spp.*





Common Woodland Pool Species:

- *Oc. excrucians**
- *Oc. abserratus**
- *Oc. canadensis*
- *Ae. vexans*

*Requires a freeze/thaw cycle
(cold-conditioning)





Reflood areas

- Floodplains
- Areas with poor drainage
- Will flood after significant rain events





Cedar/Maple swamps

- Common in the Northeast
- Habitat for *Cs. melanura* – amplification vector of EEE in birds
- Difficult to sample & control as larvae due to subterranean habits





Permanent water

- Emergent vegetation – *Cq. perturbans*
- Difficult to sample & control as larvae due to unique breathing habits – will attach to roots of vegetation & breathe through the vascular system of the plant





CATTAIL MARSH - *Typha* spp.

(*T. latifolia*, *T. angustifolia*, *T. glauca*, *T. domingensis*)

Cq. perturbans larvae
attached to root system



Degraded Ditch systems

- *Culex spp.* if pollution evident
- *Anopheles spp.*
- Will contribute to reflood areas
(*Ae. vexans* & *Ae. cinereus*)





Container habitats

- Treeholes, rock holes in stream beds
- *Oc. triseriatus*, *Oc. japonicus* & *Culex spp.*



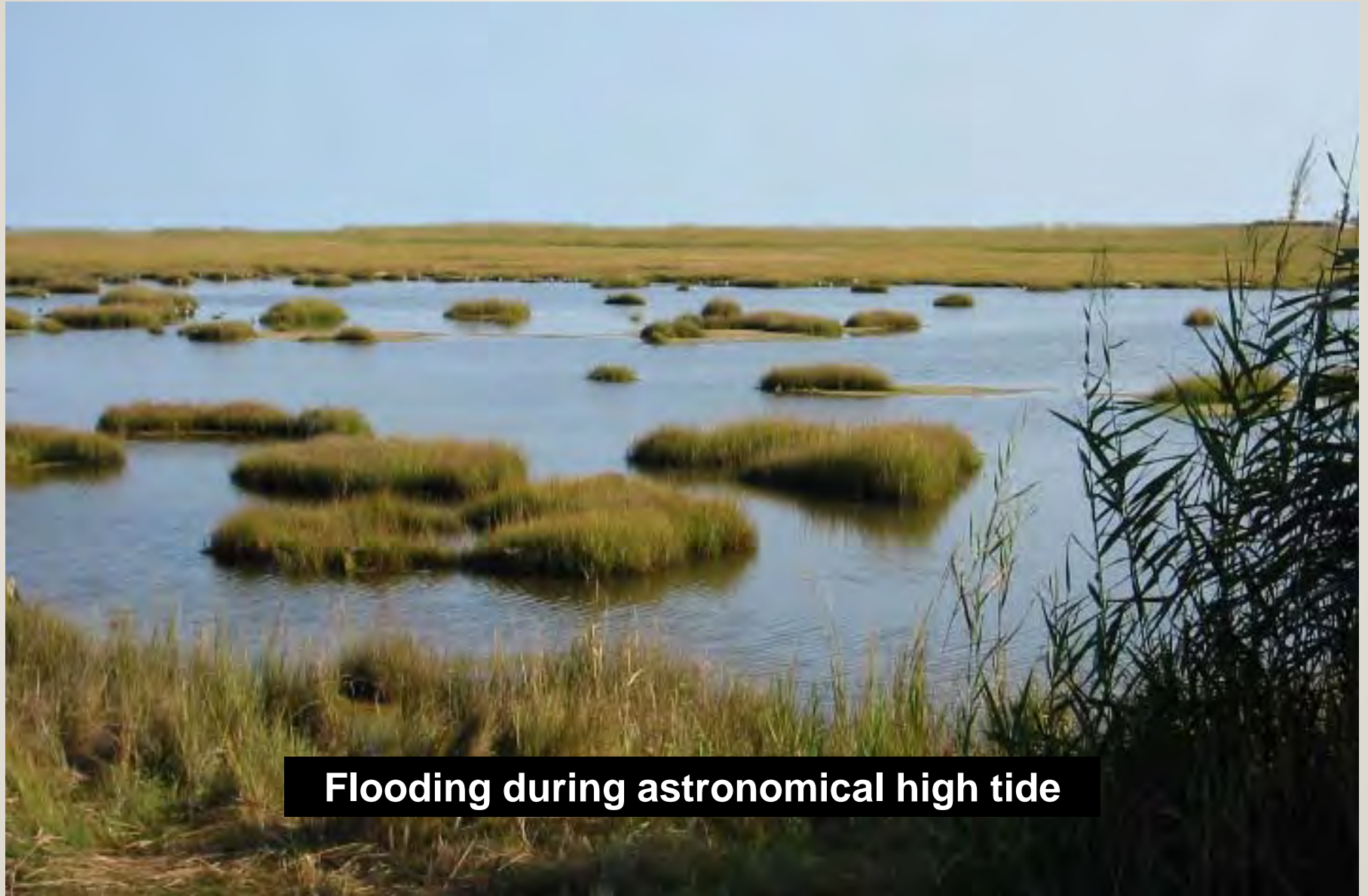




Salt Marsh species

- *Oc. taeniorhynchus*
- *Oc. cantator*
- *Oc. sollicitans*





Flooding during astronomical high tide

Invasive plant species

- Alter the biodiversity of a habitat
- Can introduce mosquito species to an area dependant on emergent vegetation (*Cq. perturbans*).





PURPLE LOOSTRIFE - *Lythrum salicaria*



THE COMMON REED - *Phragmites australis* or *Phragmites communis*

MOSQUITO CONTROL IN MASSACHUSETTS

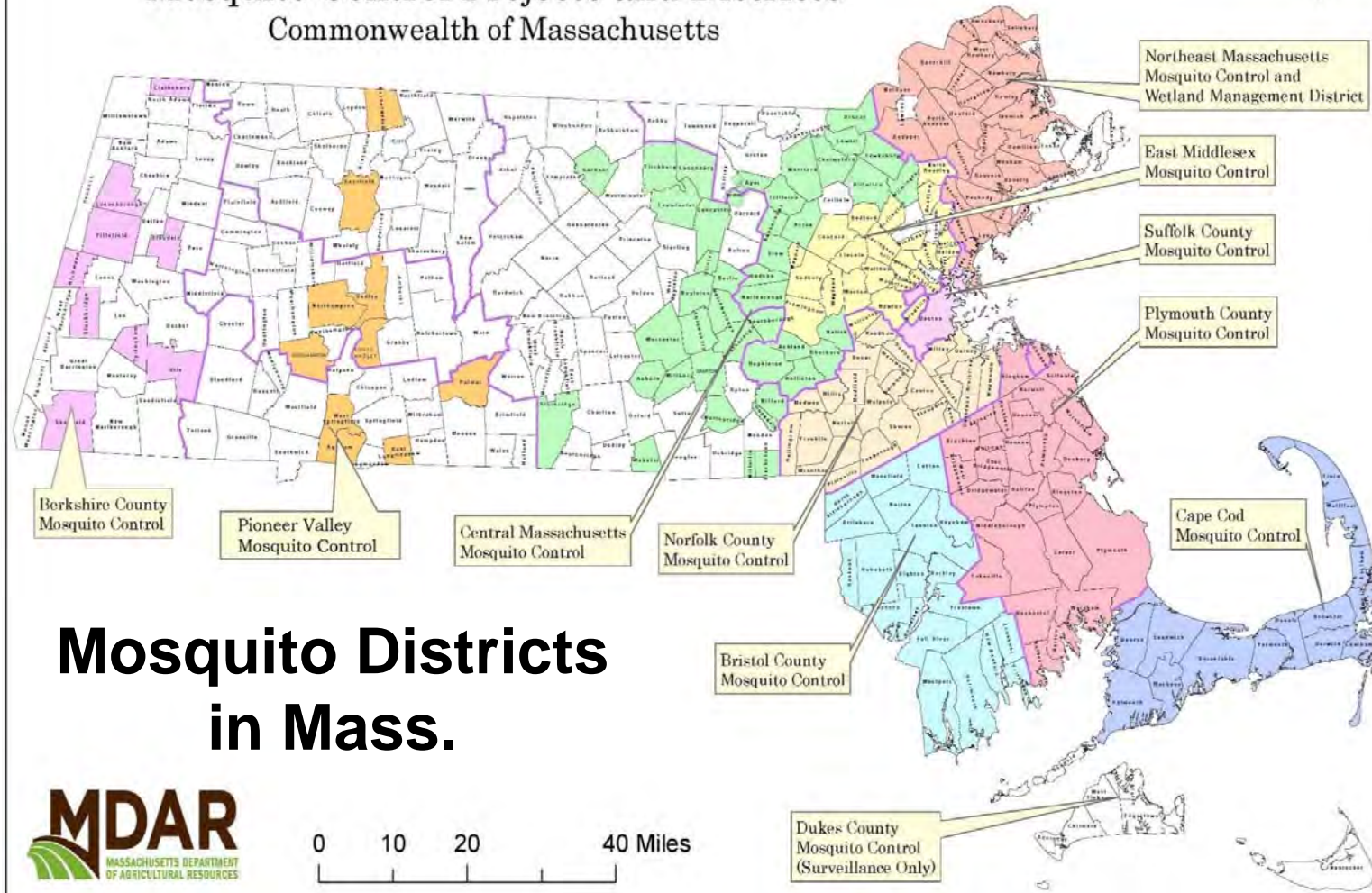


11 Mosquito Districts in Mass.

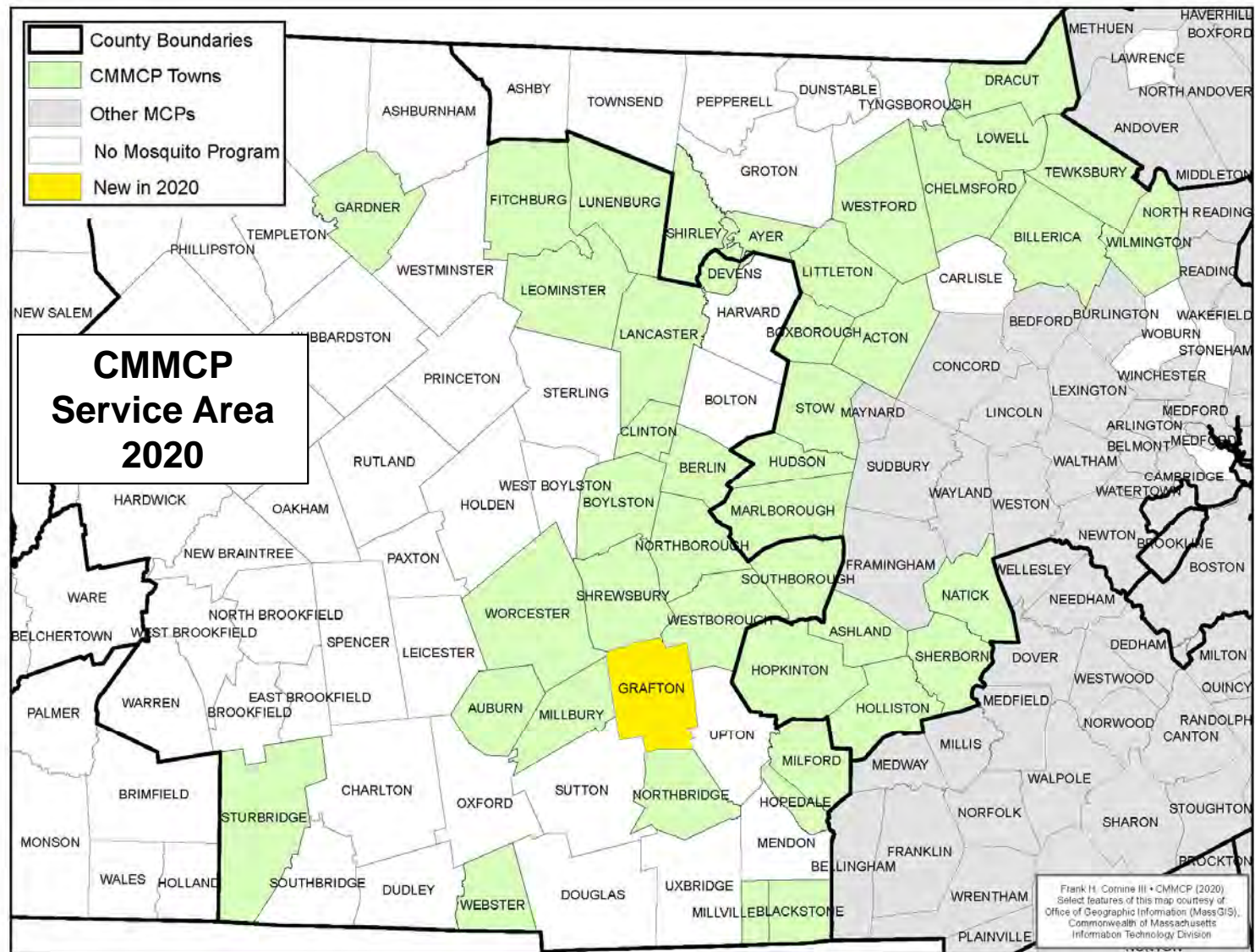
1. Berkshire County MCP
2. Bristol County MCP
3. Cape Cod MCP
4. **Central Mass. MCP**
5. East Middlesex MCP
6. Martha's Vineyard (new in 2013)
7. NE Mass. Wetlands Mgmt. & MC District
8. Norfolk County MCP
9. Pioneer Valley MCP (new in 2017)
10. Plymouth County MCP
11. Suffolk County MCP



Mosquito Control Projects and Districts Commonwealth of Massachusetts



Mosquito Districts in Mass.



