

MOSQUITO CONTROL IN CENTRAL MASSACHUSETTS

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Executive Director

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ORGANIZATION 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



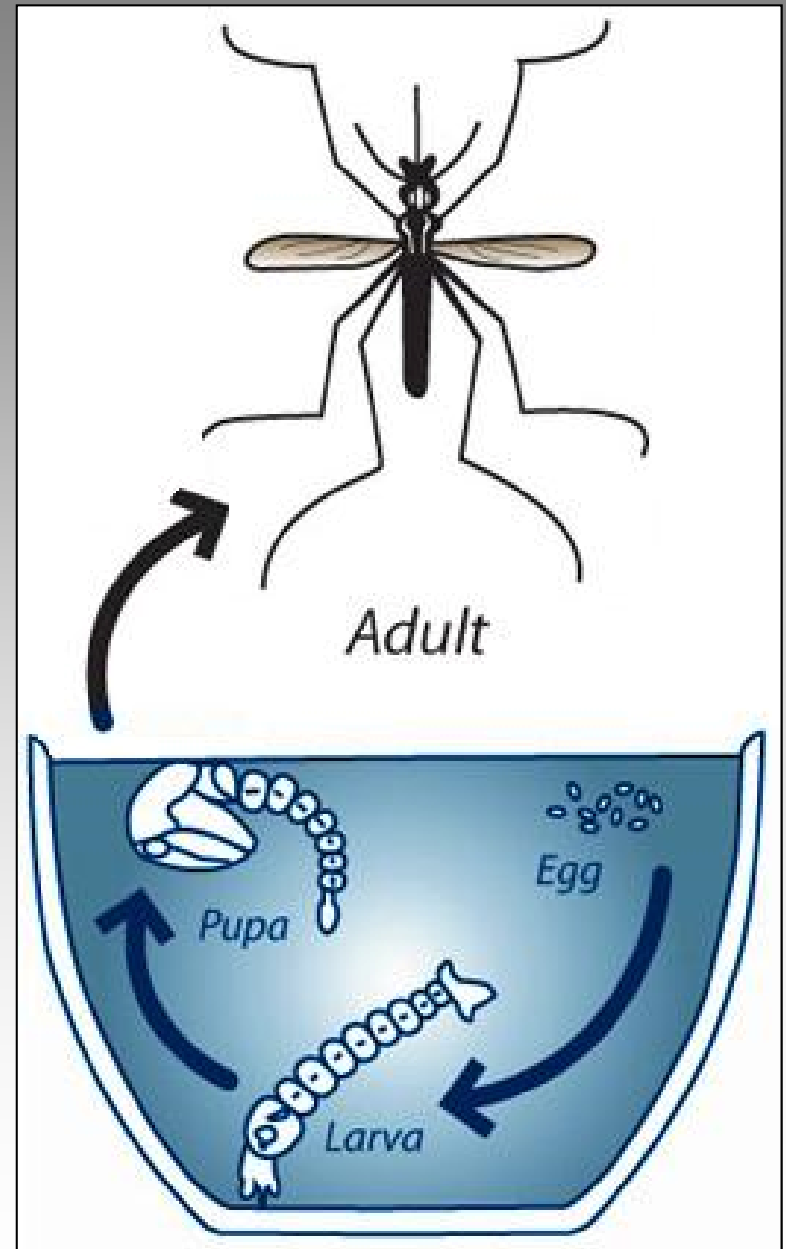
4 stages of development

- Egg
- Larvae
- Pupae
- Adult



First 3 stages are aquatic

- Egg
- Larvae
- Pupae



Mosquito Eggs

- Damp soil
- Containers
- Permanent water
- Emergent vegetation
- 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
- 51 species in Mass.
- Vector of several
diseases in the
Northeast
- Flight range <100 yds.
to 25 miles



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LARVAL MOSQUITO HABITAT IN MASSACHUSETTS



Habitat Types

- Retention/Detention areas
- Woodland pools & Reflood areas
- Cedar/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

