MOSQUITO CONTROL IN CENTRAL MASSACHUSETTS

~ AN OVERVIEW ~

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Today's Topics:

- Mosquito control in Mass.
- Mosquito diseases in Mass.
- Mosquito biology
- Mosquito habitat
- Q & A

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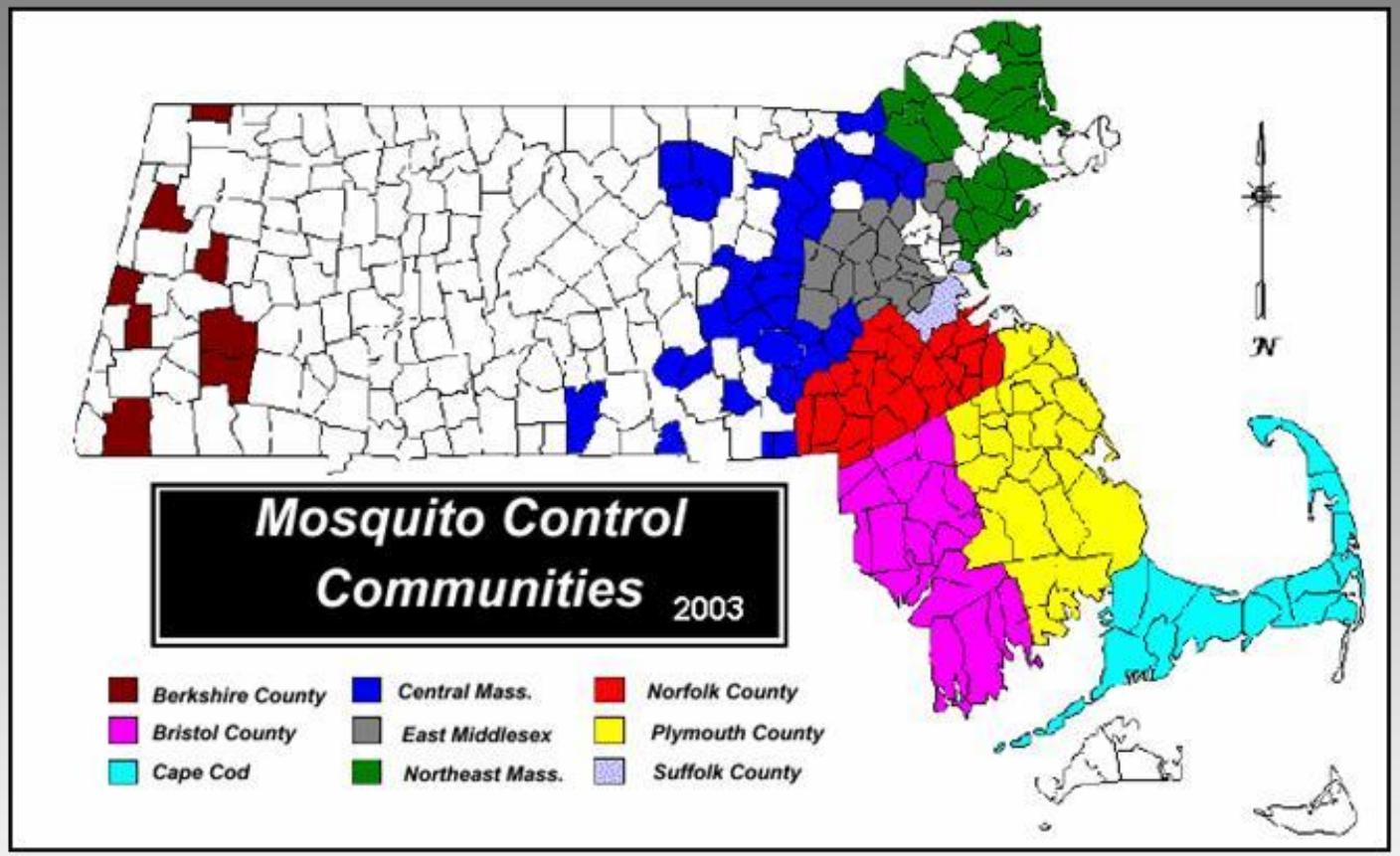
MOSQUITO CONTROL IN MASSACHUSETTS

9 Mosquito Districts in Mass.

- Berkshire County MCP
- Bristol County MCP
- Cape Cod MCP
- Central Mass. MCP
- East Middlesex MCP
- NE Mass. Wetlands Mgmt. & MC District
- Norfolk County MCP
- Plymouth County MCP
- Suffolk County MCP