CMMCP SUITE OF SERVICES



Services Offered:

1. Surveillance
2. Public Education
3. Ditch Maintenance
4. Larval Control
5. Source Reduction
6. Beaver Mitigation (new)

PROACTIVE

7. Adult Control

REACTIVE*

8. Research & Efficacy

CHECKS & BALANCES

*Adult control can be considered proactive by reducing certain species before they can transmit virus



MOSQUITO SURVEILLANCE

Adult mosquito surveillance to monitor mosquito-borne diseases, document species diversity and population densities.



Trap types



Gravid trap



CDC light trap



Resting boxes



Surveillance

- Adult mosquito surveillance will be performed in town at least once per week. 675+ traps deployed in our service area
- If virus is identified, then additional traps will be placed in that area – intervention options will be discussed with the Board of Health.



Arbovirus Testing

Adult mosquito samples sent to Mass. Dept. of Public Health each week, tested for:

- West Nile Virus
- Eastern Encephalitis
- Other diseases (Highlands J, SLE, La Crosse, etc.)



2019 CMMCP Surveillance

- 2,416 collections tested (6,585 total)
- 56,374 specimens tested (205,265 total)
- 38 viral isolates in mosquitoes
- 28 EEE, 10 WNV detected in 2019



PUBLIC EDUCATION

Education to schools, civic groups, local and state officials about mosquito biology, program services, control techniques and personal protection methods.



Public Education



SCHOOL PROGRAM

MOSQUITOES and you!!



CENTRAL MASS MOSQUITO CONTROL PROJECT

111 OTIS STREET
NORTHBOROUGH, MA 01532

Tel: (508) 393-3055
Fax: (508) 393-8492

for additional information, please
access our website at
www.cmmcp.org



BROCHURE

CENTRAL MASS. MOSQUITO CONTROL

www.cmmcp.org

Mosquito-borne Disease in Central Massachusetts:

How You Can Keep Safe This Summer



Attention:
Older Adults!!



BROCHURE



BOOKMARKS



Public Education

follow us on
twitter

You **Tube**



Find us on
Facebook

SOCIAL MEDIA



SENIOR PROGRAM



SCHOOL PROGRAM

Year	# students	# presentations
2019	3,075	93

**TOTAL
OUTREACH 2019**
**109 presentations
to 4,415 people**

SENIOR PROGRAM

Year	# seniors	# presentations
2019	25	1

PUBLIC PRESENTATIONS

Year	# people	# presentations
2019	1,315	15





Central Mass. Mosquito Control Project

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[Learn more about EEE and how to protect your family..... Read more »](#)

SEASONAL UPDATES



Personal Protection Measures »

Be aware of peak exposure times and places. Exposure to arthropod bites may be reduced if travelers modify their...



Tire Collection Program »

Our tire program is on hiatus while we deal with the EEE issue, but we will take your information and will schedule a...



Dog Heartworm »

Please consult your veterinarian to be sure all vaccinations are up to date, and if a booster is needed during the...

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[Pesticide Info](#)



[Surveillance Summary](#)



[2019 Spray Schedule](#)



[No Spray Info](#)



[Virus Information](#)



[Program Presentation](#)



CMMCP is a partner in the EPA's PESP program.



CMMCP is a partner with the EPA's WasteWise program.



CMMCP • 111 Otis Street, Northborough, MA 01532 • Phone: (508) 393-3055 • Fax: (508) 393-8492

Business Hours: Monday - Friday, 7:00 AM to 3:30 PM

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Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs



2013 Secretary's Award for Excellence
in Energy and Environmental Education

Certificate of Excellence

Central Massachusetts Mosquito Control Project

CMMCP Education Programs

*In recognition for your dedication, commitment
and contributions to environmental education*



Richard K. Sullivan, Jr., Secretary

May 13, 2013

Date

DITCH MAINTENANCE

Restoring drainage systems to historic flow patterns to allow the free flow of water, reducing larval mosquito development from that area.



Ditch Maintenance

- All proposed work is assessed by a wetland scientist on staff (a former Conservation Agent)
- Most work is low impact using hand/power tools
- More extensive projects using low ground pressure equipment requires more site evaluation
- Work is done after receipt of property owner permission



Ditch Maintenance (Hopedale 1999)



← BEFORE

AFTER →



Ditch Maintenance (Shrewsbury 2004)



← BEFORE

AFTER →





Ditch Maintenance (Chelmsford 2010)





Ditch Maintenance (Natick 2010)



LARVAL MOSQUITO CONTROL

Surveys of wetlands to monitor the development of mosquito larvae and perform control techniques to minimize mosquito emergence.



Larval Control Products

- Bacterial
 - ***Bti** (*Bacillus thuringiensis israelensis*)
 - ***Spinosad** (*Saccharopolyspora spinosa*)
 - BspH (*Bacillus sphaericus*)
- Insect Growth regulator
 - Methoprene
- Surfactant/Oils (limited use)
 - Oils derived from plant extracts
 - Petroleum based

*organic formulations used at CMMCP



Aerial Larval Control*



***NOTE:** this is the only program that is done with supplemental funding provided by member communities.



Aerial Larval Control (cont.)

- 3 towns in program, Chelmsford (~700 acres), Billerica (~600 acres) and Boxborough (~900 acres)
- Aimed at reducing dependence on the spray program and reducing spring species, as well as possible vector species.
- Can be done in summer also



2019 aerial maps

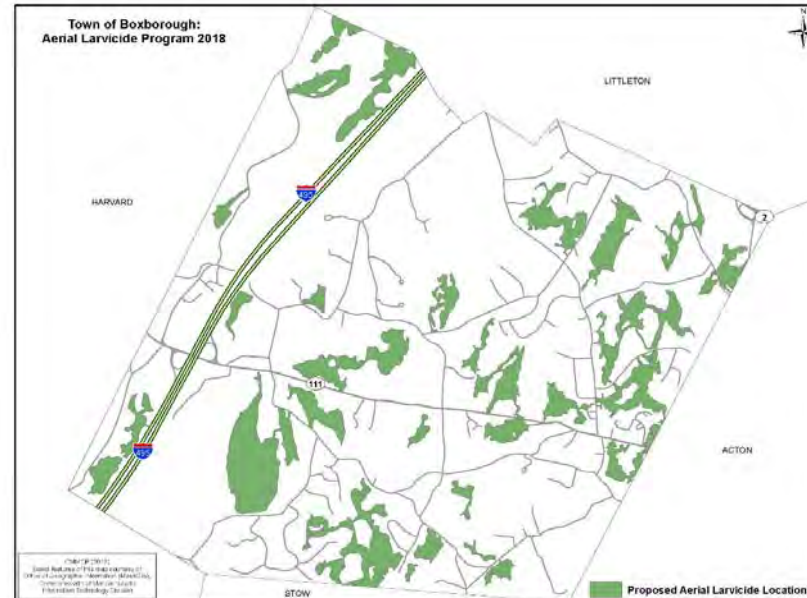
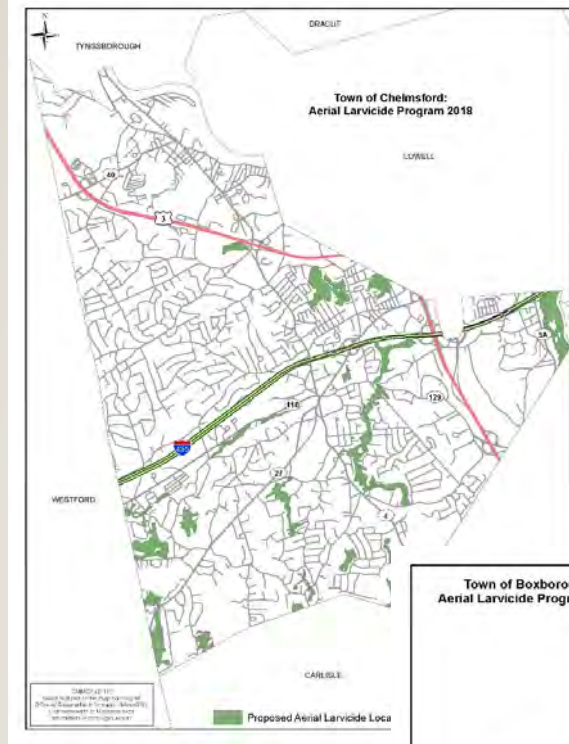


Table 1: Larval Surveillance of Treatment and Control RDS

Treatment Sites	Pre-application	Post-application	Observed Change
BIL116	72	4	-94.44%
BIL112	78	3	-96.15%
BIL408	93	3	-96.77%
BOX44	29	2	-93.10%
BOX116	24	3	-87.50%
CHM82	31	5	-83.87%
CHM279	29	1	-96.55%
CHM236	57	33	-42.11%
Overall:	413	54	-86.92%
Control Sites	Pre-application	Post-application	Observed Change
BIL227	84	84	0.00%
ACT41	56	86	53.57%
CHM146	74	94	27.03%
Overall:	214	264	23.36%

Figure 3: Boxborough Treatment RDS Pre and Post Application

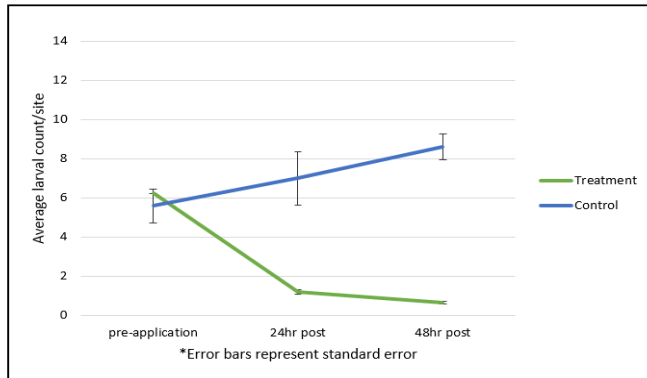


Figure 1: Billerica Treatment RDS Pre and Post Application

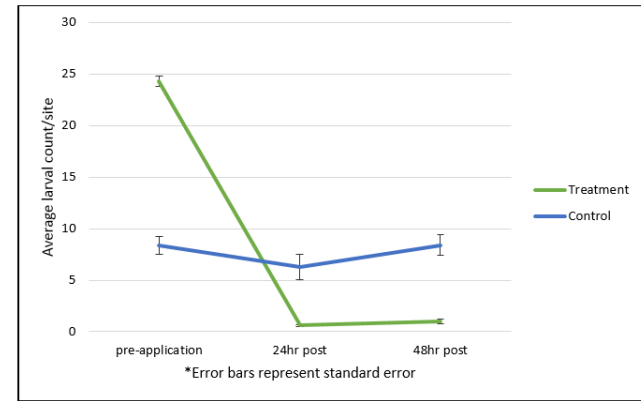
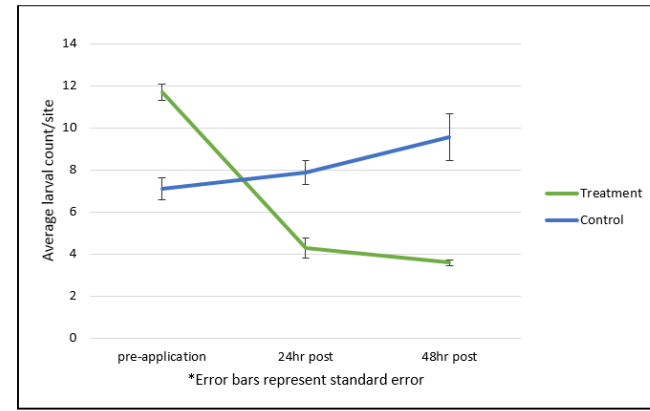


Figure 2: Chelmsford treatment RDS Pre and Post Application



2019 aerial results

SOURCE REDUCTION

Tire recycling to eliminate larval mosquito habitat and reduce risk from mosquito-borne diseases.