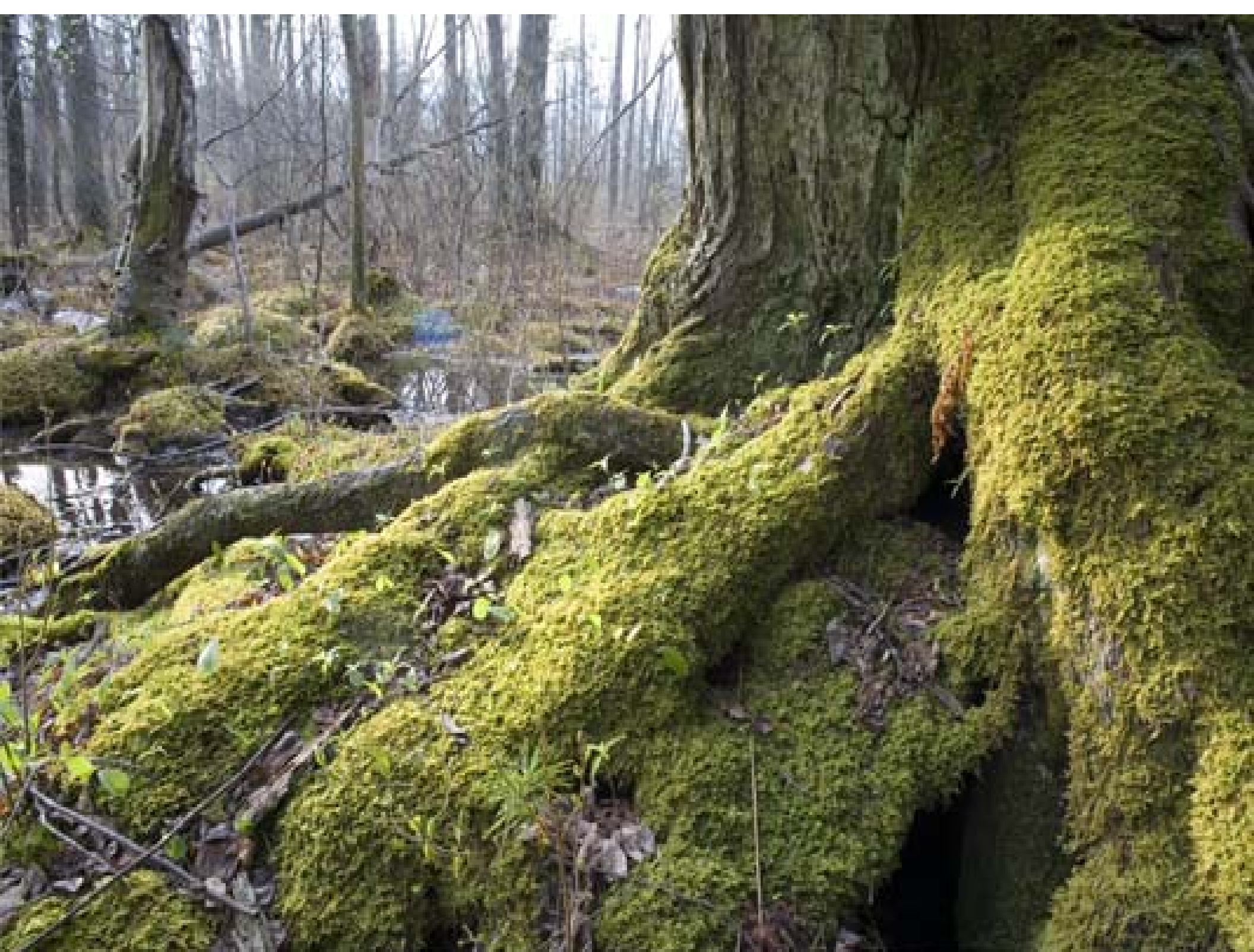




Cedar/Maple swamps

- 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.*



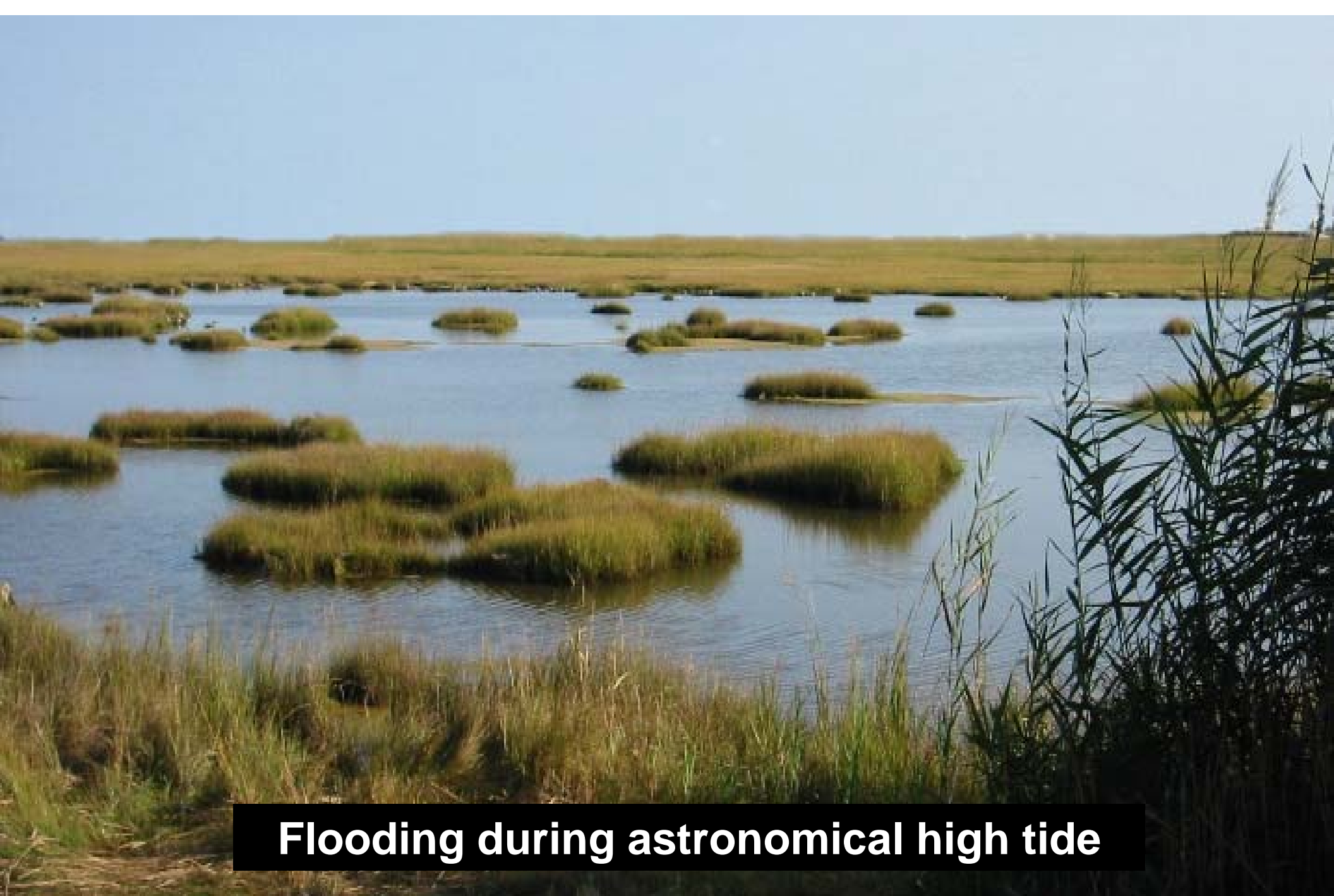




Salt Marsh species

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



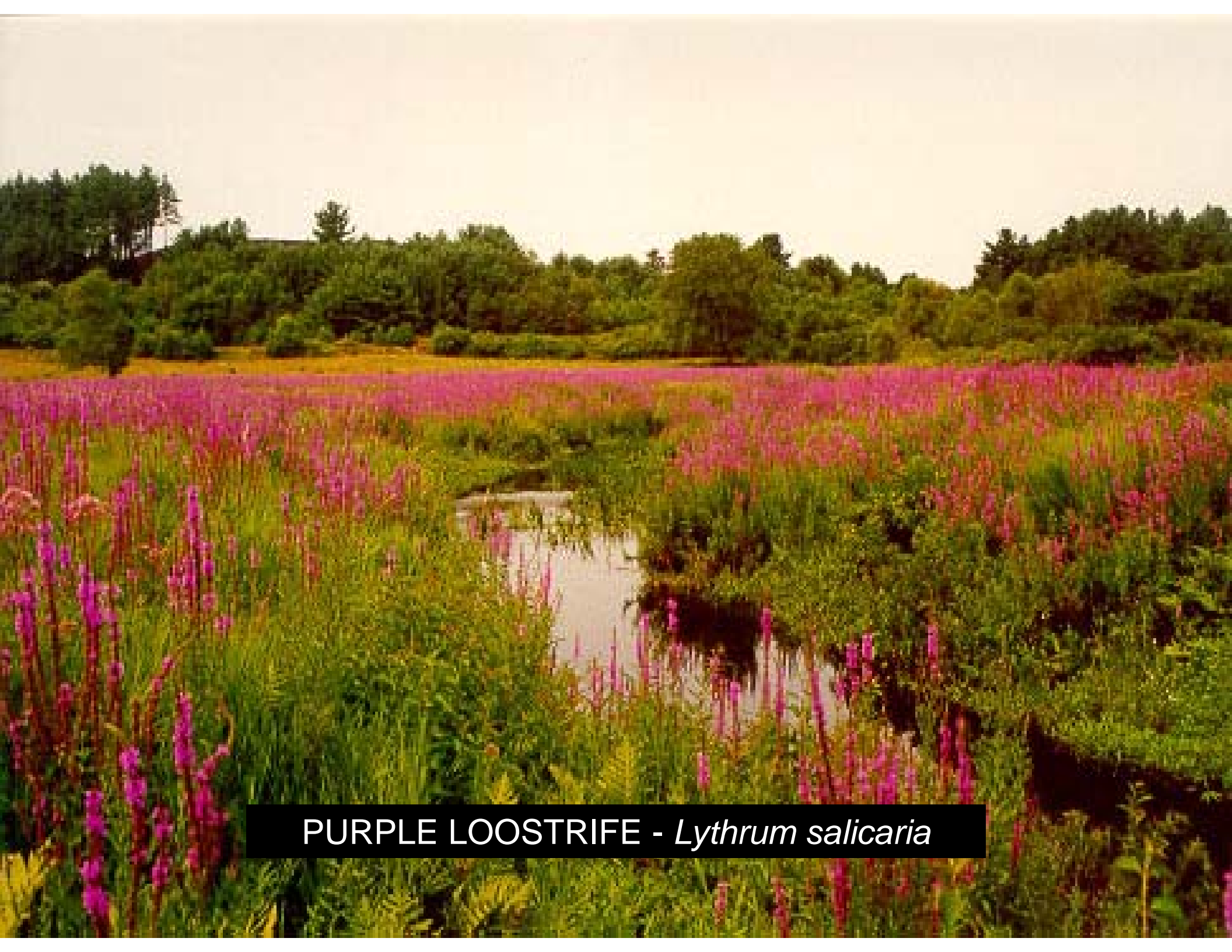


Flooding during astronomical high tide

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*

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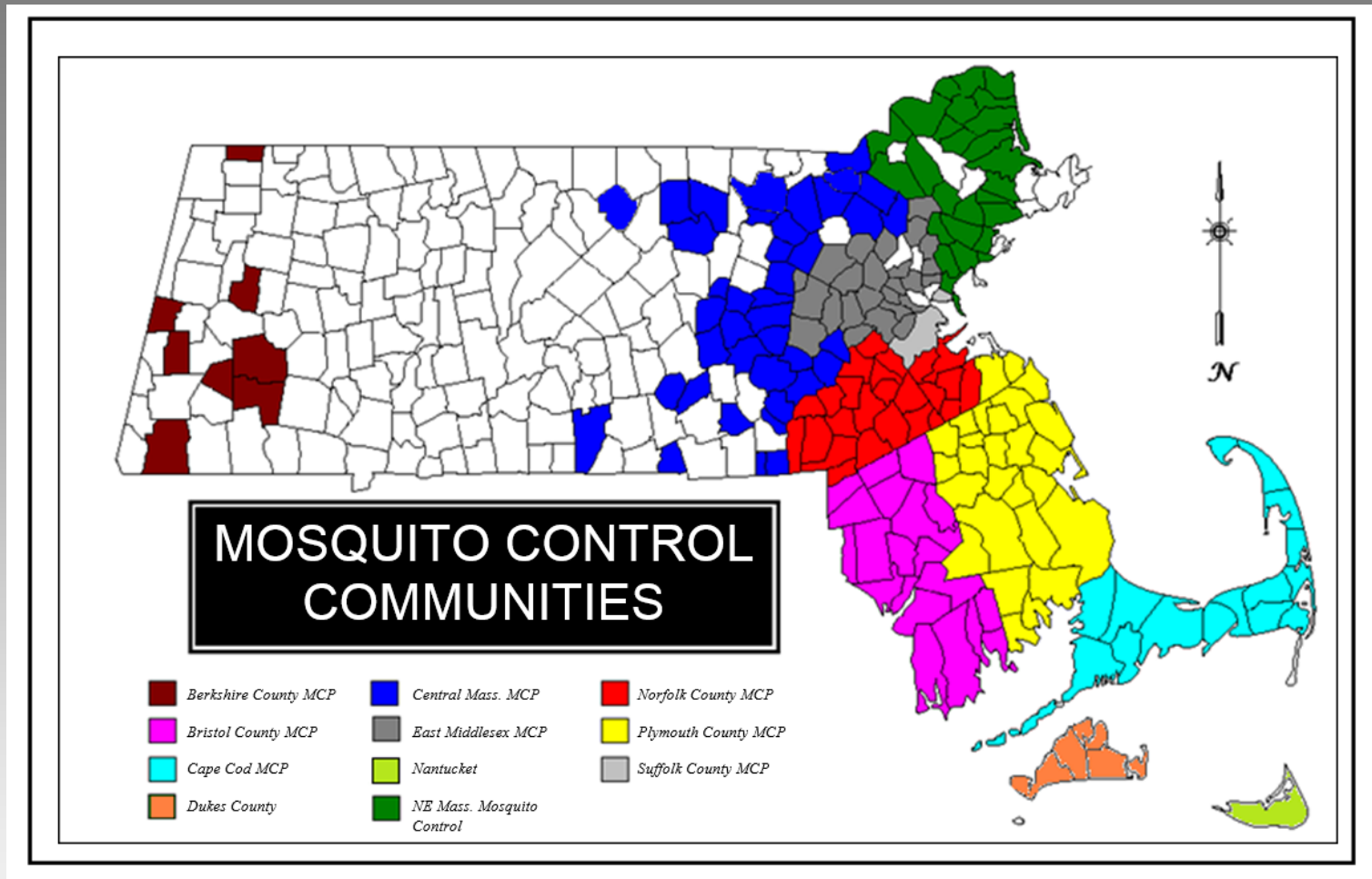
MOSQUITO CONTROL IN MASSACHUSETTS



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

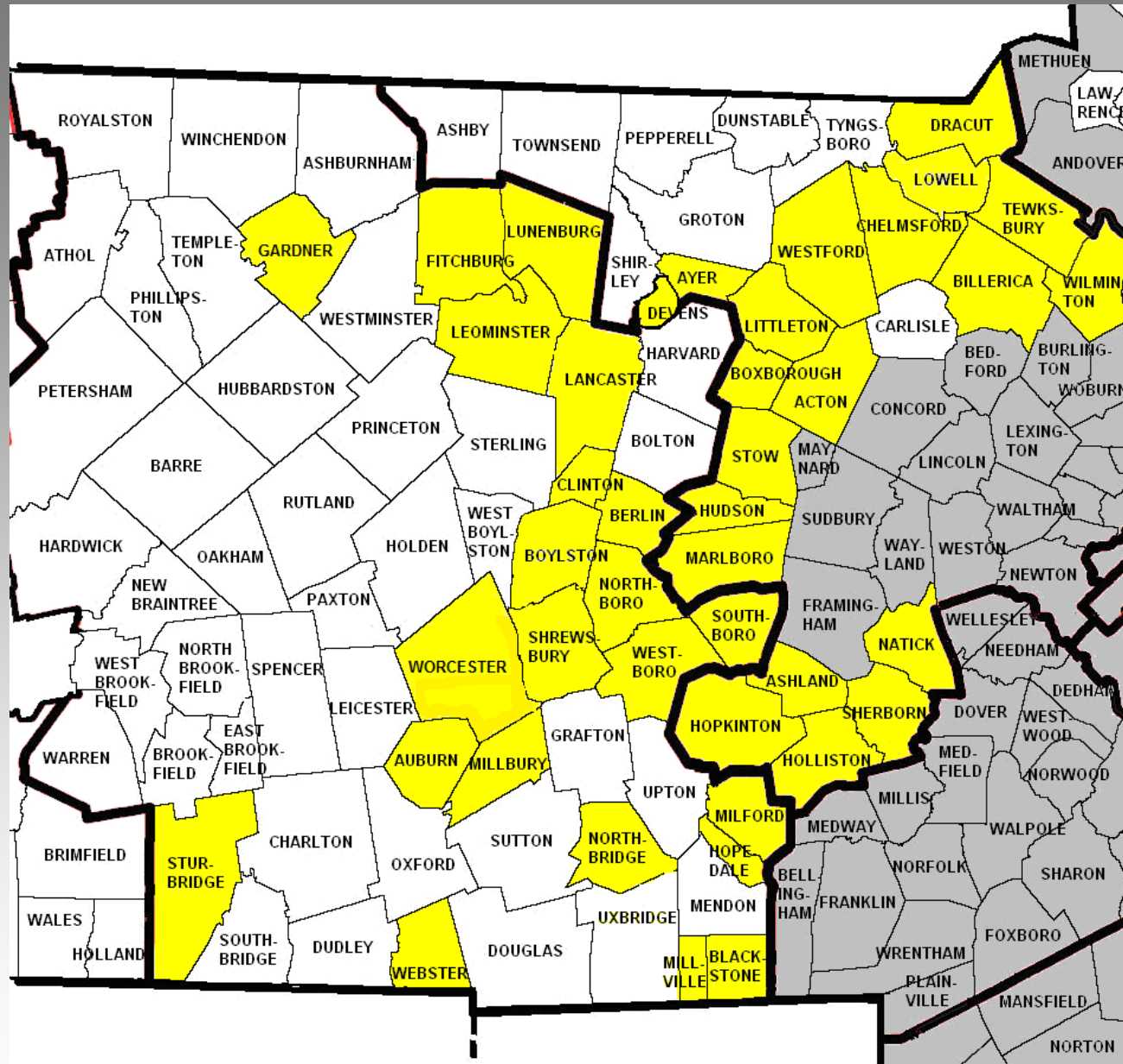




Mosquito Districts in Mass.



LEGEND



CMMCP Service Area 2019



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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

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MOSQUITO SURVEILLANCE



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 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

- 1,964 collections tested (5,264 total)
- 48,900 specimens tested (96,098 total)
- 159 viral isolates in mosquitoes, all WNV
- No EEE detected in 2018



CENTRAL MASS. MOSQUITO CONTROL

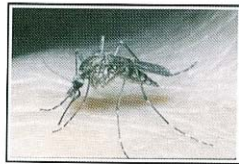
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PUBLIC EDUCATION



Public Education

MOSQUITOES and you!!



CENTRAL MASS MOSQUITO CONTROL PROJECT

111 OTIS STREET
NORTHBOROUGH, MA 01532

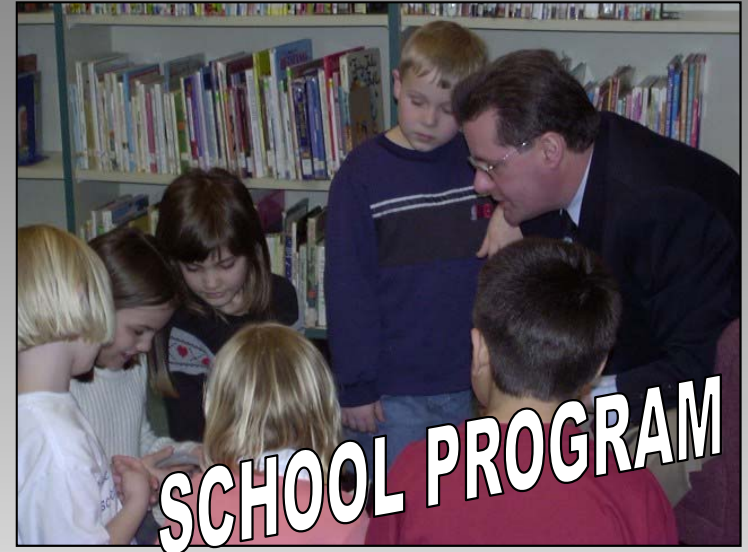
Tel: (508) 393-3055
Fax: (508) 393-8492

for additional information, please
access our website at

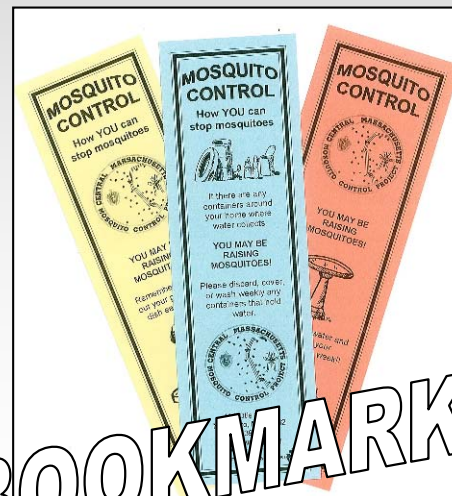
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BROCHURE



SCHOOL PROGRAM



BOOKMARKS



Public Education

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twitter

You Tube

f Find us on
Facebook

SOCIAL MEDIA



SENIOR PROGRAM



SCHOOL PROGRAM

Year	# students	# presentations
2018	2,558	64

TOTAL OUTREACH 2018

**64 presentations
to 2,558 people**

SENIOR PROGRAM

Year	# seniors	# presentations
2018	45	3

PUBLIC PRESENTATIONS

Year	# people	# presentations
2018	650	5





Central Mass. Mosquito Control Project

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FAQs

Contact Us

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...