Mosquito Districts 2004

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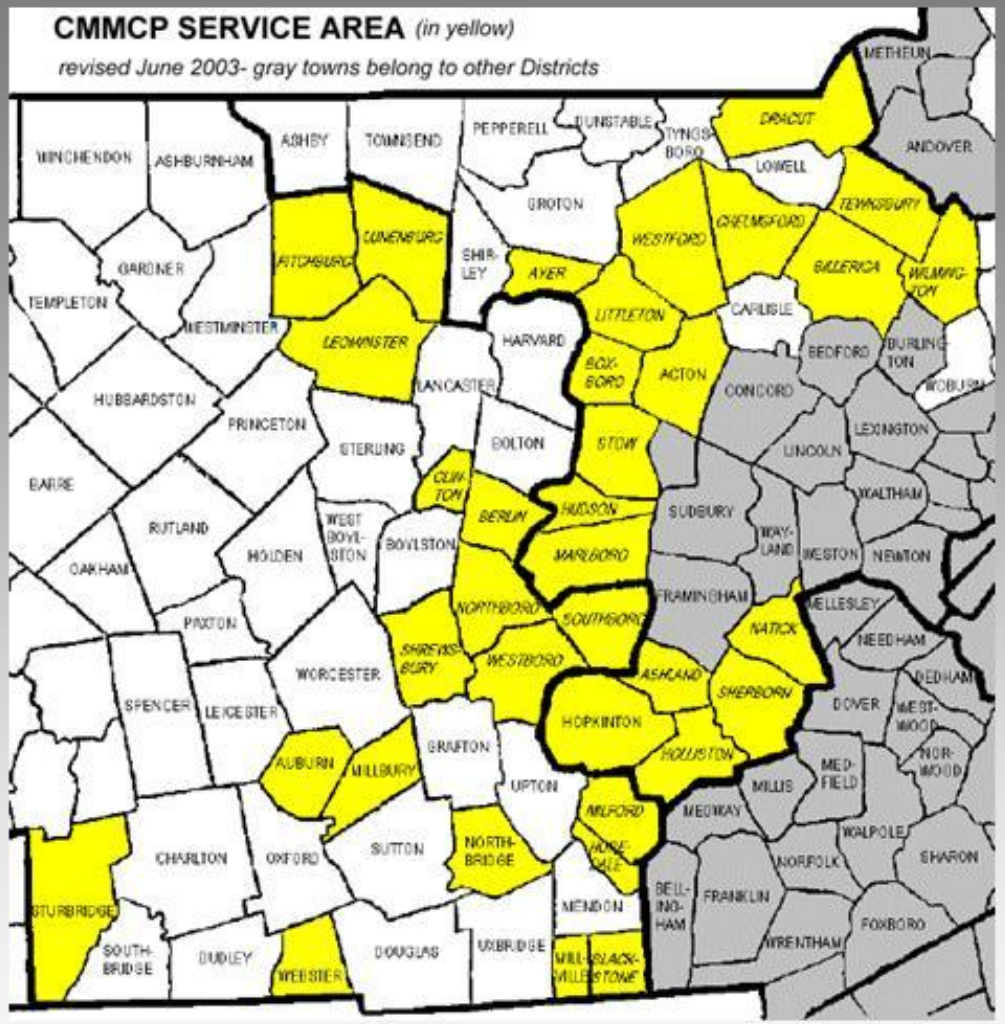

CMMCP Service Area 2004

Components Of A Full Program:

- Surveillance
- Public Education
- Wetland Restoration/Ditch Maintenance
- Larval Control
- Adult Control

Surveillance

- Adult
- Larval


CDC light trap


Gravid trap

CENTRAL MASSACHUSETTS MOSQUITO CONTROL PROJECT

CDC TRAPPING LOCATIONS FOR
Cs. melanura
N42.16.446
W71.36.040
N42.16.203
W71.34.081
N42.15.734
W71.35.764
N42.15.434
W71.34.335
N42.15.351
W71.35.153
WESTBOROUGH
Westborough
Hastings Sch
Cedar Swamp Pond
CONRAIL
INTERCHANGE 11A
INTERCHANGE 22
Tollgate
WORCESTER CO
MIDDLESEX CO
St Lukes Cem
Pine Grove Cem
Sand and Gravel Pit
HOPKINTON RD
MORSE
FLANDERS
Gravel Pit
Quarry
Jackstraw Brook
Piccadilly Bk
Whitehall
Rutters

Disease Surveillance

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.)