Source Reduction

- Program began in 2010
- Operates off initial grant, now in operating budget
- 32,060 tires recycled to date in 39 member cities & towns

Tires in the environment are the preferred larval habitat of several species of mosquitoes, some that transmit West Nile Virus

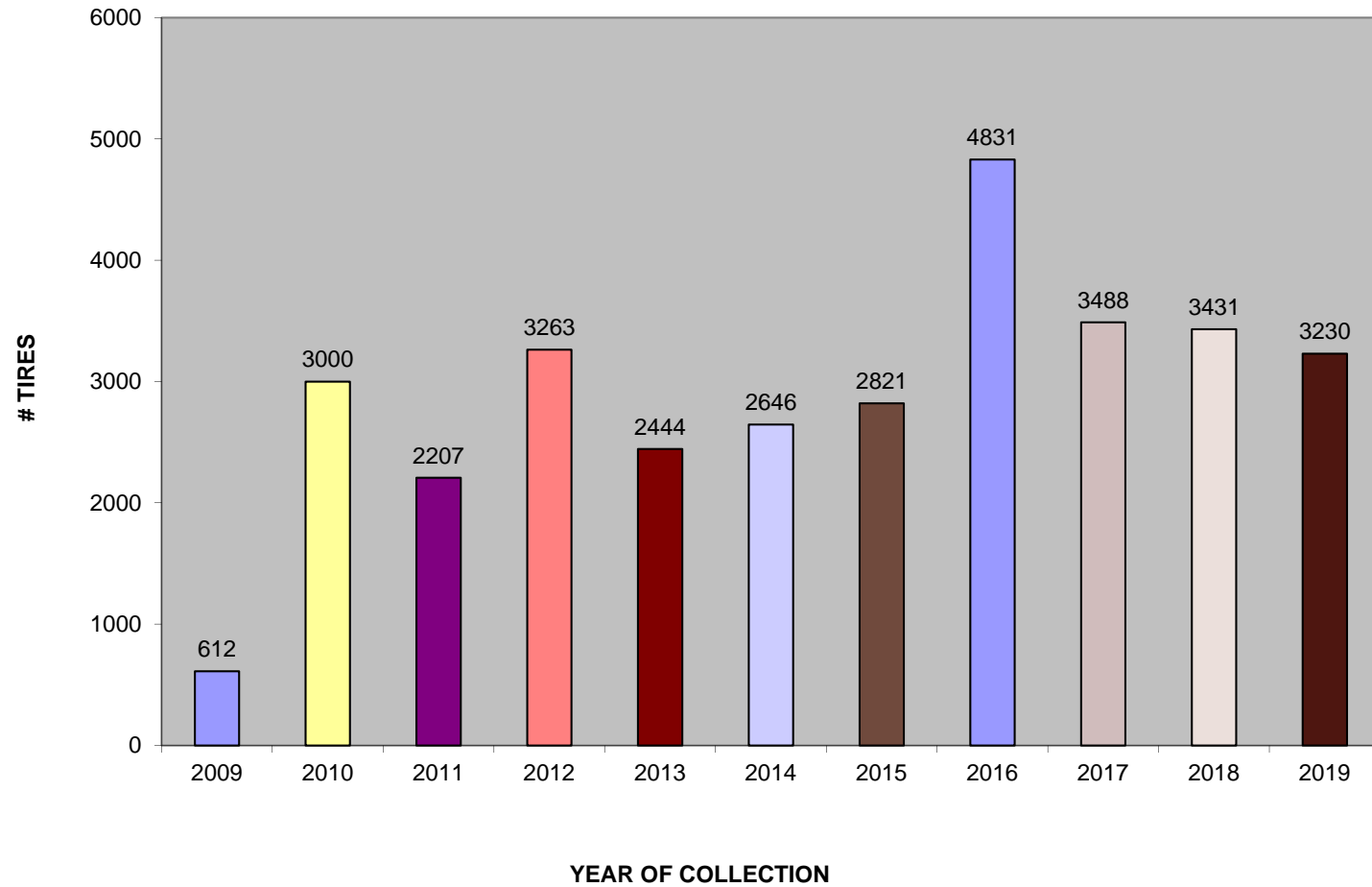


Source Reduction

- Clean-up of large waste tire dumping sites that we have databased;
- Residential waste tire removal (curb-side);
- Removal of waste tires discarded on the side of the road; and
- Coordination with communities during recycle events, hazardous waste collections, river cleanups, etc.



TIRE COLLECTIONS IN CENTRAL MASS.



ASHLAND, MA

1,300+ tires

BEFORE



ASHLAND, MA

0 tires

AFTER



MassRecycle

presents the 2011

BRONZE

Institution & Nonprofit Award

to

Central Mass Mosquito Control Project

for

Outstanding efforts to increase recycling and reduce waste



Dmitriy Nikolayev

Dmitriy Nikolayev, President

November 15, 2011

U.S. Environmental Protection Agency - Region 1



Environmental Merit Award

presented to

Central Mass Mosquito Control Project

for outstanding efforts in
preserving New England's environment

April 2014

From the EPA awards:

“Through this project, the organization has recycled 11,500 tires, which saved 192 staff hours in monitoring larval habitats, and resulted in usage of 720 pounds less of pesticides.”



Our tire program was recognized in 2014 by the EPA – Region 1



2017 Certificate of Achievement *WasteWise*

The U.S. Environmental Protection Agency's National Sustainable Materials Management Program commends

Central Massachusetts Mosquito Control

for your demonstrated commitment to improving sustainable waste management practices since becoming a participant in 2011.

A handwritten signature in black ink, reading "Deborah A. Szaro".

DEBORAH A. SZARO
ACTING REGIONAL ADMINISTRATOR
EPA REGION 1

Sustainable
Materials Management



CHANGING HOW WE THINK ABOUT OUR RESOURCES FOR A BETTER TOMORROW

BEAVER MITIGATION

Proper management of beaver populations to reduce potential negative aspects of beaver activity.

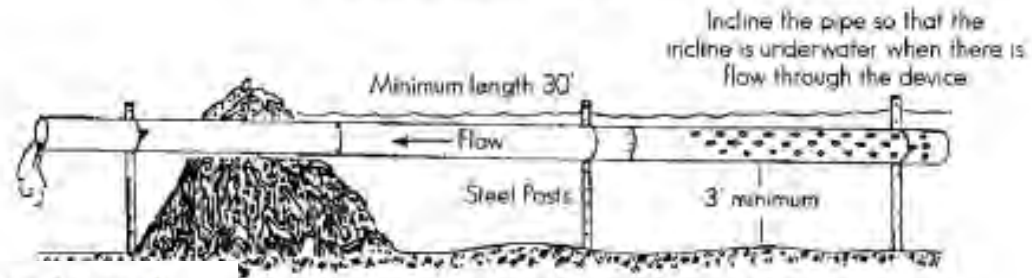


Beaver Mitigation

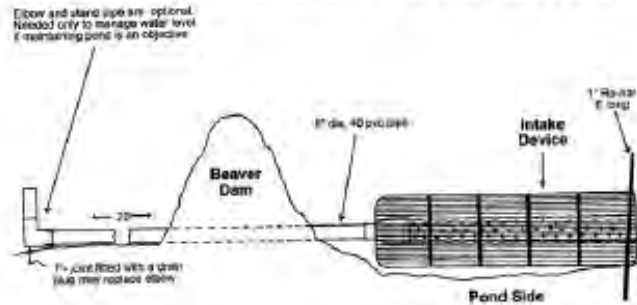
- New program for CMMCP (2014)
- Working under emergency permits through BOH & ConCom
- Installation of WLCD
- Dam breaching
- Licensed trappers on staff



Pond Drain Pipe

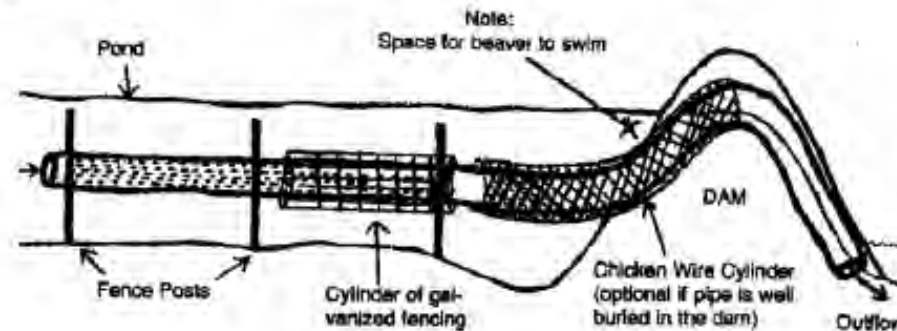


The Clemson Beaver Pond Leveler



WLCD EXAMPLES

PVWV Flexible Leveler





HOLLISTON, MA – Upper Charles River watershed



HOLLISTON, MA – Upper Charles River watershed



HOLLISTON, MA – Upper Charles River watershed

ADULT MOSQUITO CONTROL

Targeted applications to control adult mosquitoes and reduce risk from mosquito-borne diseases.



Adult Control Product

- Etofenprox, a reduced risk* synthetic pyrethroid
- Not a residual product, rapid decomposition in the environment
- Low toxicity to humans, pets, etc.

*as classified by the EPA



Application rates

Application rate pound A.I. per acre	Flow rates		Vehicle Speed
	Undiluted		
	Oz/Acre	Oz/Minute	
0.00175		2.25	5
	0.75	4.50	10
		7.00	15
0.00350	1.5	4.50	5
		9.00	10
		13.50	15
0.00700	3.0	9.00	5
		18.00	10

The red box are the application rates of the 4% solution of etofenprox over the area the size of an acre – 43,560 sq. ft.

The green box is the typical application rate we use



Pyrethroids

- Animal Products (flea spray, flea shampoos)
- Restaurant applications
- Food & grain storage
- Available to homeowners as Yard Guard®, Repel®, etc.



Pyrethroids in Pet Products



ACTIVE INGREDIENTS:	
Etofenprox	55.0%
Piperonyl Butoxide (PBD)	10.0%
* n-octyl bicycloheptene dicarboximide (MGK 264)	1.0%
Pyriproxyfen (Nylar)	0.5%
OTHER INGREDIENTS:	
	33.50%
TOTAL	100.0%

Here is a common pet product for topical (skin) applications using the same pesticide we use, but at higher rates (55% vs. 4%)



Adult Control

- If no service requests are received from residents, then no spraying will be done. Other work like larval control, landing counts, etc. may be performed in town on the scheduled day/evening
- If spraying is done for virus control, it will be done only after consultation with local and state officials



Adult Control

- Website redesign to allow electronic notifications before spray applications.
- New GPS tracking system in place, includes Windows® tablets.
- Spray areas are detailed in new report system showing exact locations and time of spray.