+ VIEW ALL



Service Request



Prevention Tips



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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CMMCP website – www.cmmcp.org



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

**Our educational programs were recognized in 2013 by the
Secretary of EOEEA**

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DITCH MAINTENANCE



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)

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LARVAL MOSQUITO CONTROL



Larval Control Products

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



Aerial Larval Control*

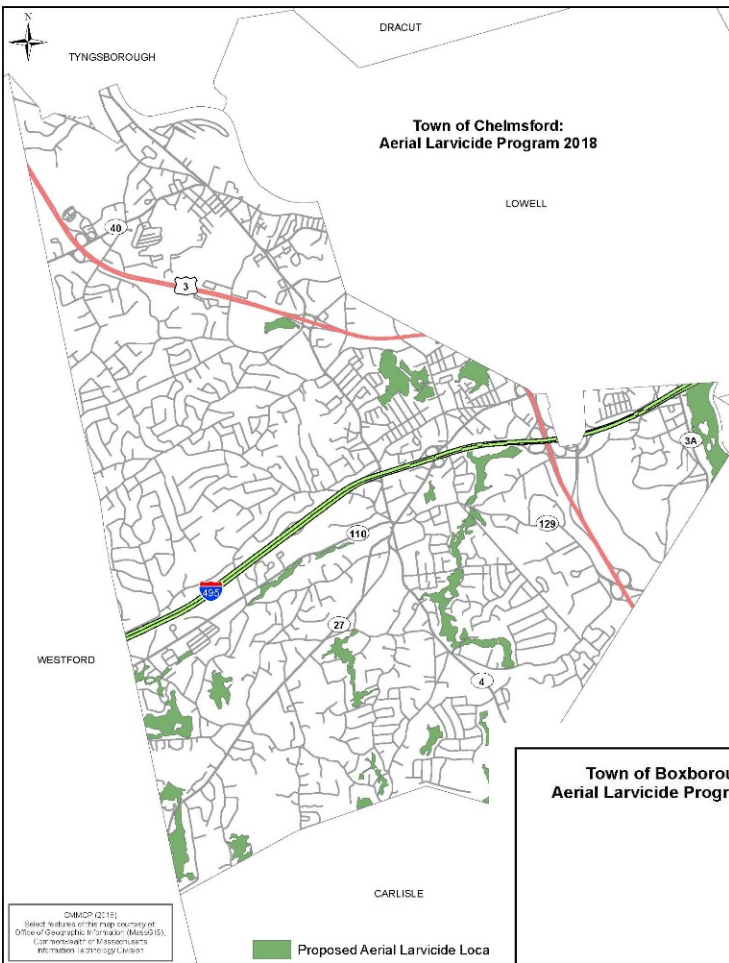


***NOTE:** this is the only program that is done with supplemental funding provided by member communities.

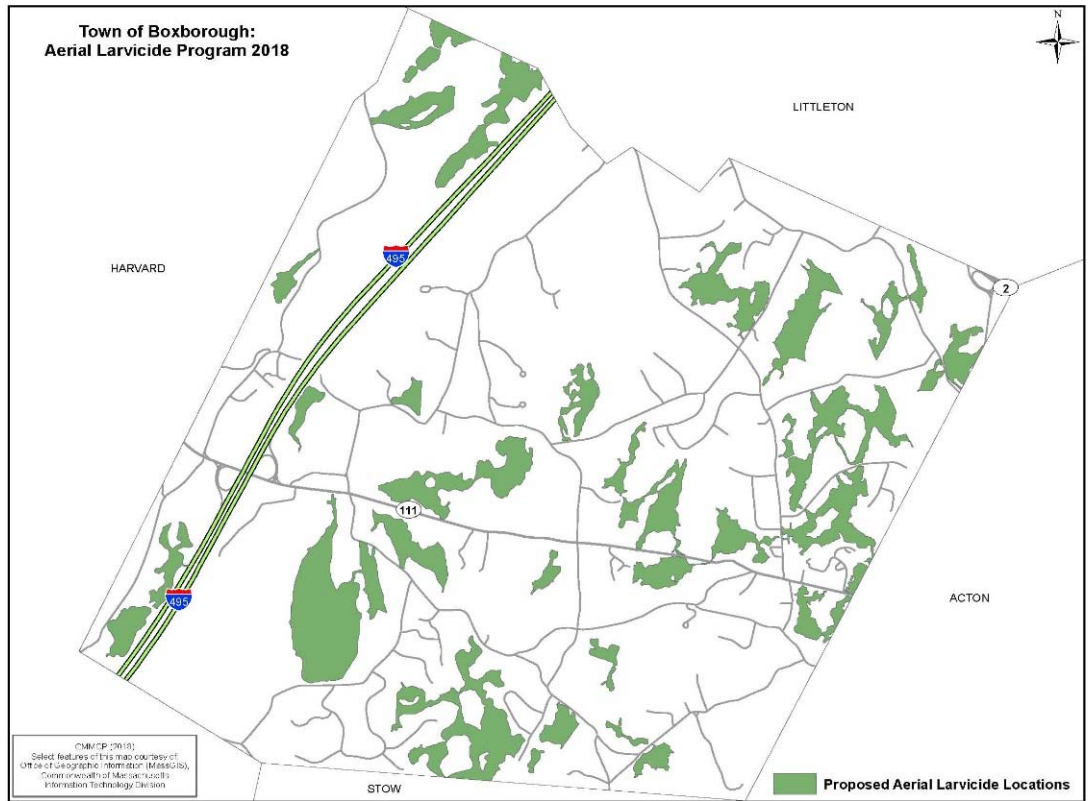
Aerial Larval Control (cont.)

- 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





2018 aerial maps



1 Aerial Larvicide Locations

Table 1: Larval Surveillance of Treatment and Control RDS

Treatment Sites	Pre-application	Post-application	Observed Change
BIL116	84	13	-84.52%
BIL112	81	8	-90.12%
BIL408	77	36	-53.25%
BOX44	27	0	-100.00%
BOX116	33	8	-75.76%
BOX77	37	2	-94.59%
BOX55	30	1	-96.67%
CHM82	25	4	-84.00%
CHM279	27	2	-92.59%
CHM236	36	8	-77.78%
Overall:	457	82	-82.06%
Control Sites	Pre-application	Post-application	Observed Change
BIL227	62	16	-74.19%
BOX103	30	26	-13.33%
CHM146	55	56	1.82%
Overall:	147	98	-33.33%

Figure 1: Billerica Treatment RDS Pre and Post Application

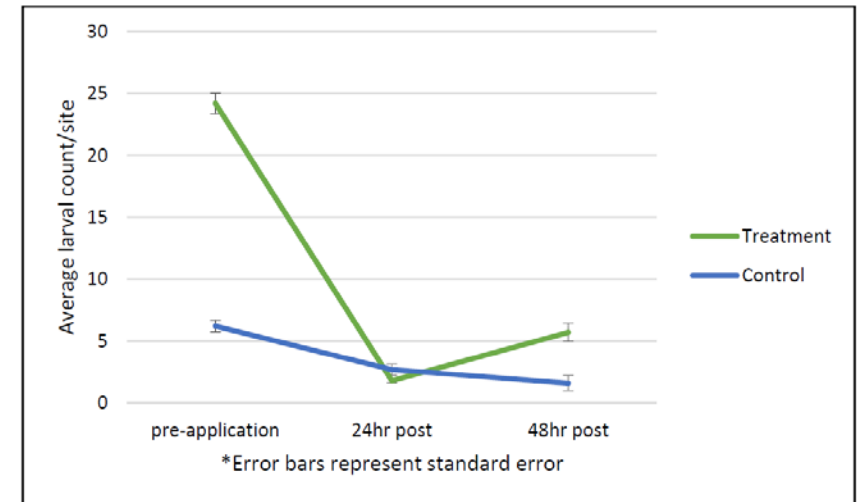


Figure 2: Chelmsford treatment RDS Pre and Post Application

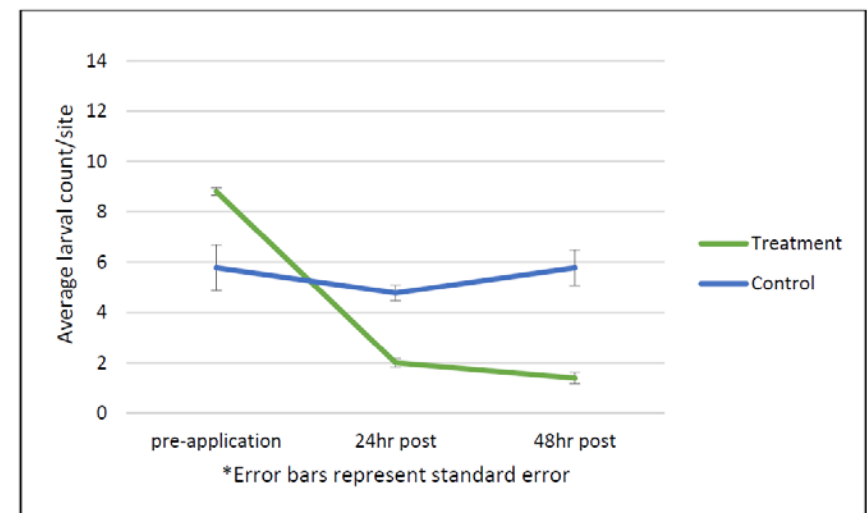
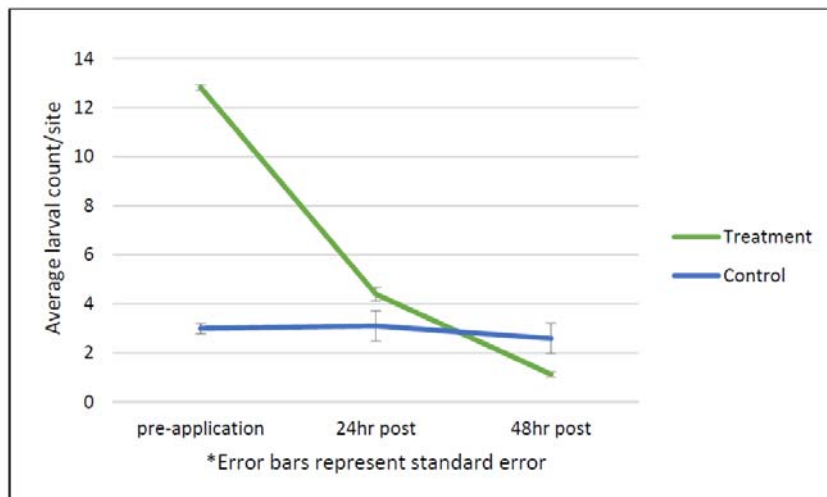


Figure 3: Boxborough Treatment RDS Pre and Post Application



2018 aerial results

Bti granules



Altosid® pellets

SOURCE REDUCTION



Source Reduction

- Program began in 2010
- Operates off initial grant, now in operating budget
- 28,743 tires recycled to date in 39 member cities & towns