Public Education

Wetland Restoration

Wetland Restoration

BEFORE

AFTER

Larval Control

Larval Control Products

- Bacterial
  - Bti (*Bacillus thuringiensis israelensis*)
  - Bs (*Bacillus sphaericus*)
- Insect Growth regulator (IGR)
  - Methoprene
- Surfactant/Oils
  - refined mineral oil

Adult Control

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Adult Control Product

- Resmethrin, a synthetic pyrethroid
- Applied at a dilute solution at the lowest label rate
- Not a residual product, rapid decomposition in the environment
- Surveillance gathered before applications

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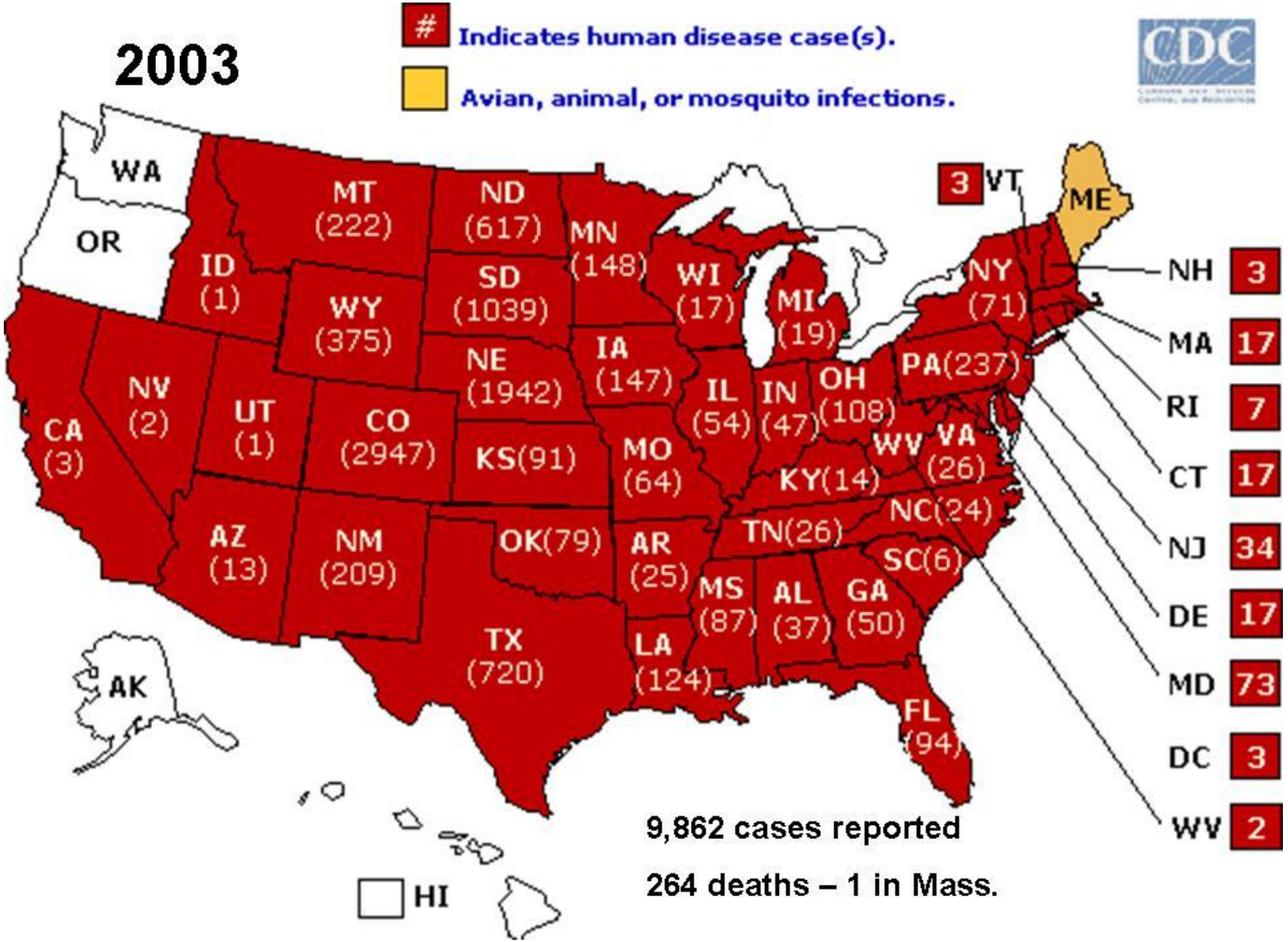
MOSQUITO-BORNE DISEASES IN MASS.