Exclusion properties (No Sprays)

- Register through MDAR under new process
- Detailed list sent with all pesticide applicators & on GPS units in spray vehicles



Identify

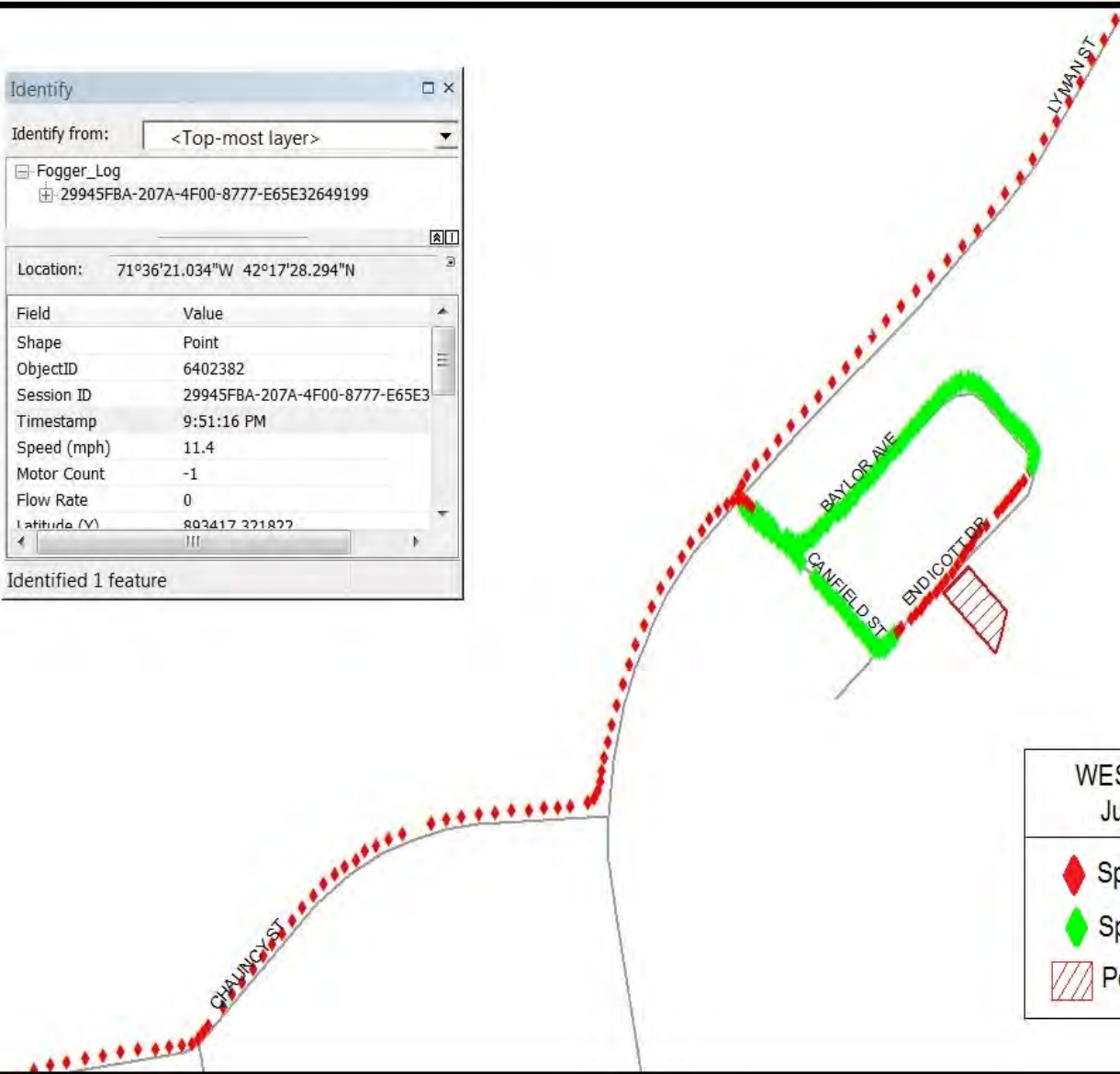
Identify from: <Top-most layer>

Fogger_Log
29945FBA-207A-4F00-8777-E65E32649199




Location: 71°36'21.034"W 42°17'28.294"N

Field	Value
Shape	Point
ObjectID	6402382
Session ID	29945FBA-207A-4F00-8777-E65E3
Timestamp	9:51:16 PM
Speed (mph)	11.4
Motor Count	-1
Flow Rate	0
Latitude (N)	803417 321822

Identified 1 feature



WESTBOROUGH
July 17, 2019

-  Sprayer off
-  Sprayer on
-  Pesticide Exclusion

Spray Notifications

- Monthly schedules sent to all Boards of Health & City/Town Clerks 2 weeks prior to start of each month
- Street listings on CMMCP phone system after 3:30pm each day
- Street listing on CMMCP website after 3:30pm each day.



Landing Rates

- Landing rates >1 per min.*
- 321 landing rates in 2019** (181 with no application 56%)

*from the Mass. Mosquito Generic Environmental Impact Report

** Landing rates were suspended after confirmation of virus on July 15



RESEARCH & EFFICACY

To check the efficacy of our products and techniques, and perform research in new or advanced control methods.



Research & Efficacy

- Department began in 2007 – includes GIS capabilities
- Provides checks & balances
- Past studies:
 - Mosquito bloodmeal analysis
 - Pesticide resistance testing
 - Adulticide program efficacy evaluation
 - Host-seeking activity
 - Resident survey

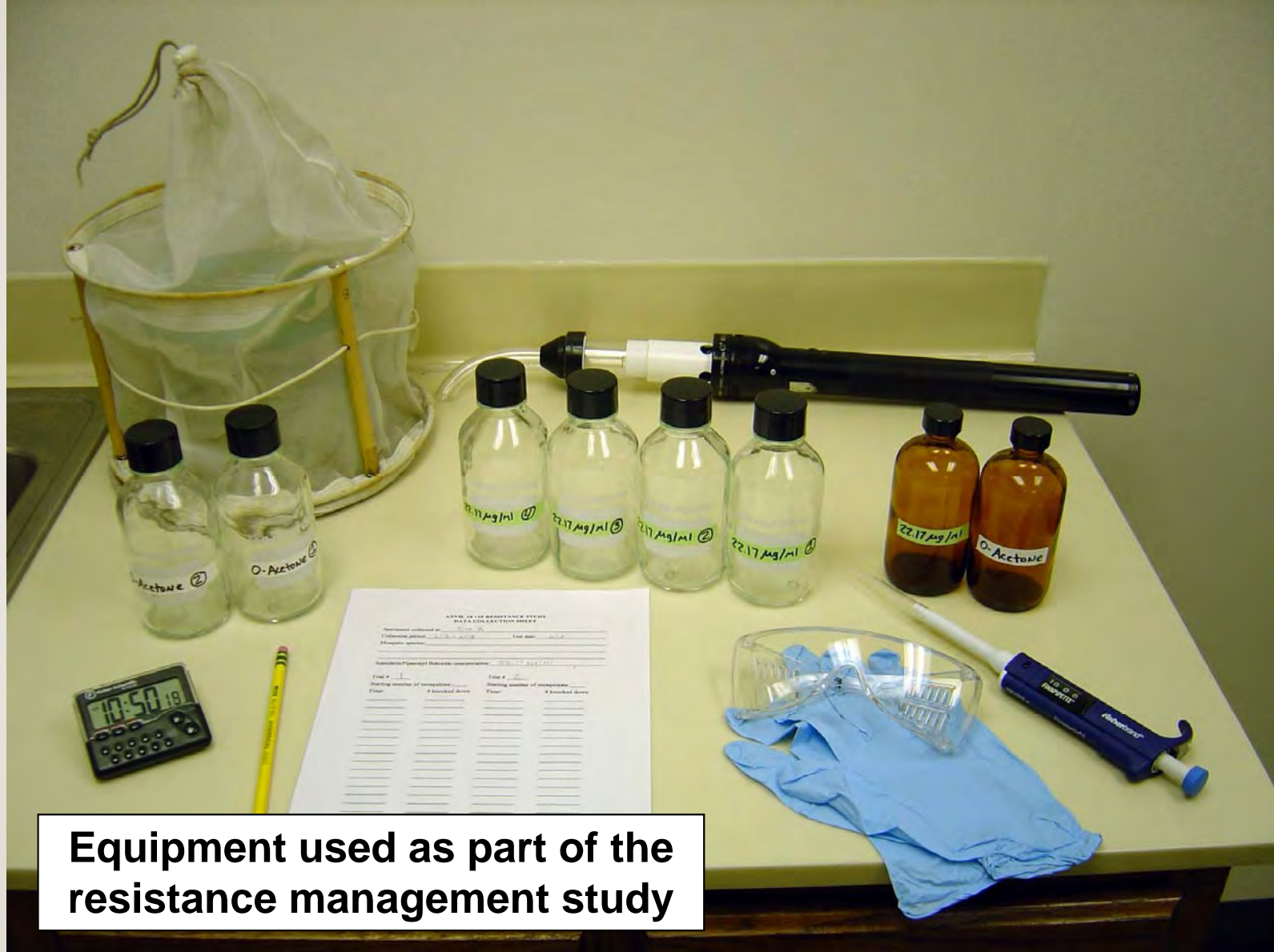


Research & Efficacy (cont.)

Pesticide resistance (sumithrin/resmethrin)

- Using CDC protocols
- Done for past 14 years, no resistance noted in area





**Equipment used as part of the
resistance management study**



Resistance management

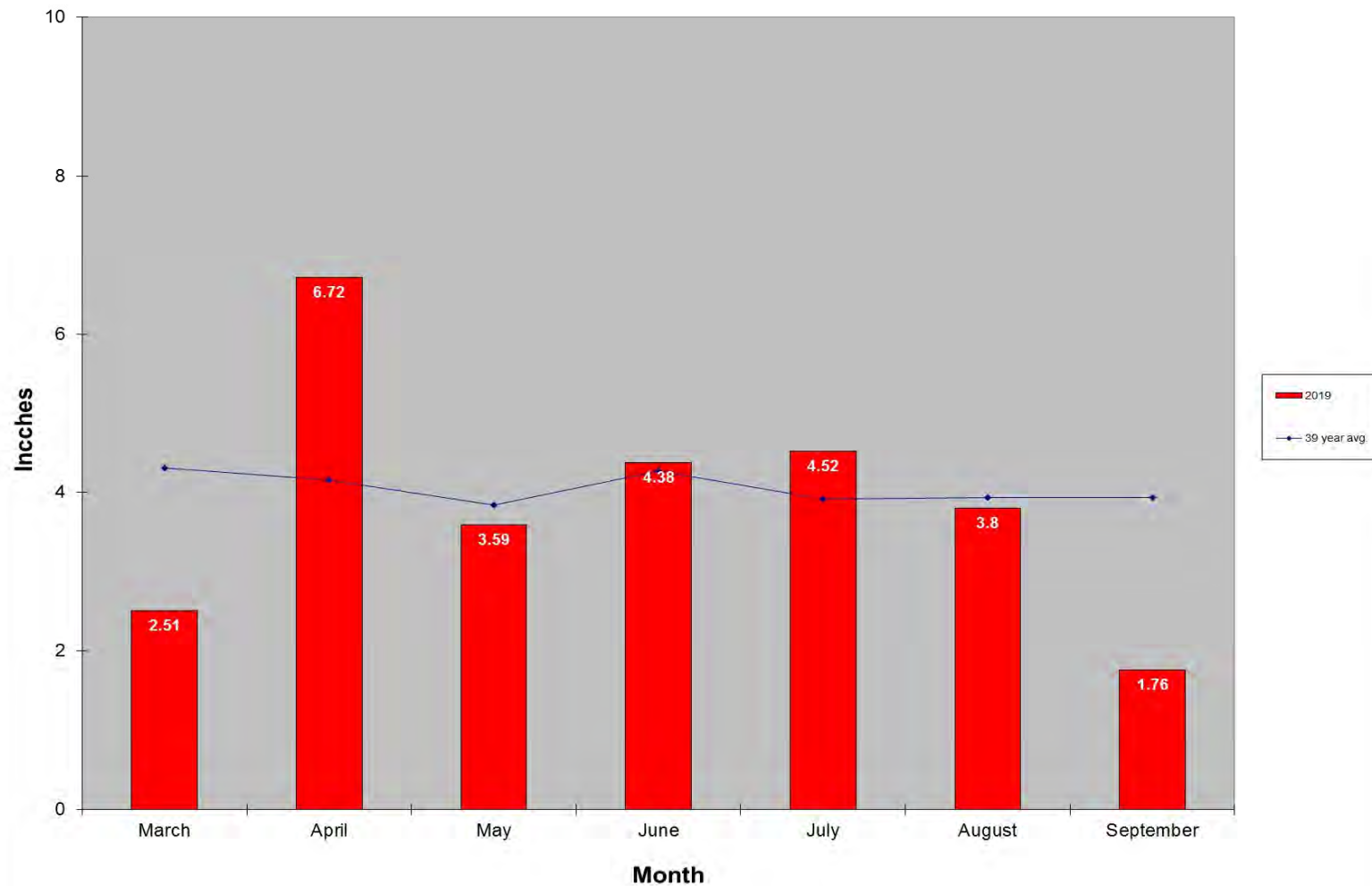
**Rotator light traps
used in the adulticide
efficacy study & host
seeking activity study**