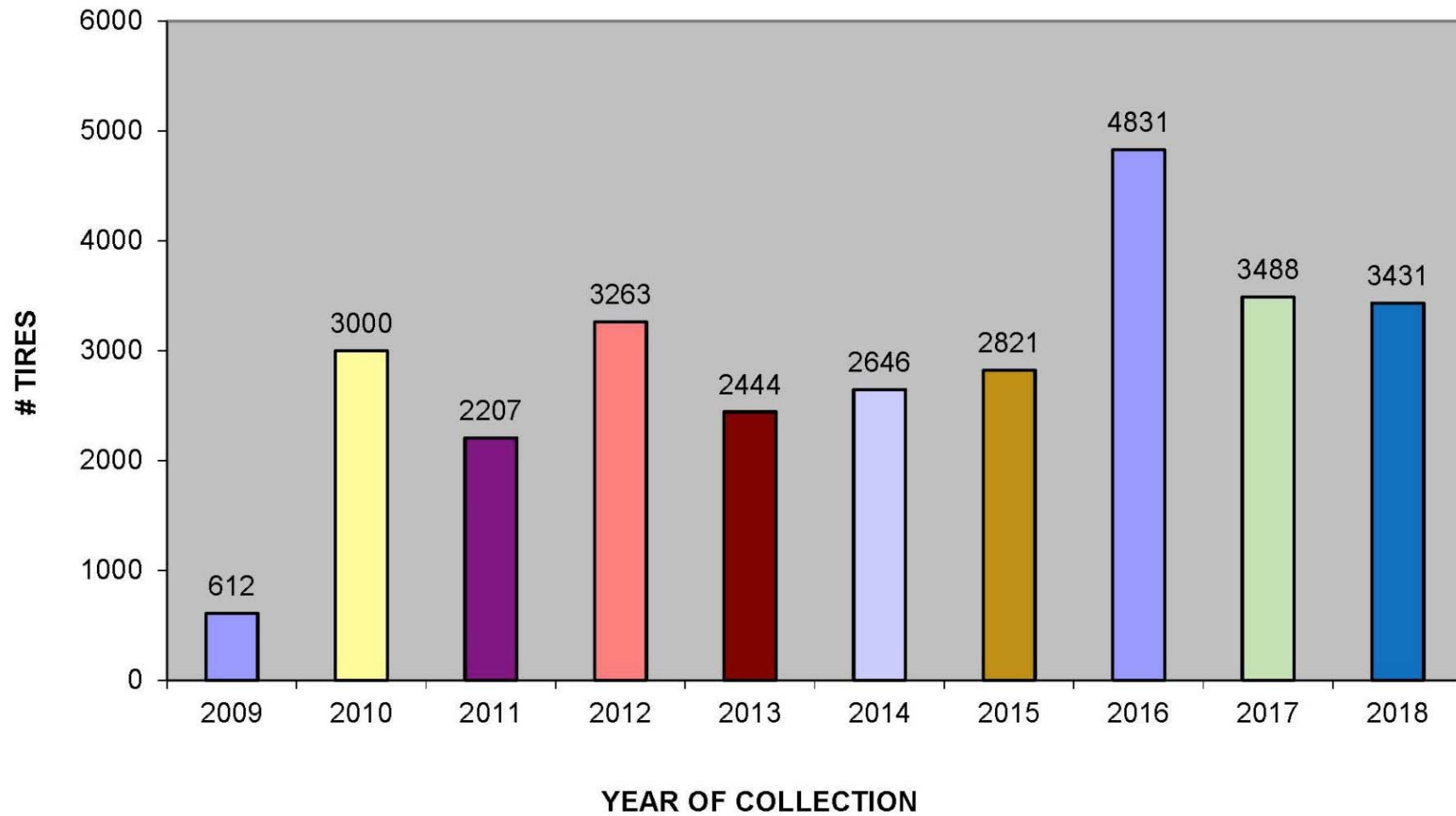
Tires in the environment are the preferred larval habitat of several species of mosquitoes, some that transmit West Nile Virus