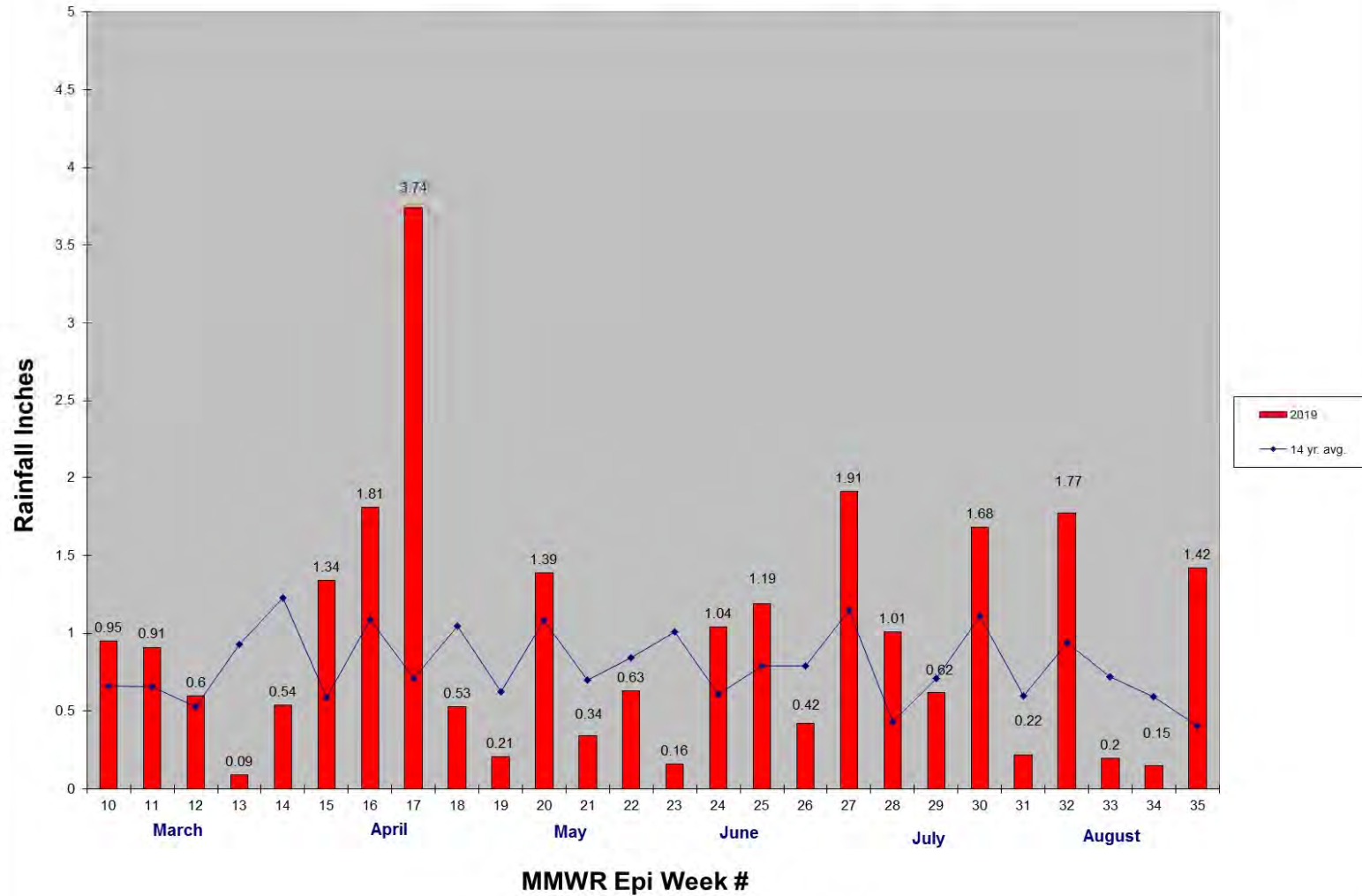
**CMMCP weather
station to monitor
wind, rain &
temperatures**

2019 Mass. Rainfall Data vs. 39 Year Average*



*source: <http://www.nrcc.cornell.edu/regional/tables/tables.html>

2019 CMMCP Weekly Rainfall vs. 14 Year Average*

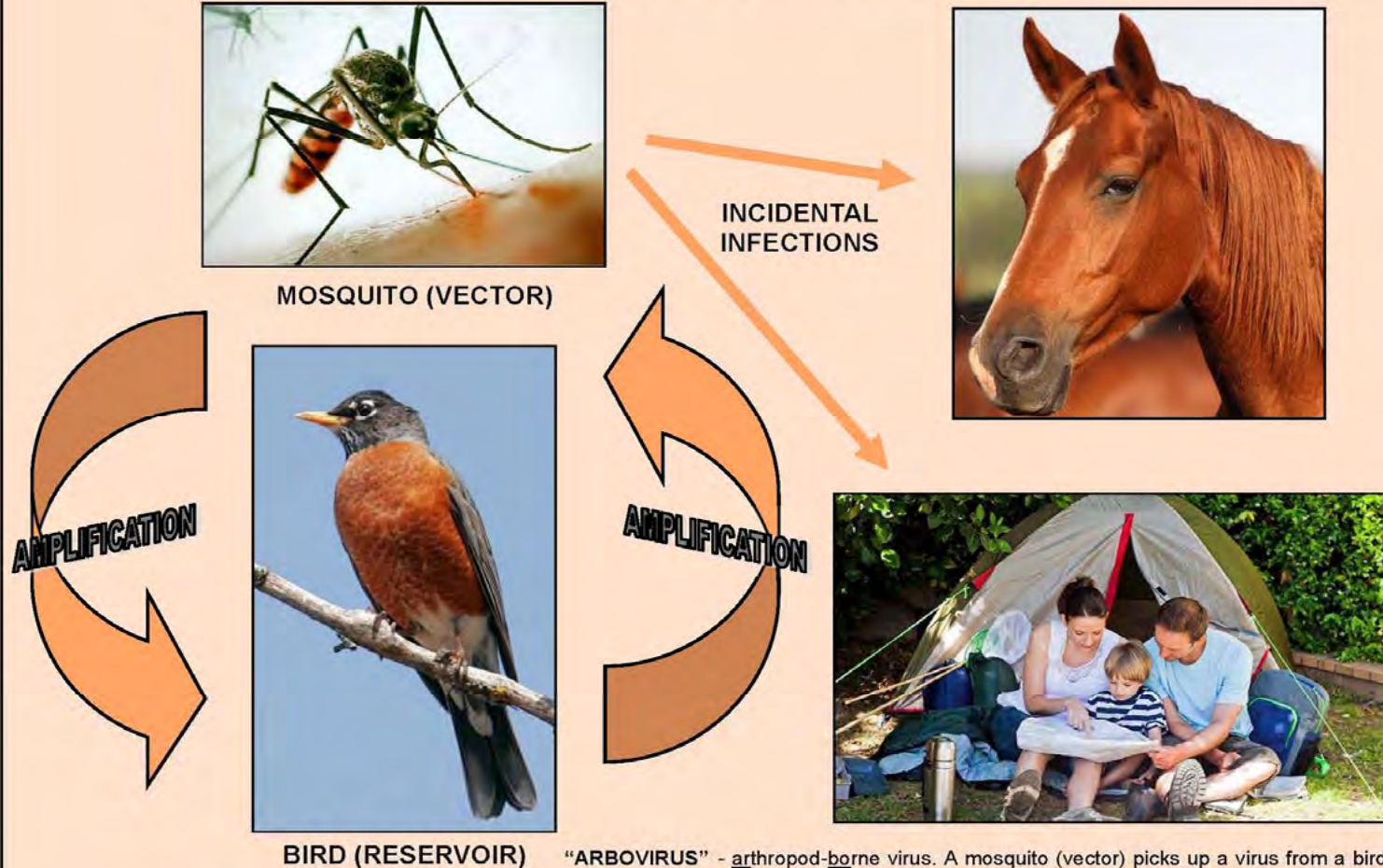


*source: CMMCP weather station Northborough, MA

MOSQUITO-BORNE DISEASES IN MASS.



ARBOVIRUS TRANSMISSION CYCLE



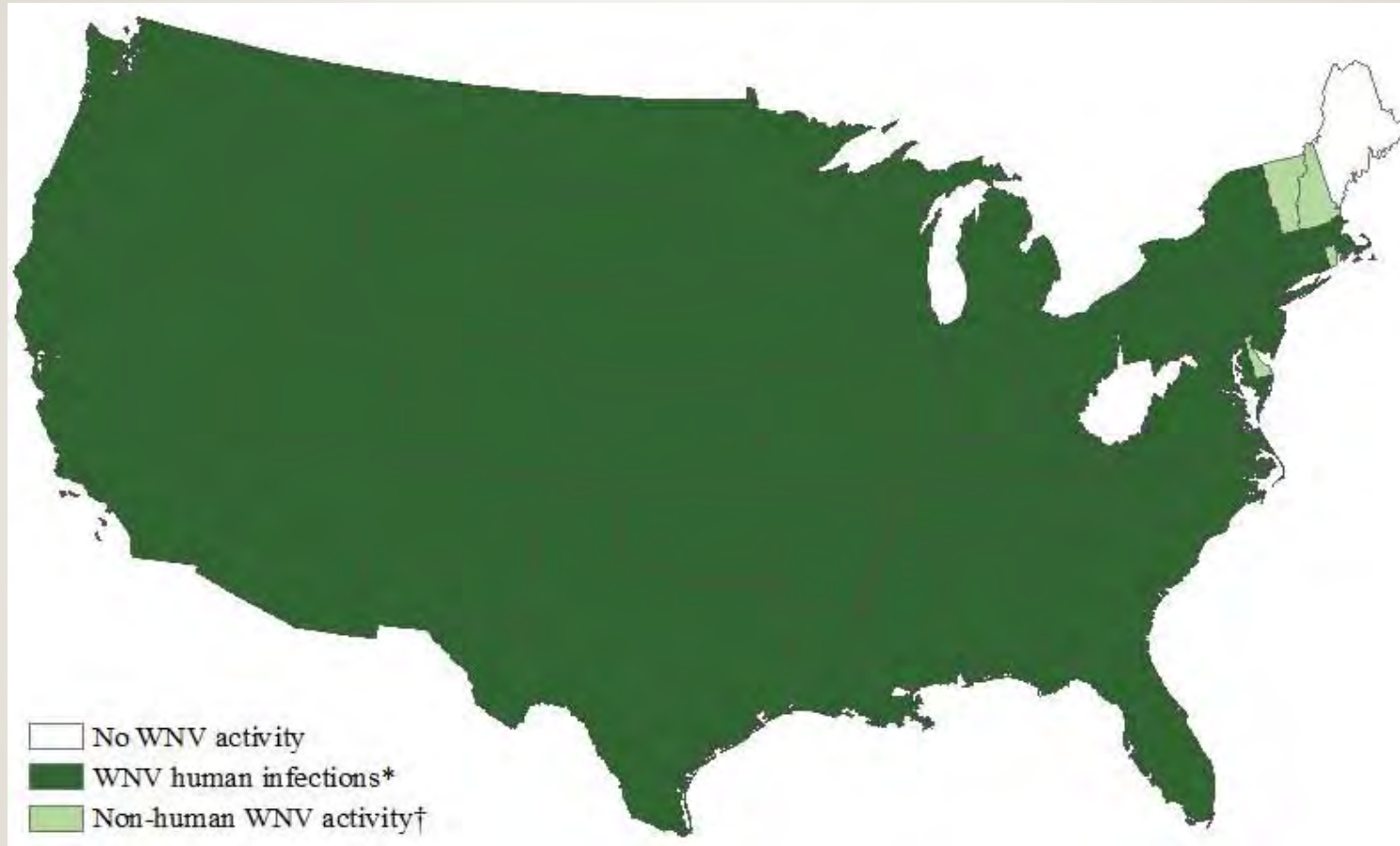
"ARBOVIRUS" - arthropod-borne virus. A mosquito (vector) picks up a virus from a bird (reservoir), lays eggs and transmit the virus to another bird - this is called amplification. Incidental infections occur when an infected mosquito bites a susceptible mammal.