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

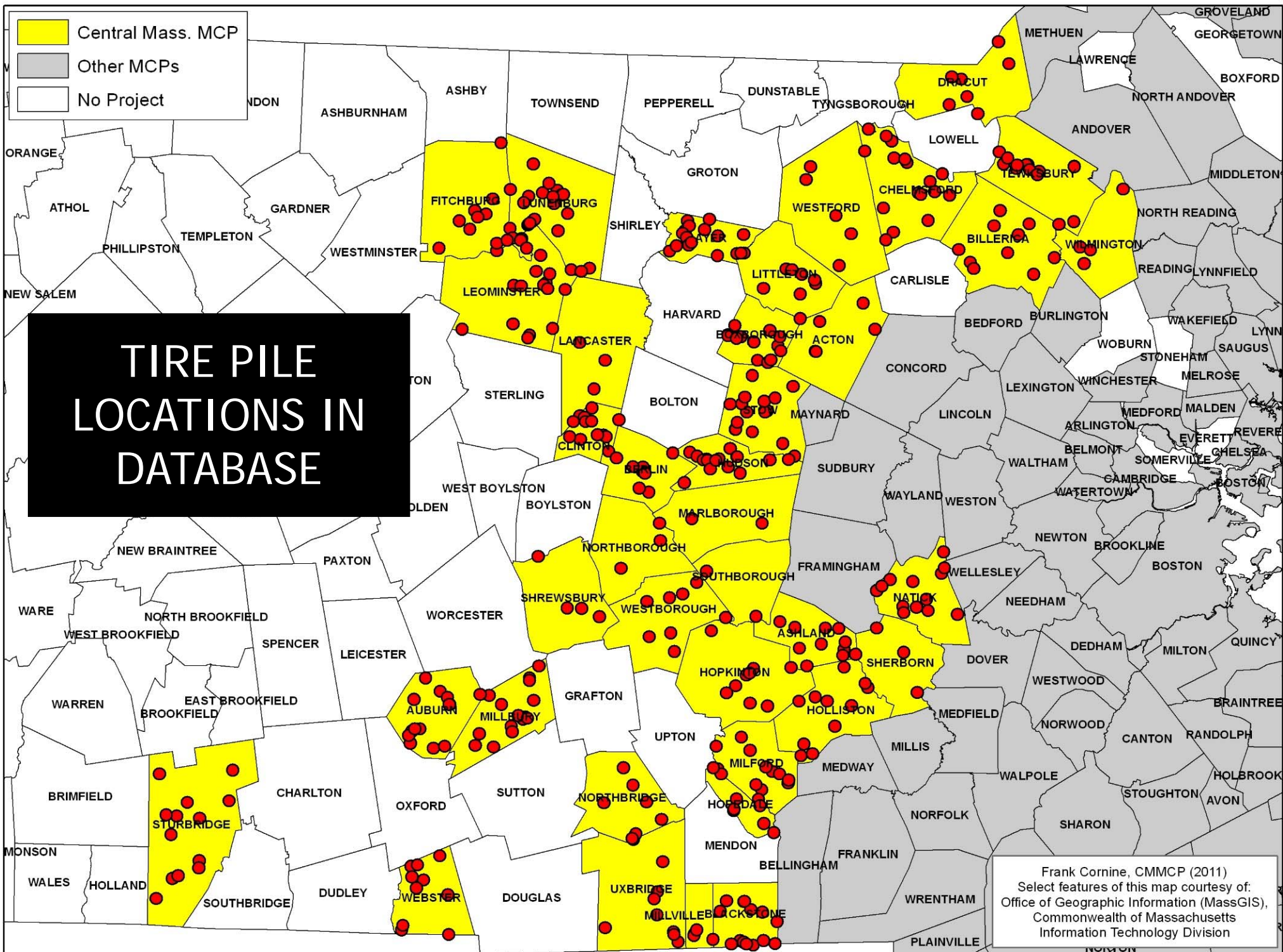


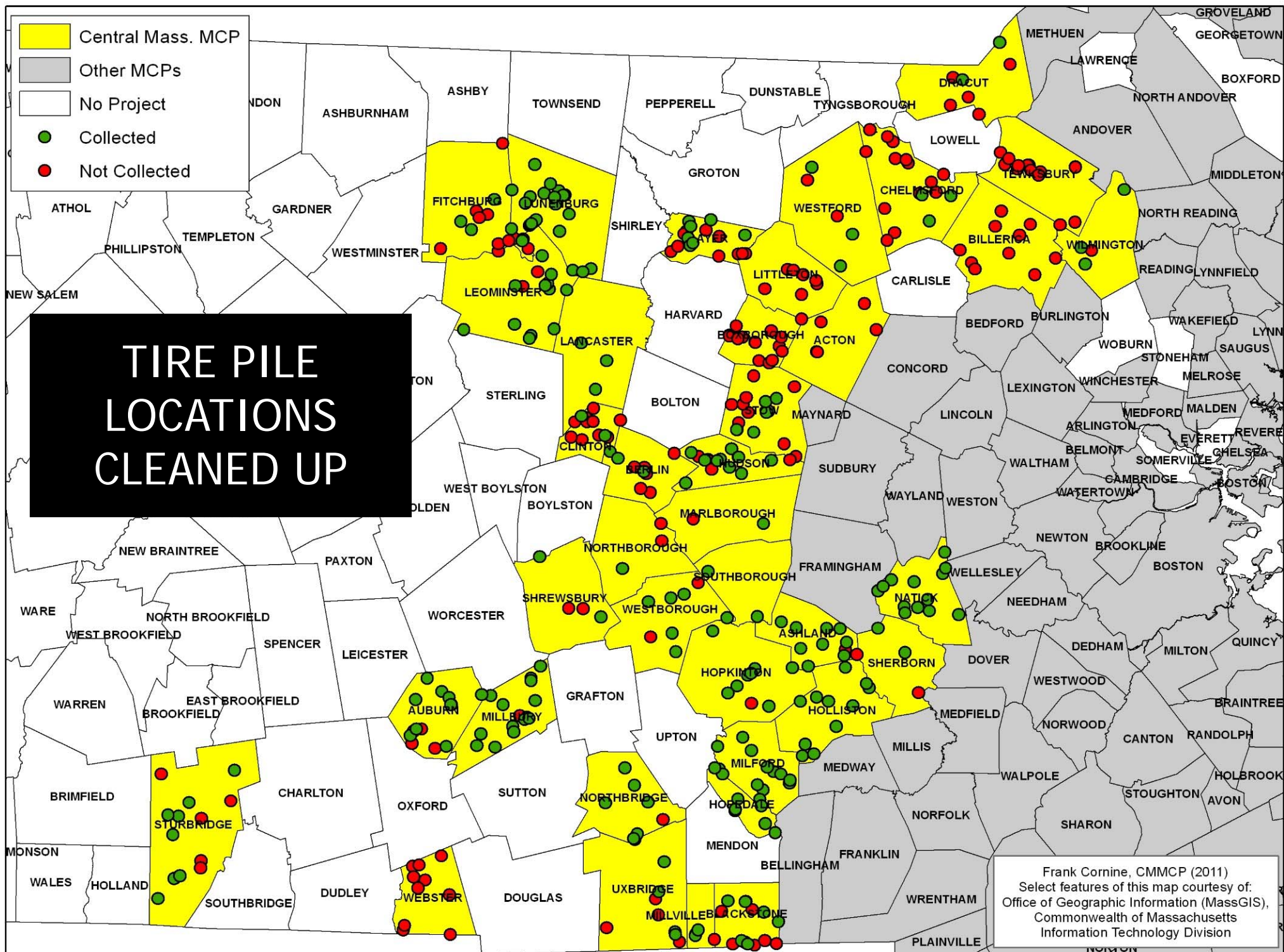
ASHLAND, MA

0 tires

AFTER









Our tire program was recognized in 2011 by MassRecycle

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



Our tire program was recognized again in 2017 by the EPA

BEAVER MITIGATION

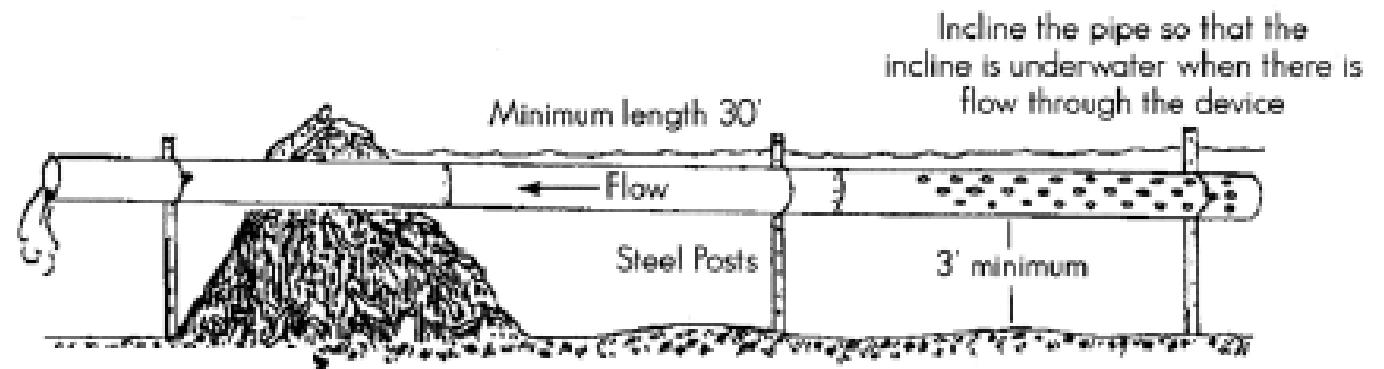


Beaver Mitigation

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

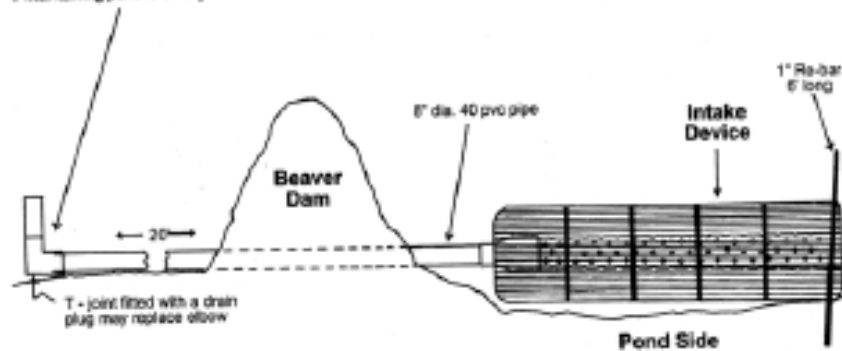


Pond Drain Pipe



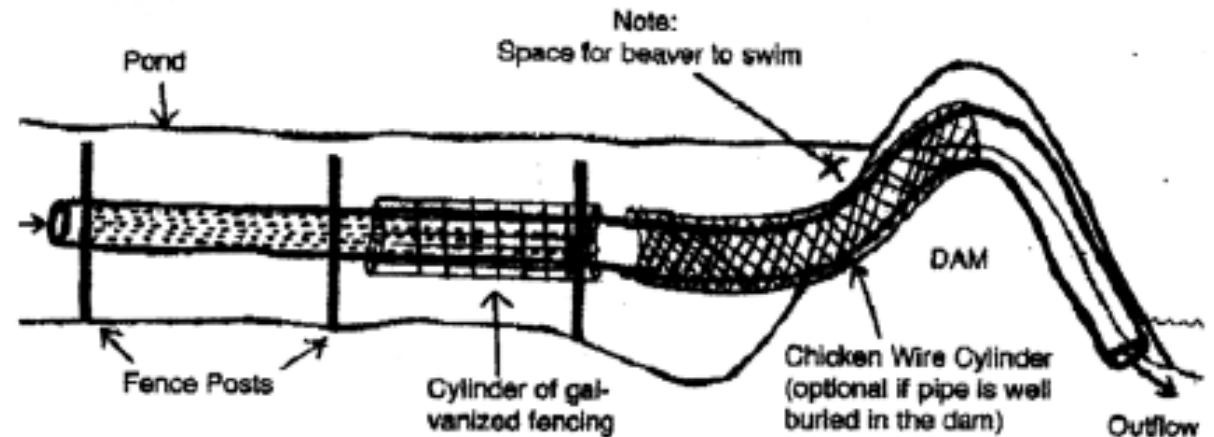
The Clemson Beaver Pond Leveler

Elbow and stand pipe are optional.
Needed only to manage water level
if maintaining pond is an objective



WLCD EXAMPLES

PVWV Flexible Leveler





HOLLISTON, MA – Upper Charles River watershed



HOLLISTON, MA – Upper Charles River watershed



HOLLISTON, MA – Upper Charles River watershed

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ADULT MOSQUITO CONTROL



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		4.50	5
	1.5	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 (PBO)	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



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.*
- 33 landing rates in 2018** (9 with no application 27%)

*from the Mass. Mosquito Generic Environmental Impact Report

** Landing rates are suspended after confirmation of virus in late June.



RESEARCH & EFFICACY



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 7 years, no resistance noted in area



Equipment used as part of the resistance management study

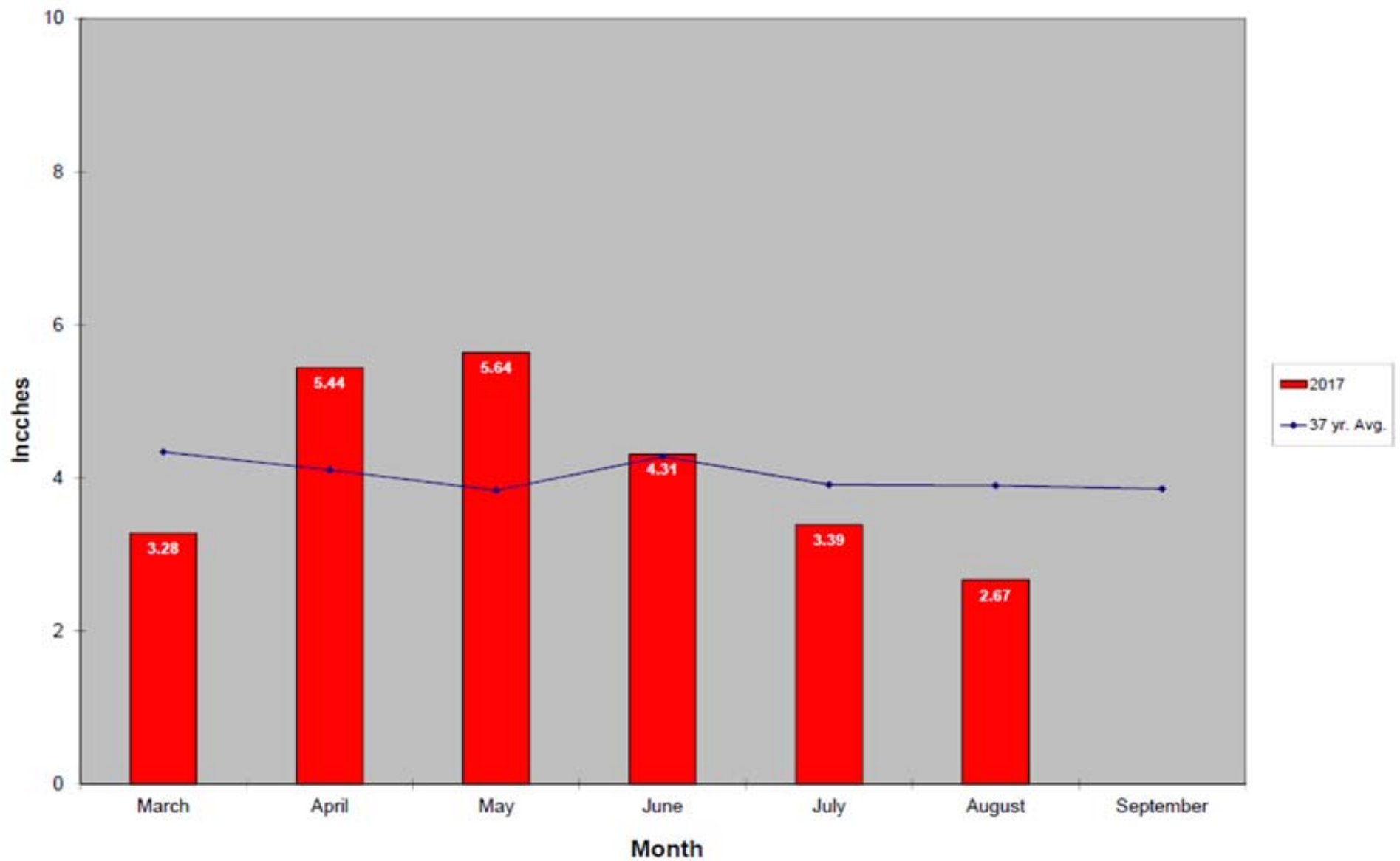
Rotator light traps used in the adulticide efficacy study & host seeking activity study



CMMCP weather station to monitor wind, rain & temperatures

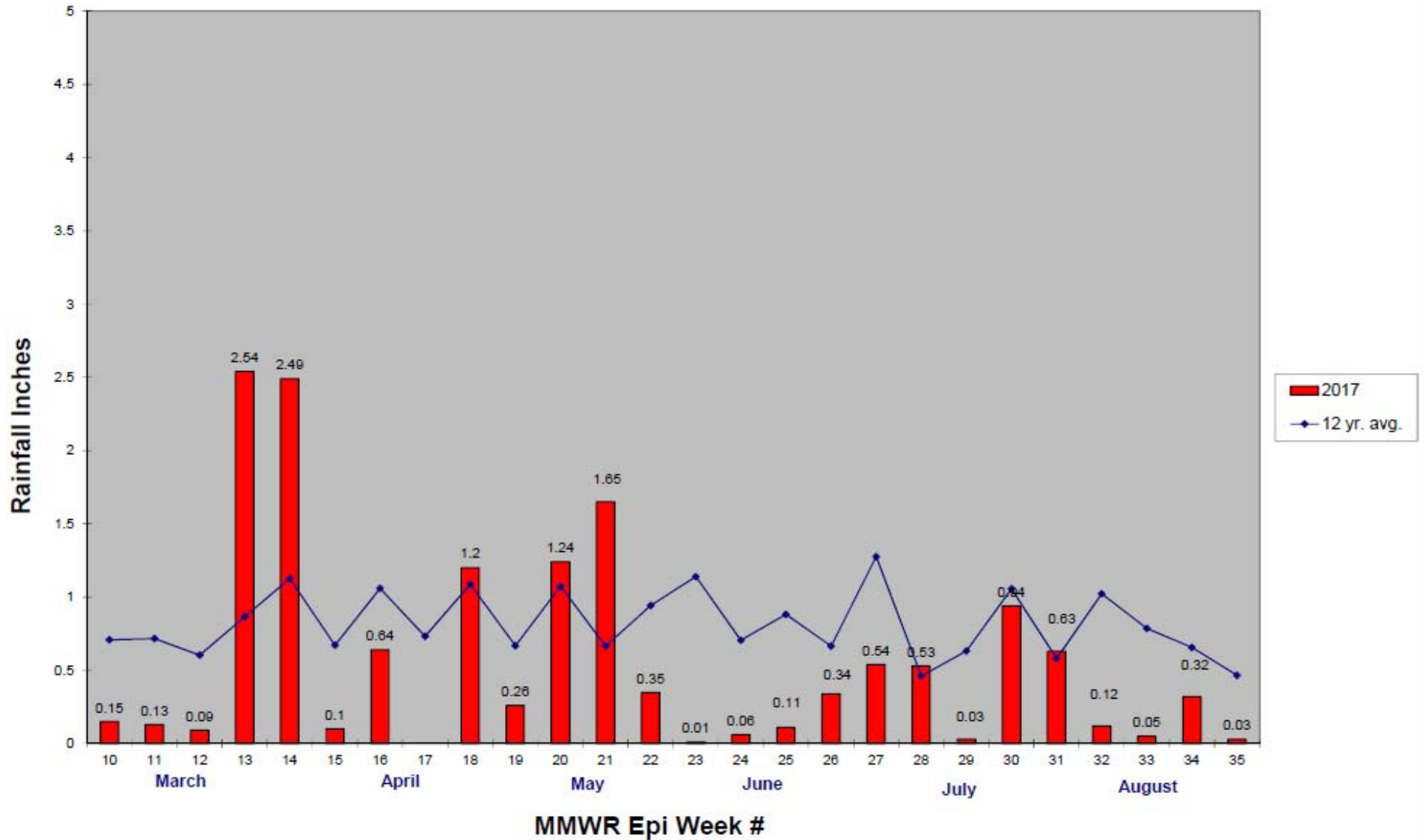


2017 Mass. Rainfall Data vs. 37 Year Average*



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

2017 CMMCP Weekly Rainfall vs. 12 Year Average*



*source: CMMCP weather station Northborough, MA

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MOSQUITO-BORNE DISEASES IN MASS.



ARBOVIRUS TRANSMISSION CYCLE



MOSQUITO (VECTOR)



INCIDENTAL
INFECTIONS



BIRD (RESERVOIR)

AMPLIFICATION

AMPLIFICATION



“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.

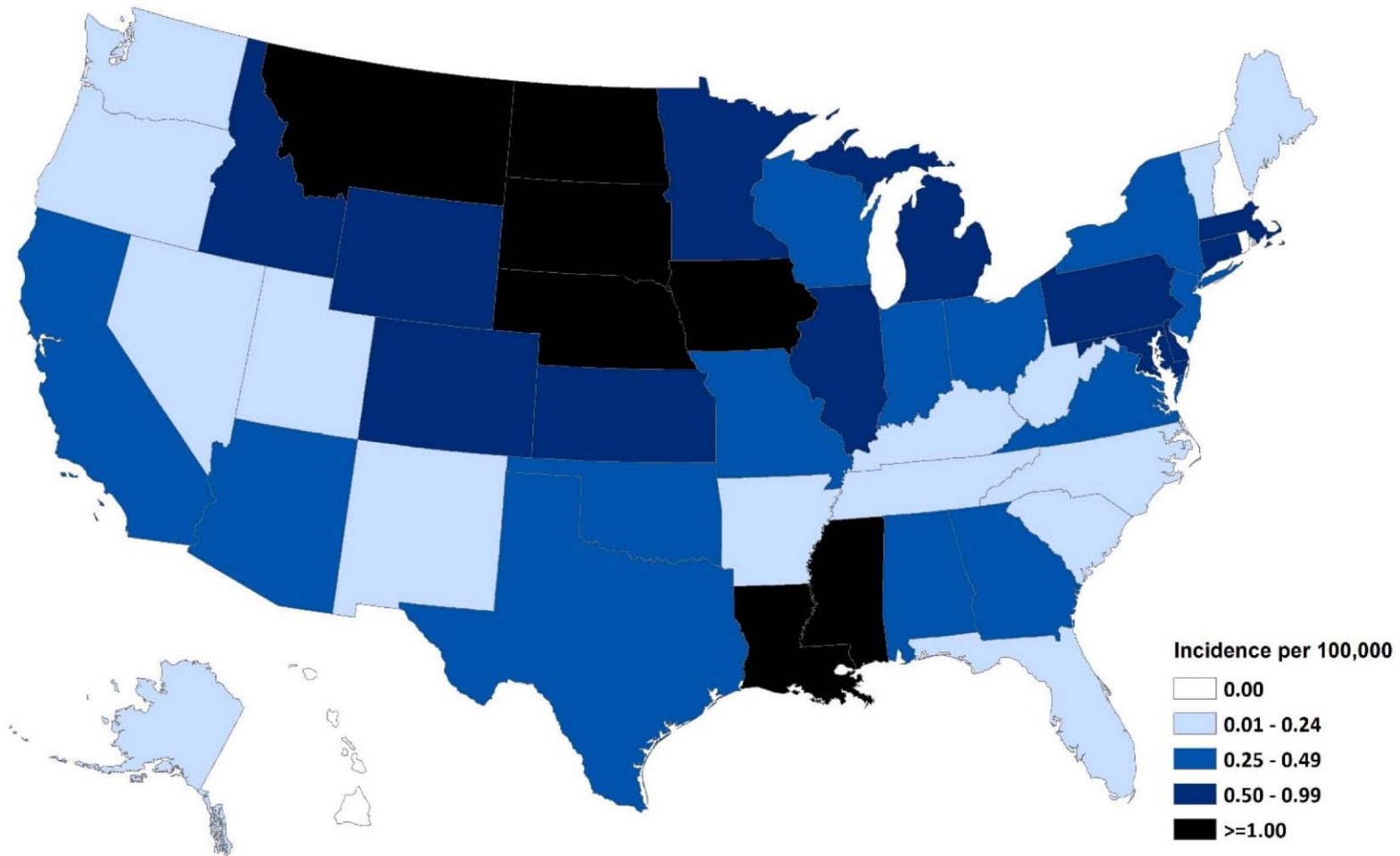
West Nile Virus

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



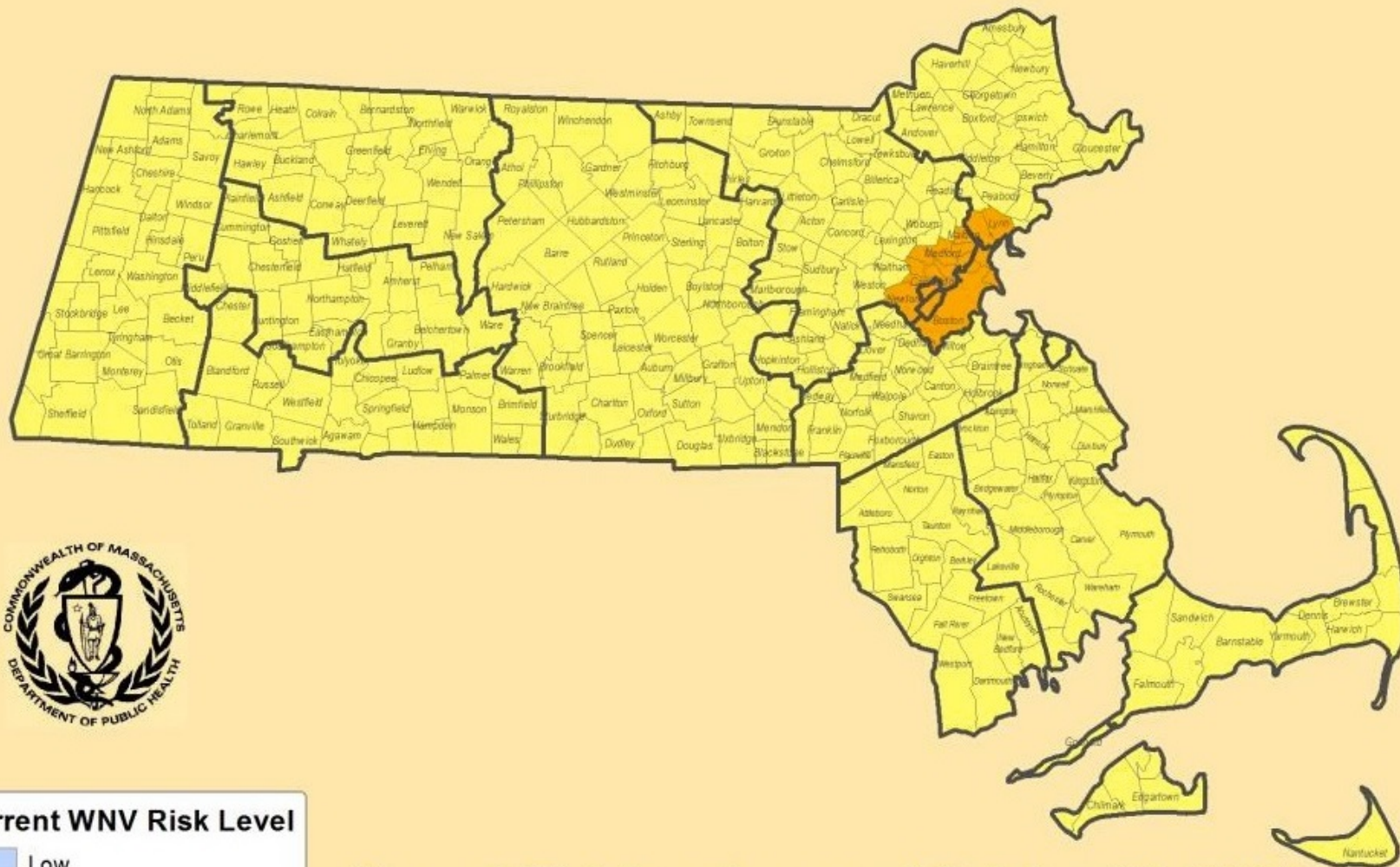
2018 WNV - Nationwide

West Nile virus neuroinvasive disease incidence reported to ArboNET, by state, United States, 2018

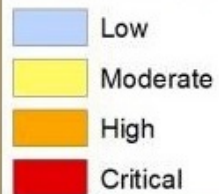


**2,647 human cases reported – 49 in Mass.
167 deaths nationwide – 2 in Mass.**

Massachusetts WNV Risk Categories



Current WNV Risk Level



Current Risk Levels – as of October 01, 2018

MA WNV Surveillance Summary 2018

Mosquito Pools Positive	579
Horses Positive	1
Humans Positive	29

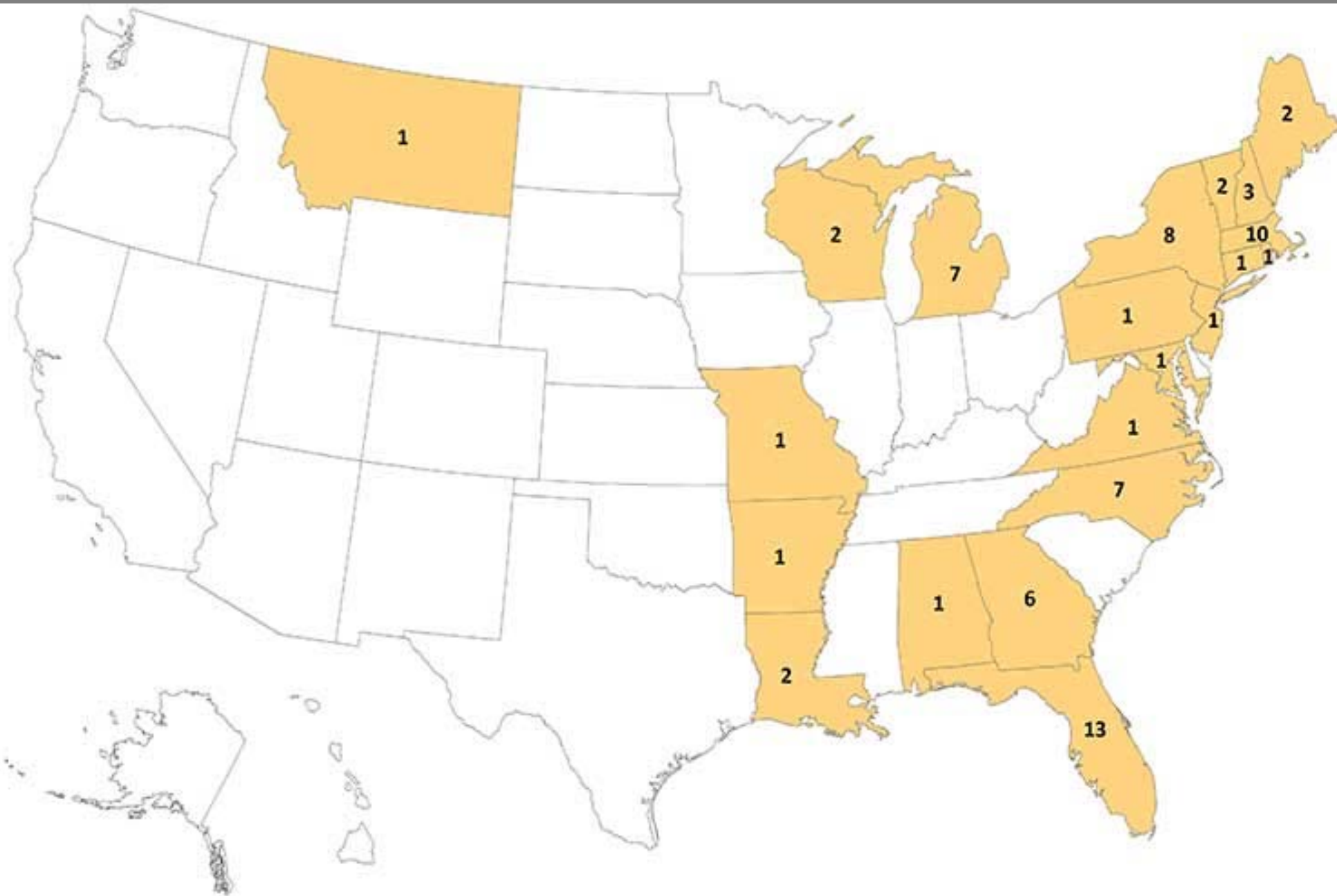


Eastern Equine Encephalitis

- 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

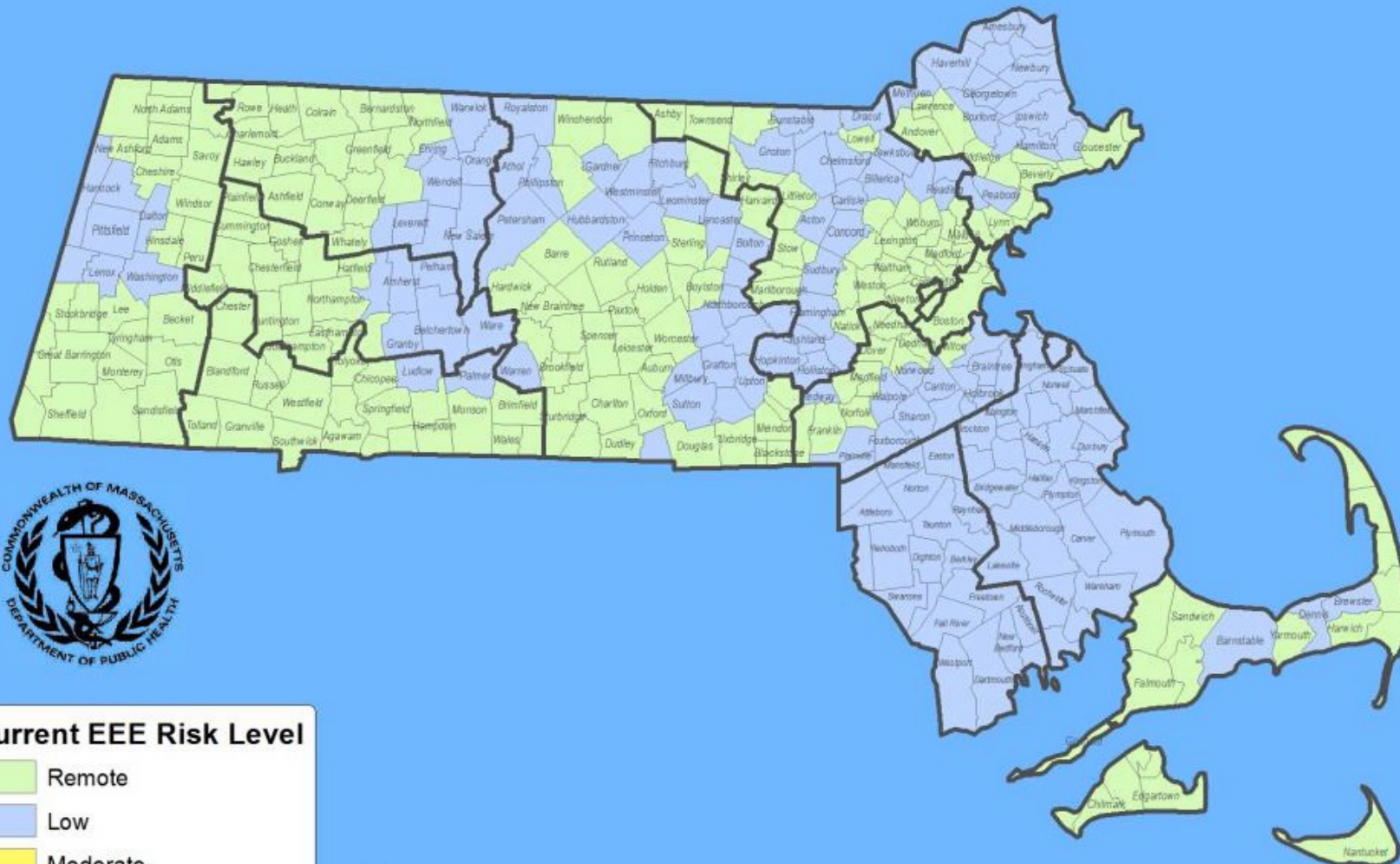


MA EEEV Surveillance Summary 2018

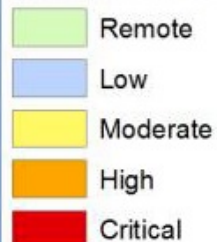
Mosquito Pools Positive	2
Horses Positive	0
Humans Positive	0