West Nile Virus

- Discovered in USA in New York in 1999
- Discovered in Mass. in 2000
- Firmly established in the nation with sporadic, localized outbreaks

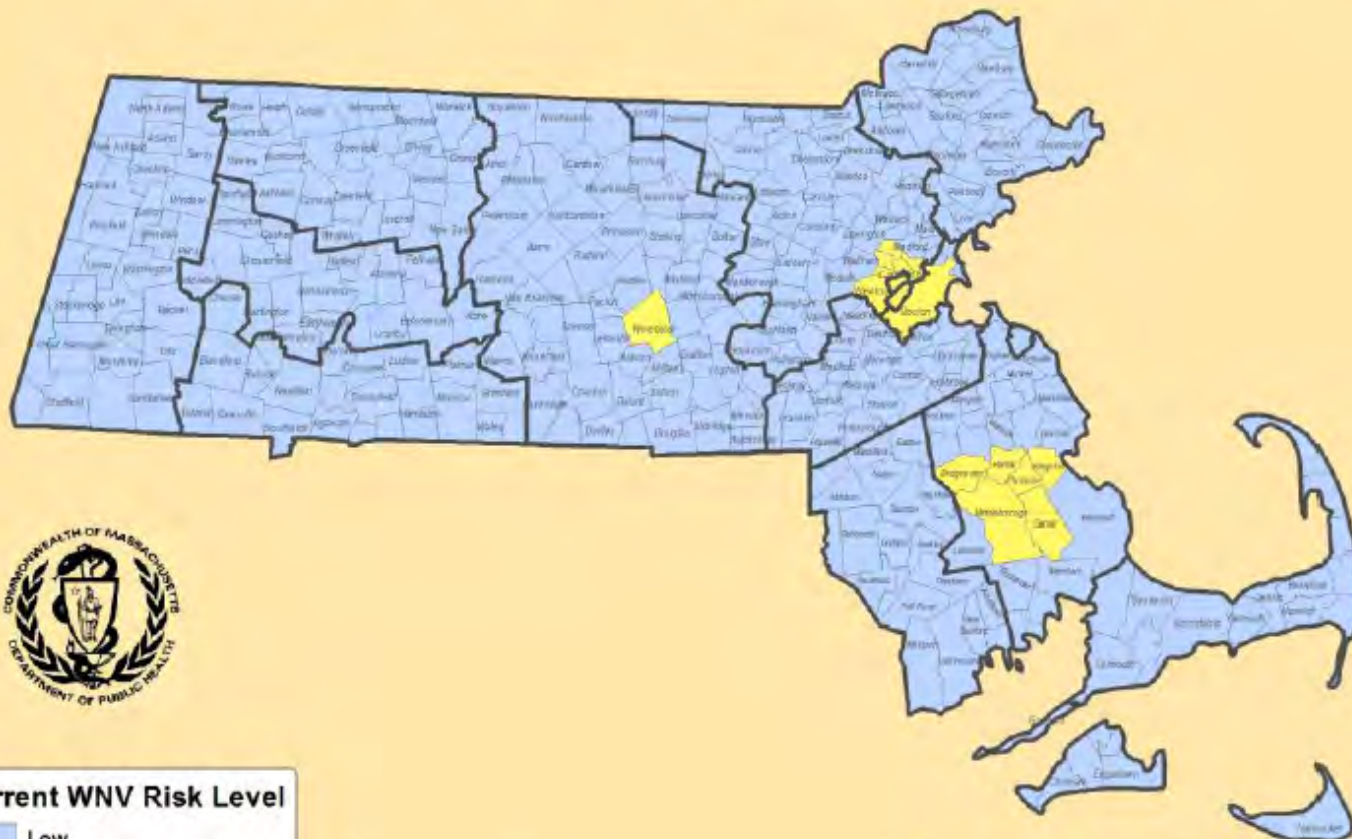


2019 WNV - Nationwide

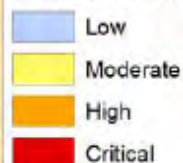


**917 human cases reported – 5 in Mass.
51 deaths nationwide – 0 in Mass.**

Massachusetts WNV Risk Categories



Current WNV Risk Level



Current Risk Levels – as of October 16, 2019

MA WNV Surveillance Summary

2019

Mosquito Pools Positive	87
Horses Positive	0
Humans Positive	5

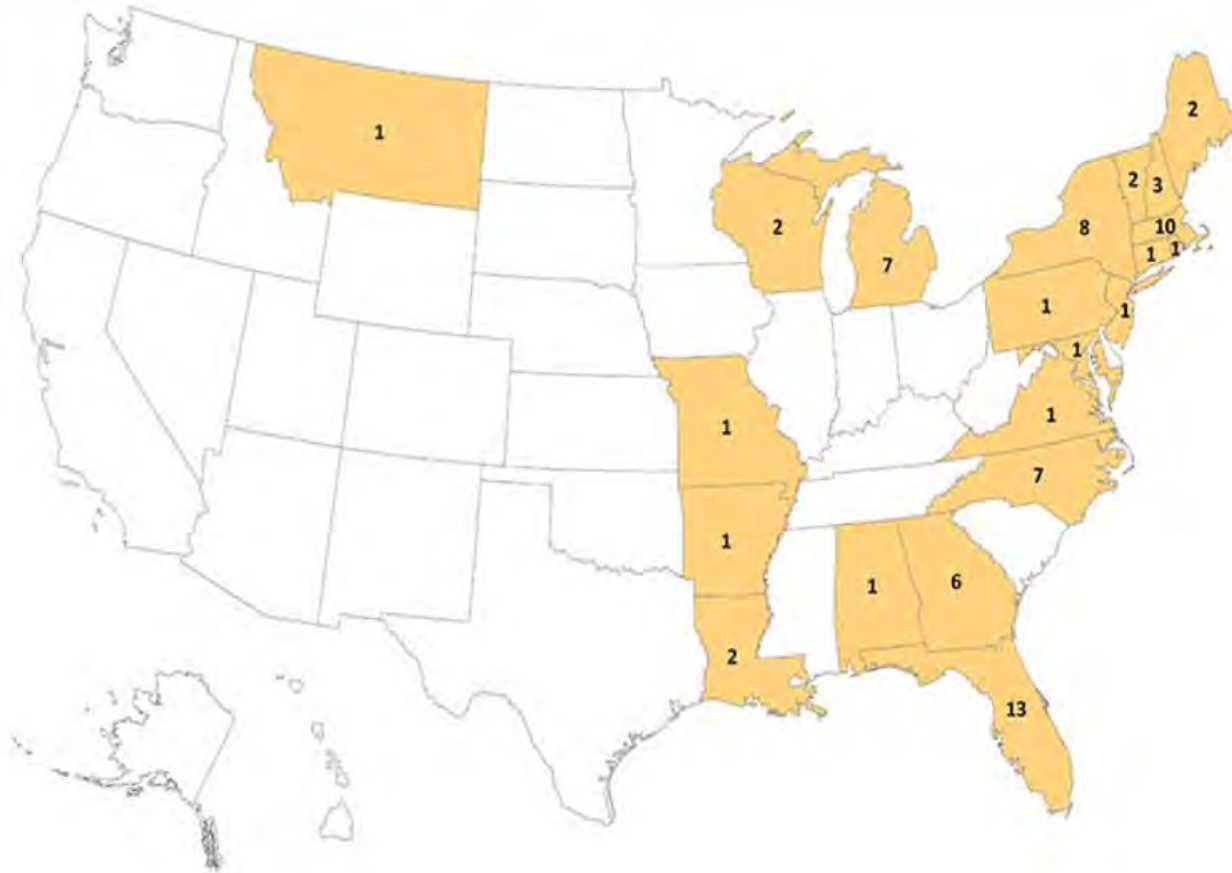


Eastern Equine Encephalitis

- 30-50% mortality
- Of the survivors, most have severe permanent neurological damage
- Most common in SE Mass. but may be moving west/north



Eastern equine encephalitis virus neuroinvasive disease cases reported by state of residence, 2009–2018



Source: ArboNET, Arboviral Diseases Branch, Centers for Disease Control and Prevention