Massachusetts EEE Risk Categories



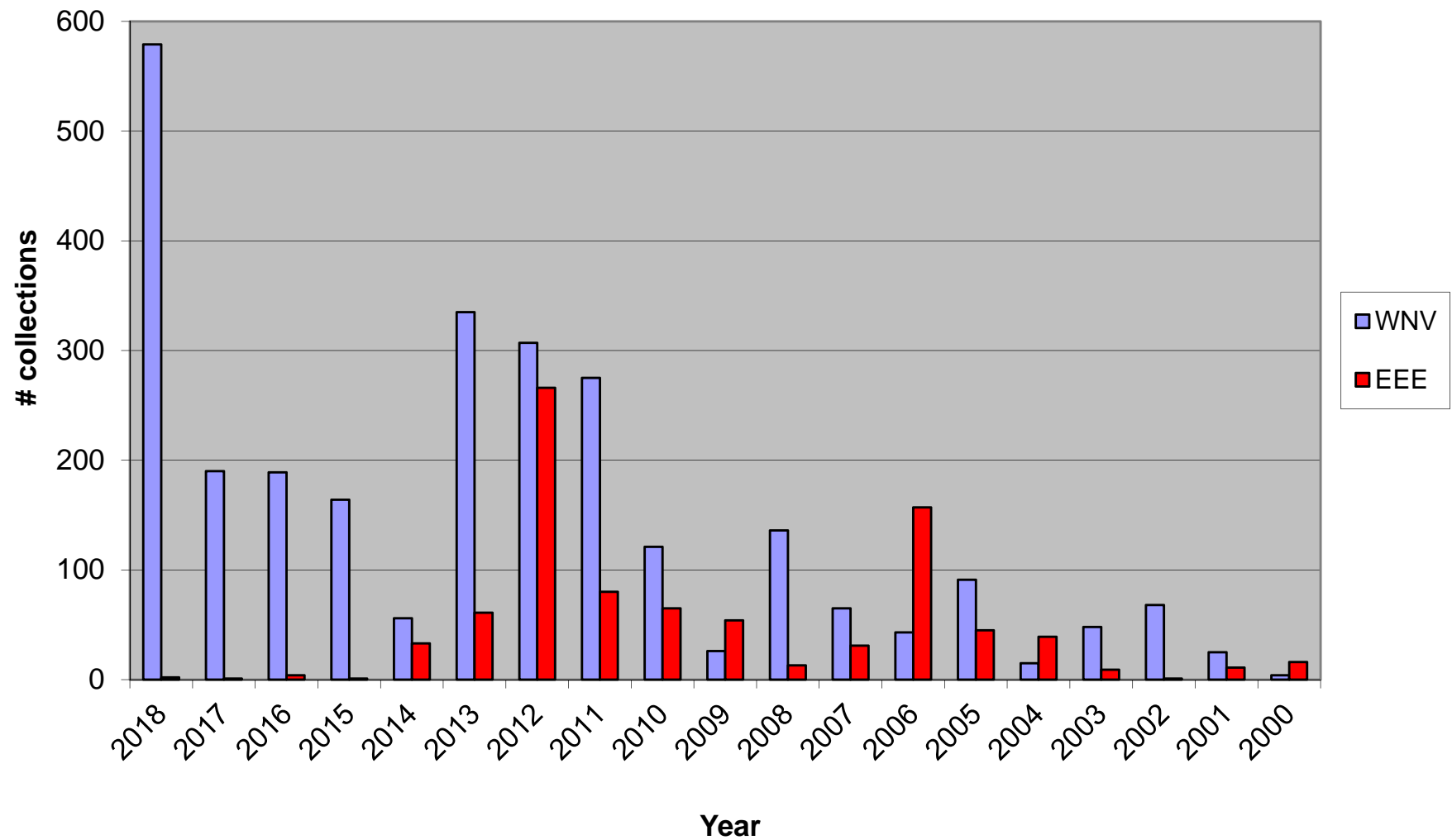
Current EEE Risk Level



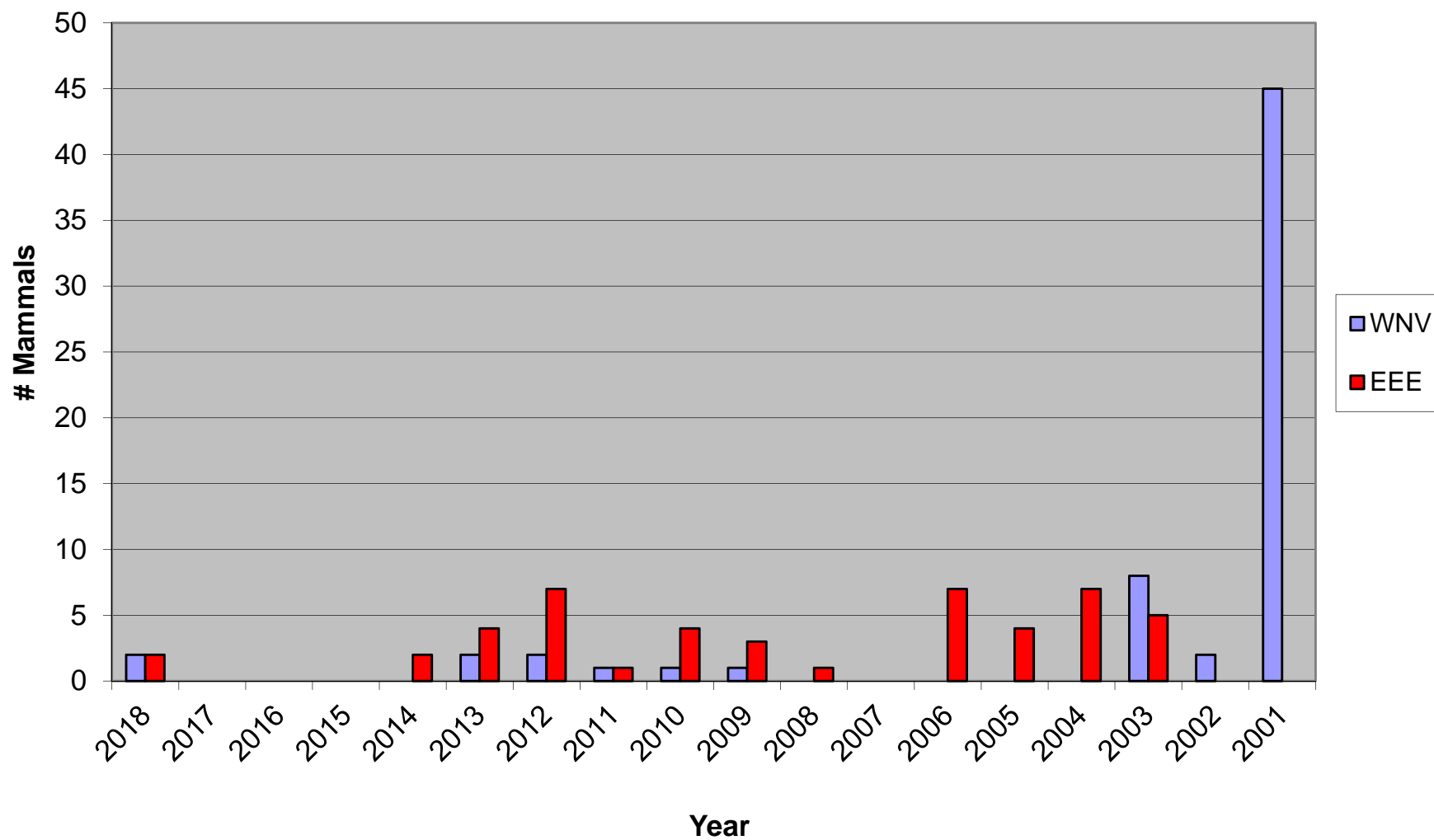
Current Risk Levels – as of October 01, 2018

Massachusetts State Public Health Laboratory
Arbovirus Surveillance Program

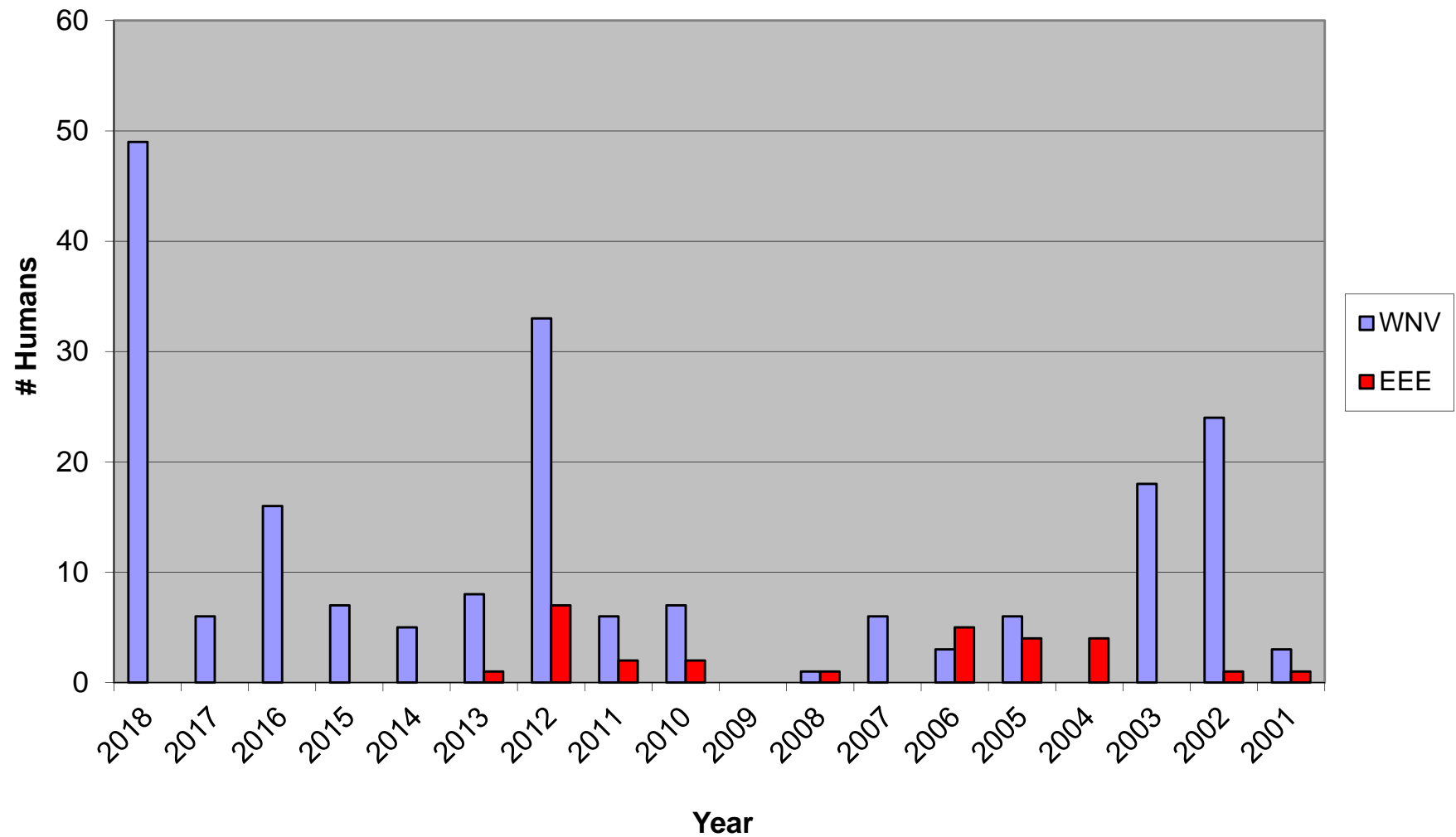
Statewide Mosquito Collections 2000-2018