MA EEEV Surveillance Summary

2019

Mosquito Pools Positive	428
Horses Positive	8
Humans Positive	12



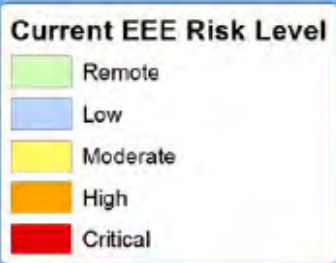
Massachusetts EEE Risk Categories

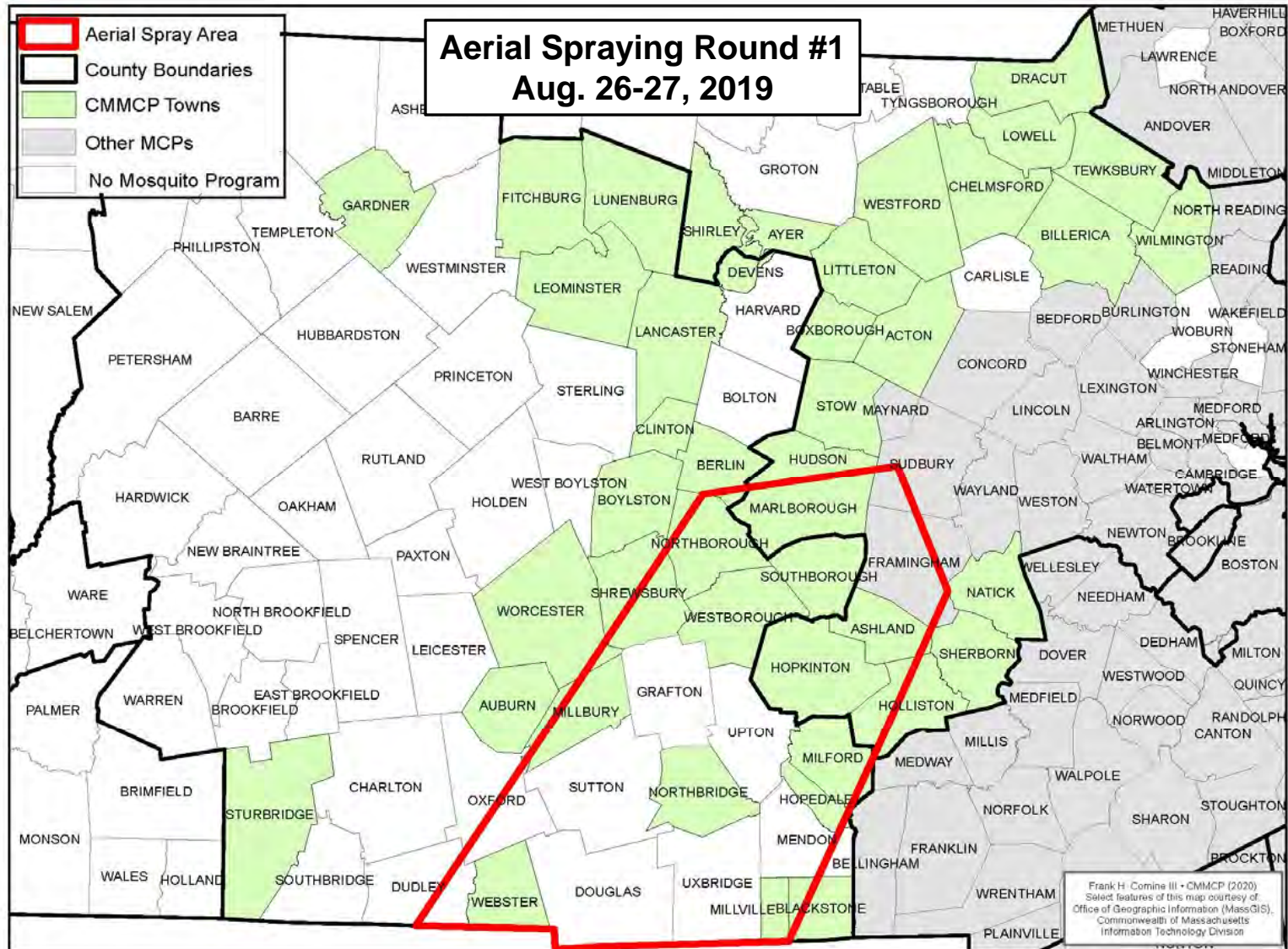
Current EEE Risk Level

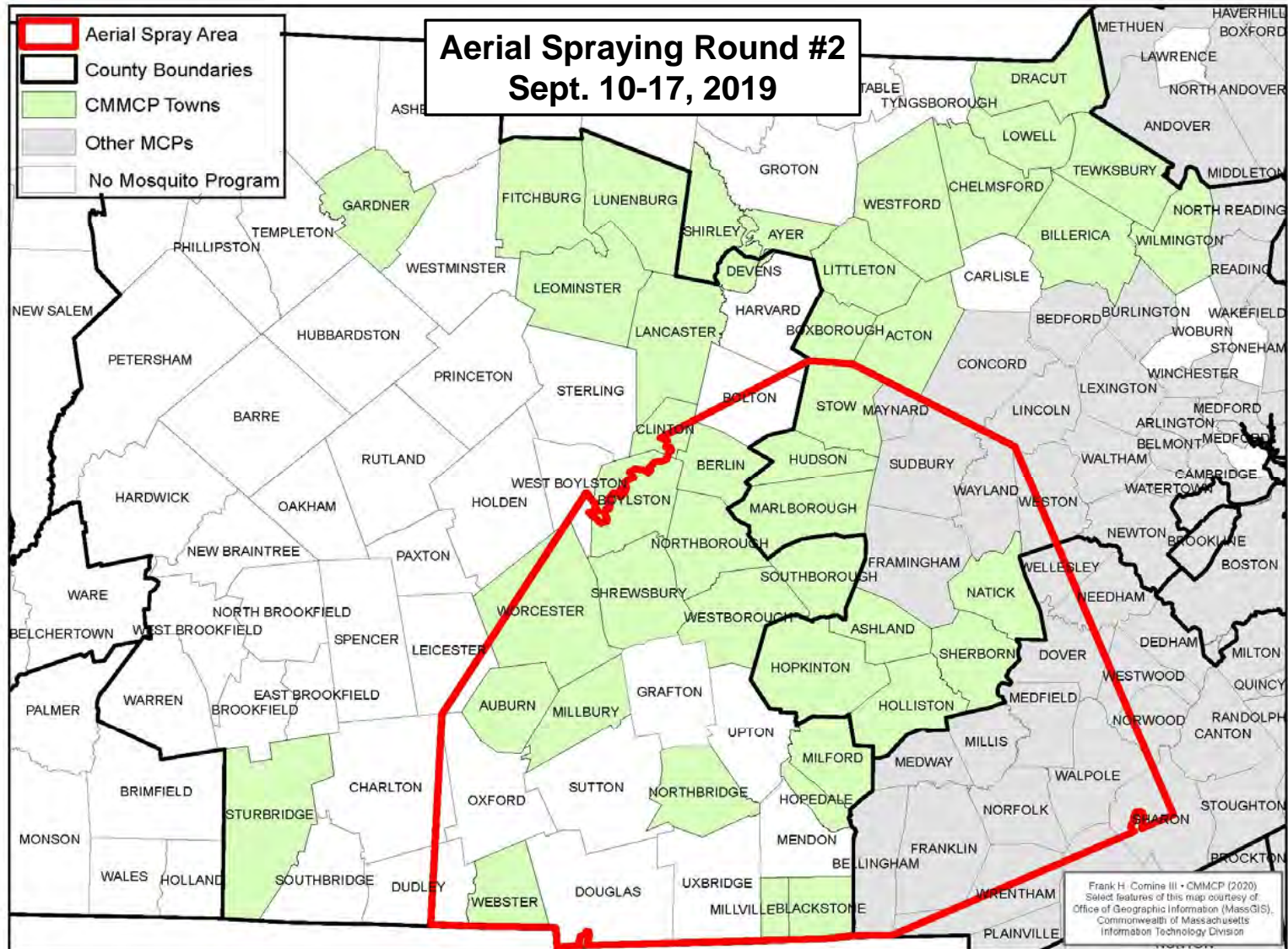
- Remote
- Low
- Moderate
- High
- Critical

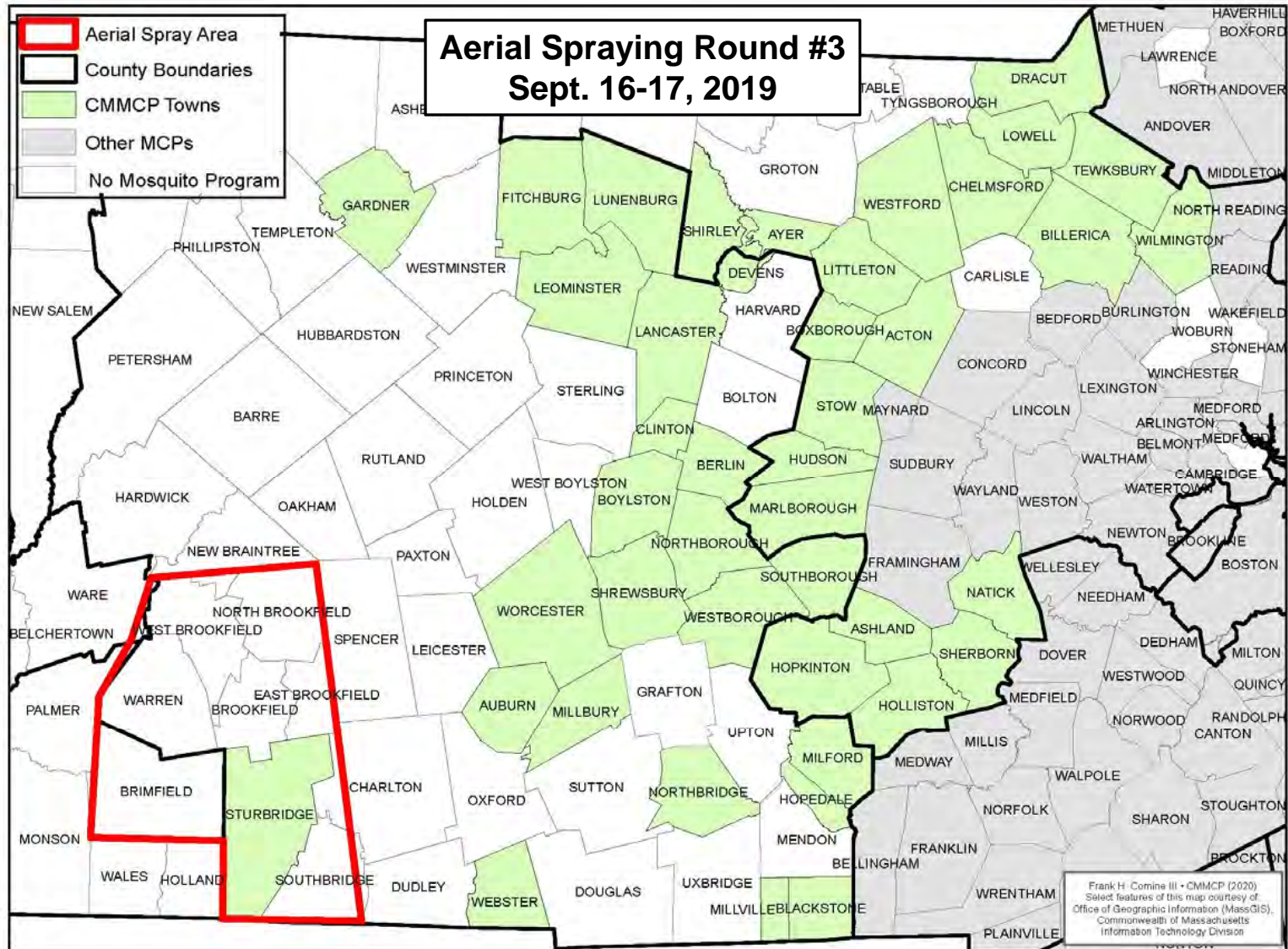
Current Risk Levels – as of October 16, 2019

Massachusetts State Public Health Laboratory
Arbovirus Surveillance Program

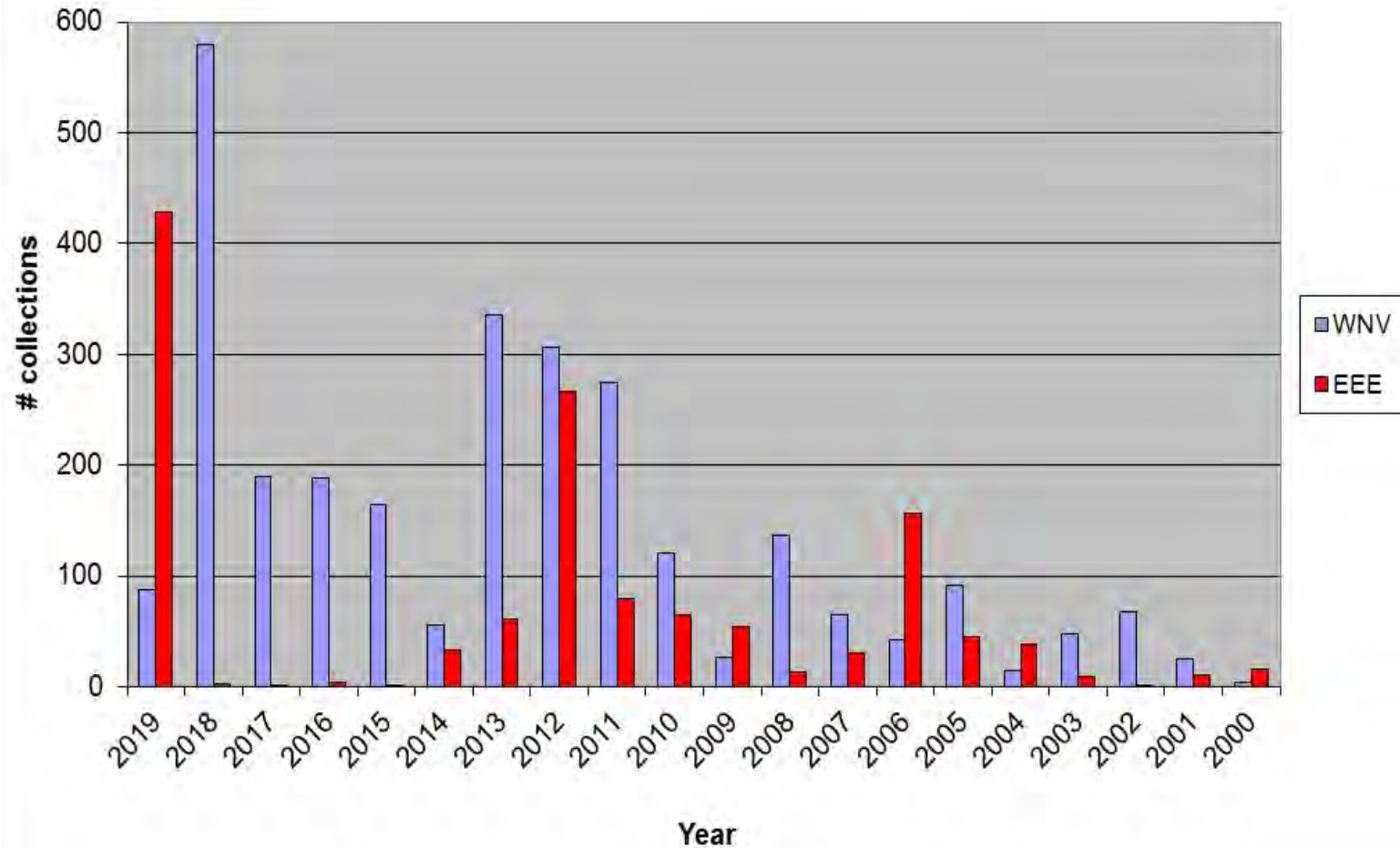
Massachusetts State Public Health Laboratory
Arbovirus Surveillance Program