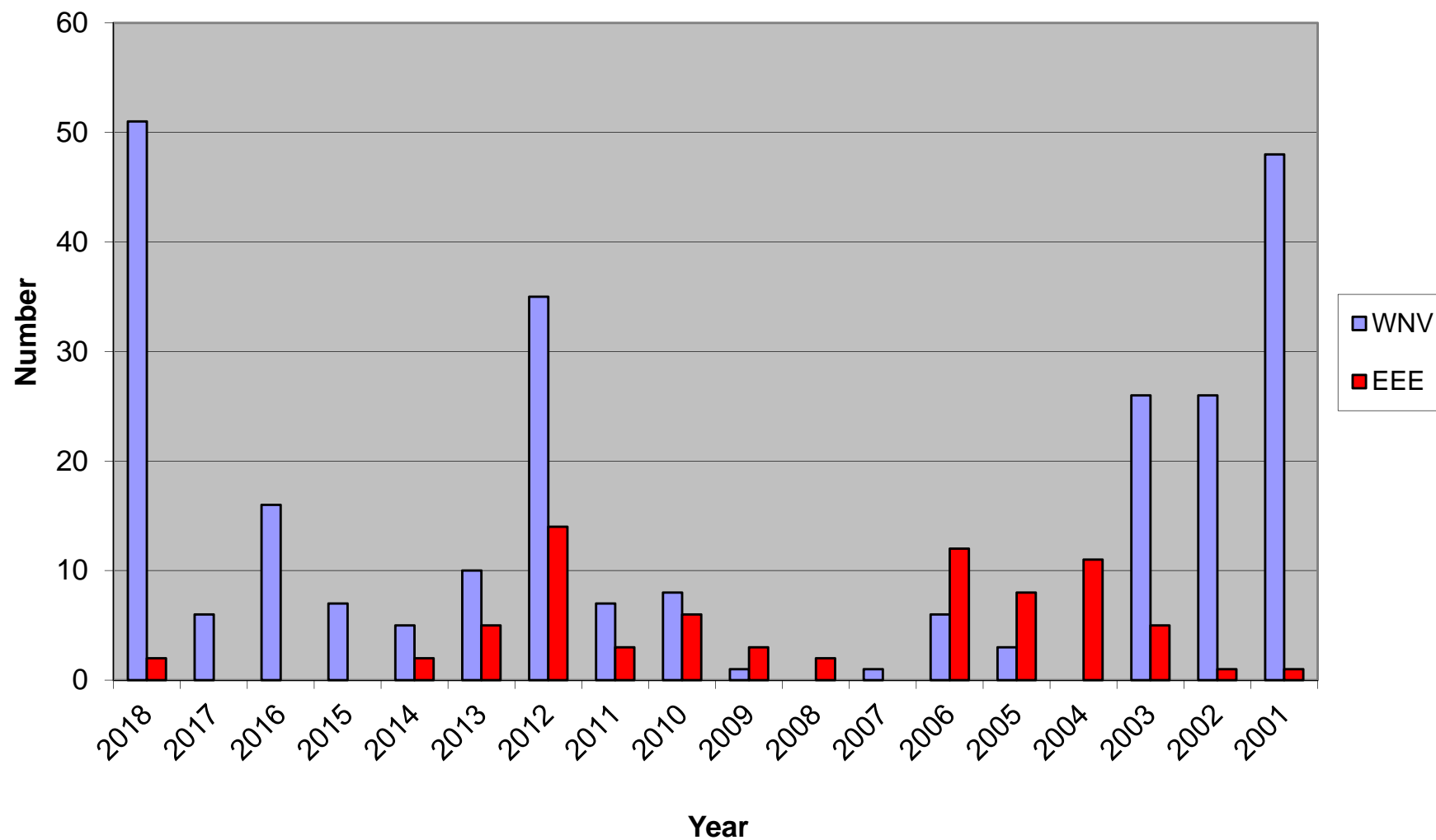
Statewide Mammal Cases 2001-2018



Statewide Human Cases 2000-2019



Mammal & Human Cases Statewide 2001 - 2019

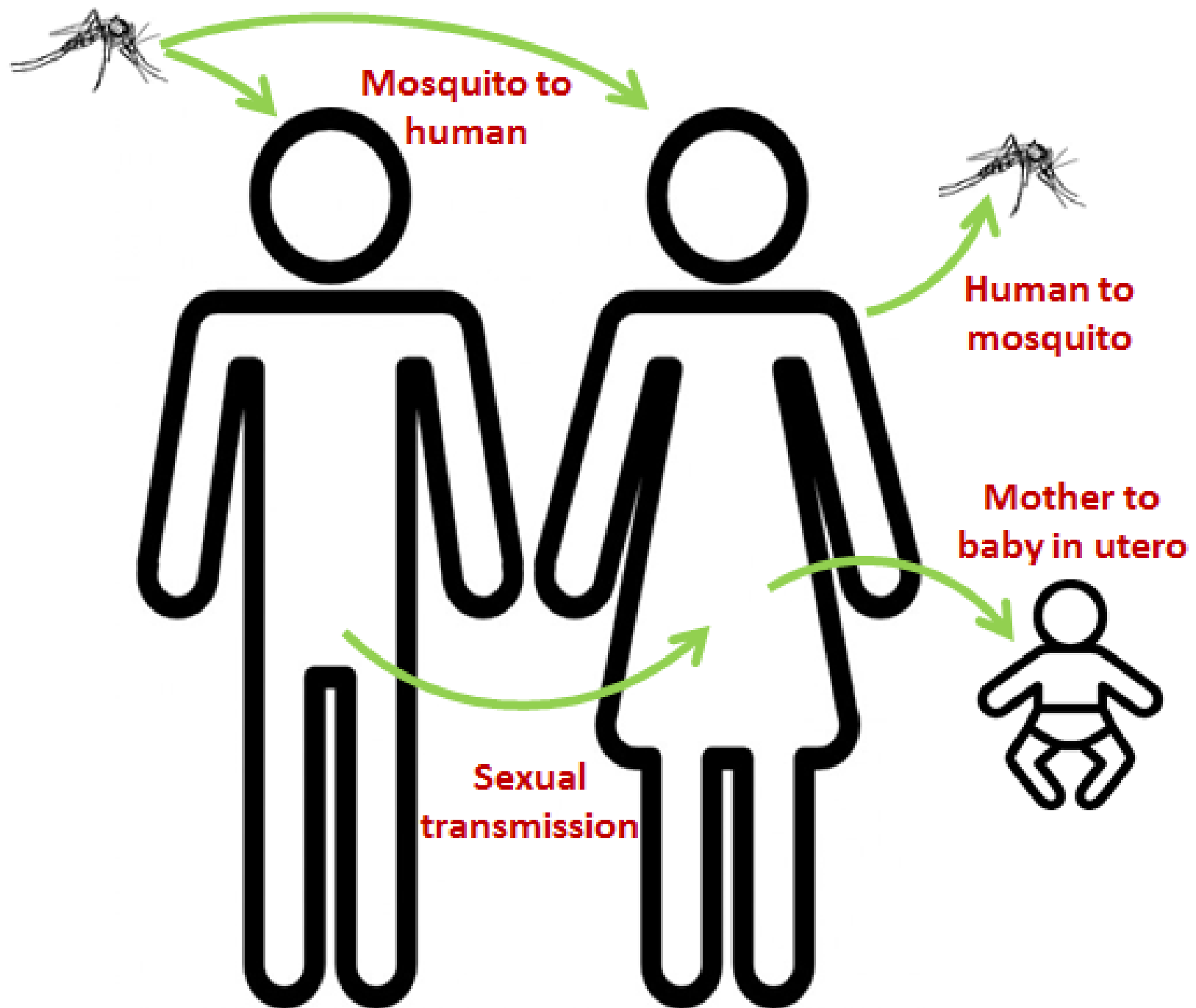


Zika Virus

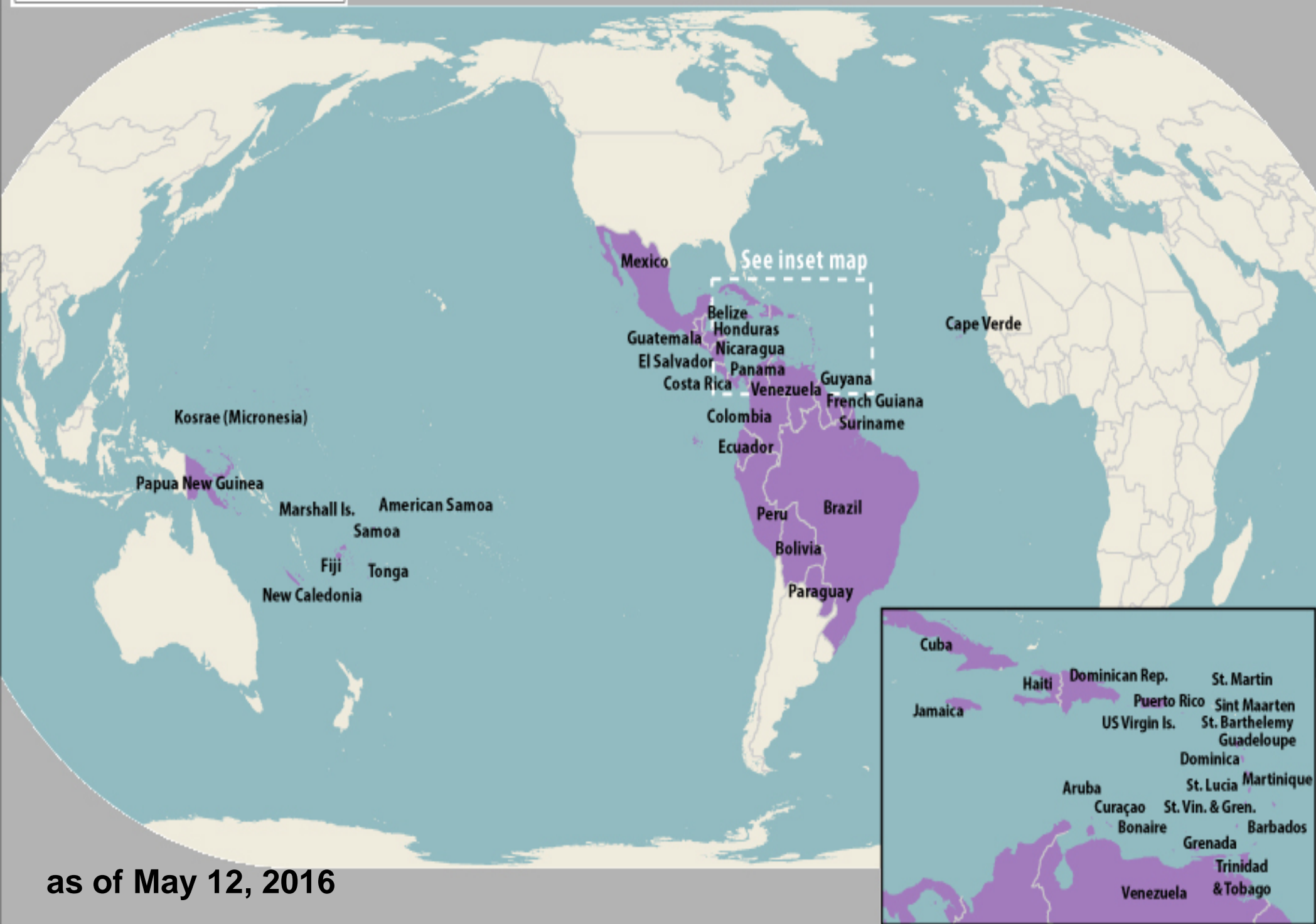
- Before 2013 considered a mild, rare disease
- Virus may have mutated, now causes severe complications, esp. in pregnant women
- South, Central & Latin America
- Possibility for issues in the South



4 Zika Transmission Routes



Reported active transmission



as of May 12, 2016

PERSONAL PROTECTION MEASURES



Repellents

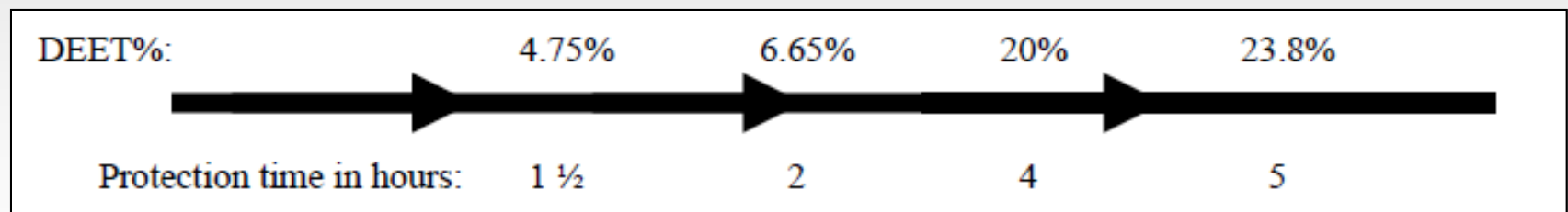
- DEET
- Permethrin*
- Picaridin
- Oil of Lemon Eucalyptus (PMD)

*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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