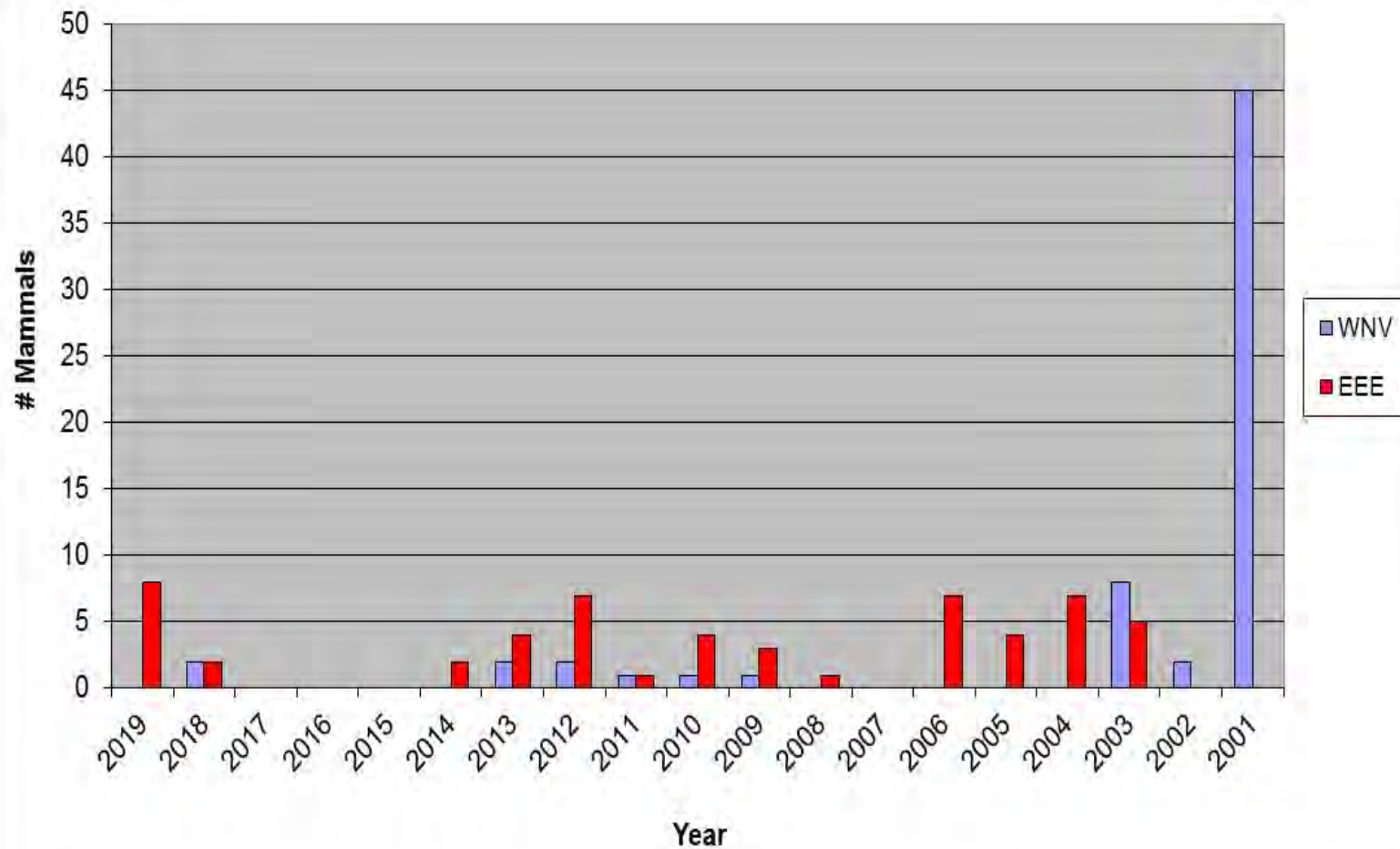




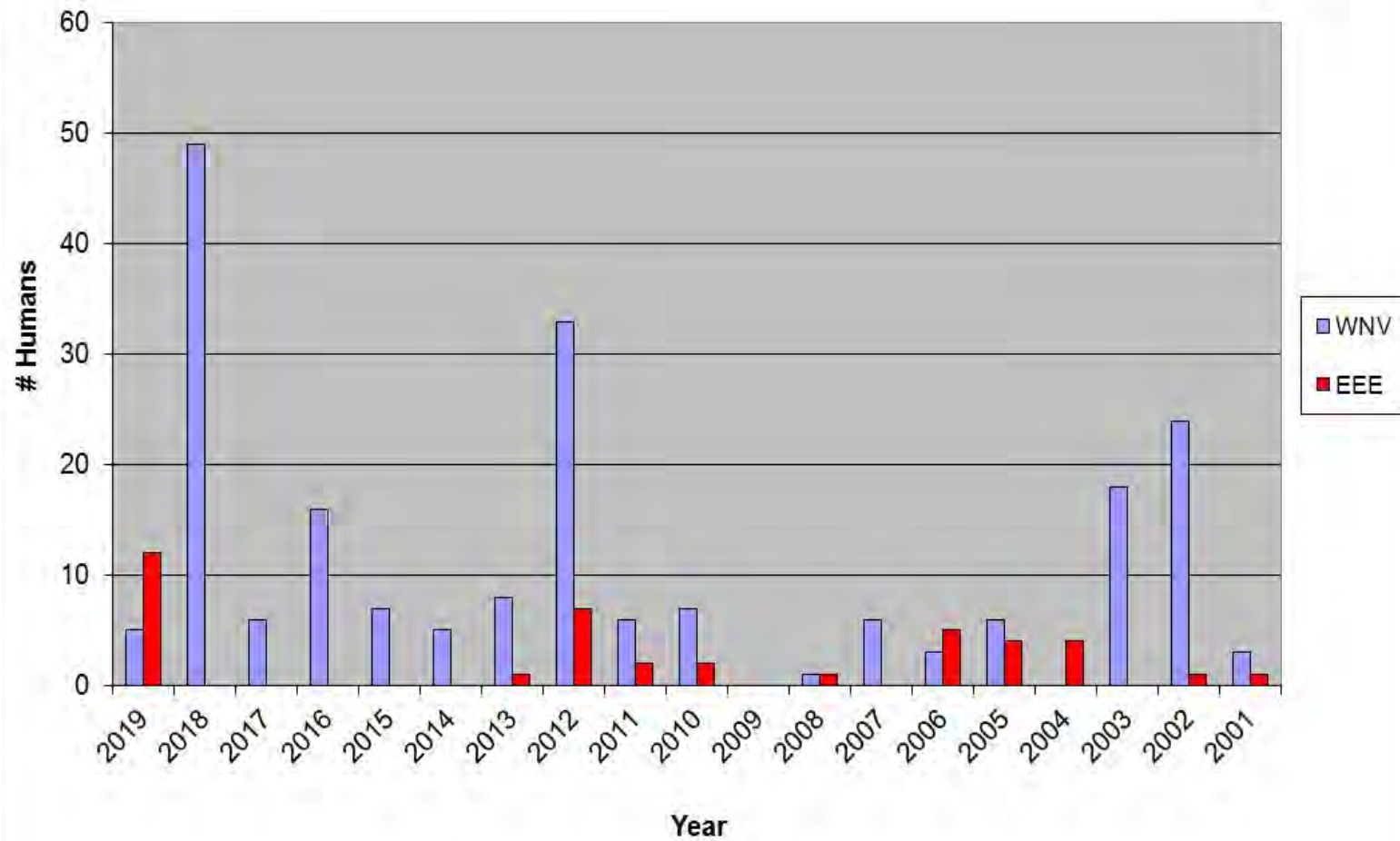
Statewide Mosquito Collections 2000-2019



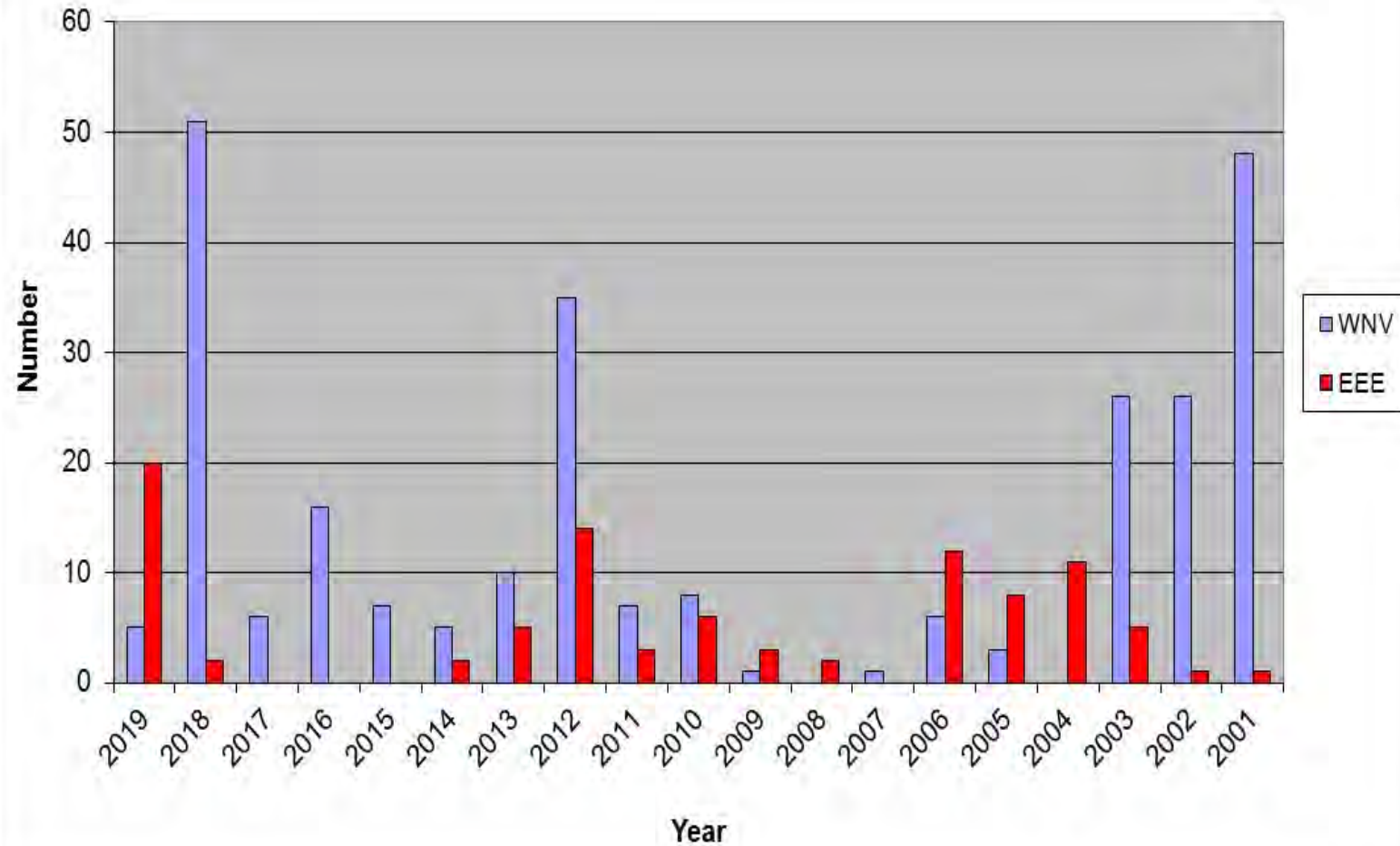
Statewide Mammal Cases 2001-2019



Statewide Human Cases 2000-2019



Mammal & Human Cases Statewide 2001 - 2019



PERSONAL PROTECTION MEASURES



Repellents

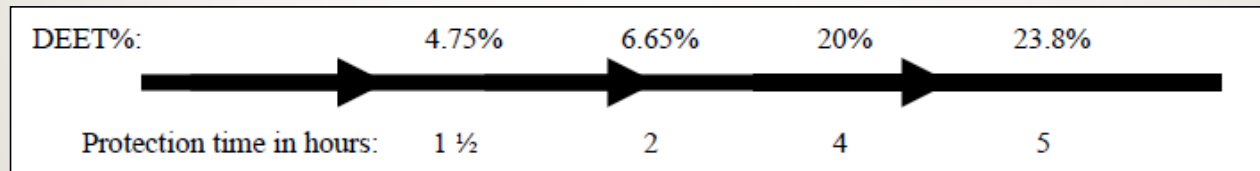
- DEET
- Permethrin*
- Picaridin
- Oil of Lemon Eucalyptus (PMD)

*clothing only



DEET*

- The “Gold Standard” since 1946 (military use – 1957 civilian use)
- **READ THE LABEL** – under 30% recommended for children >2 months
- Not recommended for infants



*N,N-Diethyl-*m*-toluamide



Permethrin

- Contact insecticide
- Intended for use on clothing, bed nets, shoes, camping gear – **NOT ON SKIN**
- Follow label instructions
- Very effective against mosquitoes, ticks & other biting insects

READ THE LABEL



Picaridin & PMD

- Shorter effectiveness (comparable to low concentrations of DEET)
- Newer products, less data available
- Don't use PMD (oil of lemon eucalyptus) on children under 3 years of age

READ THE LABEL



Natural Repellents

- Limited data available of effectiveness and toxicity
- Look for products with an EPA registration number
- Just because it's "natural" doesn't mean it works or is safer than alternatives

READ THE LABEL



Application of Repellents

- Don't use repellents under clothing
- Don't use on cuts or irritated skin
- Don't use repellents near the mouth or eyes and use them sparingly around the ears. When using spray products, spray the product onto your hands first, and then apply it to your face.





Ticks

- Repellents
- Tick checks
- Increase sunlight & wind
- Remove underbrush & leaves
- Information on website:

<http://www.cmmcp.org/tickcontrol.htm>



CONTACT INFORMATION

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