West Nile Virus

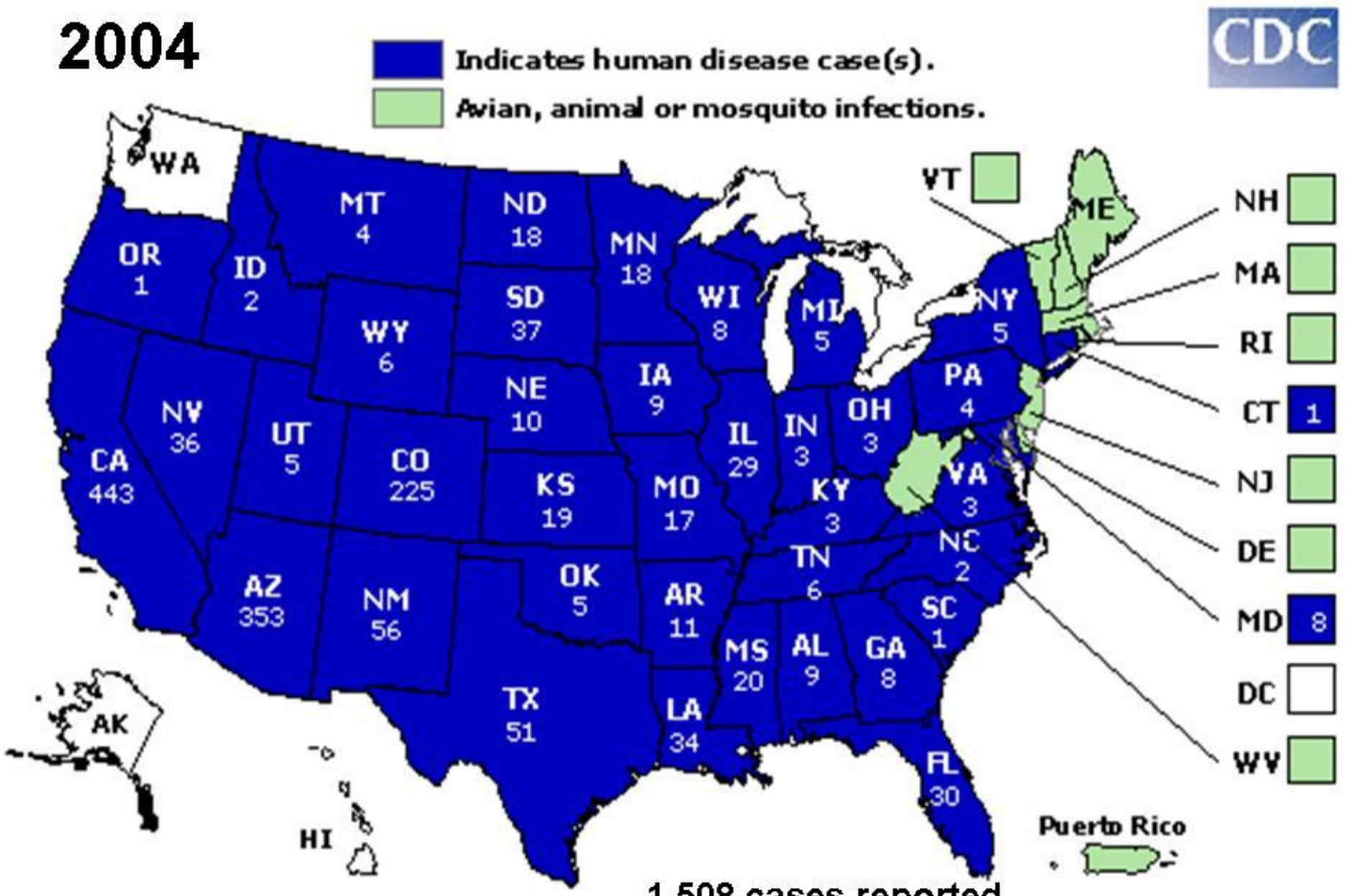
- Discovered in USA in New York in 1999
- Discovered in Mass. in 2000
- Firmly established in the Northeast


2003
# Indicates human disease case(s).
Avian, animal, or mosquito infections.
CDC
WA
OR
CA (3)
NV (2)
ID (1)
MT (222)
WY (375)
UT (1)
AZ (13)
CO (2947)
NM (209)
ND (617)
SD (1039)
NE (1942)
KS(91)
OK(79)
TX (720)
MN (148)
IA (147)
MO (64)
AR (25)
LA (124)
WI (17)
IL (54)
MS (87)
MI (19)
IN (47)
KY(14)
TN(26)
AL (37)
OH (108)
WV
VA (26)
NC(24)
SC(6)
GA (50)
FL (94)
PA(237)
NY (71)
3 VT
ME
NH 3
MA 17
RI 7
CT 17
NJ 34
DE 17
MD 73
DC 3
WV 2
AK
HI
9,862 cases reported
264 deaths – 1 in Mass.

West Nile Virus in CMMCP area 2003

- **Positive mosquito collections:**
  - Ashland, Hudson, Leominster, Westboro
- **Horse:**
  - Billerica & Sturbridge
- **Human:**
  - Fitchburg & Westboro

2004



1,508 cases reported
45 deaths – none in Mass.

West Nile Virus Cycle

- Birds are the host (reservoir)
- Mosquitoes transmit and increase the infection in birds (amplification)
- Mammal-biting species transmit to horses and humans (bridge vectors)

MA WNV Surveillance Summary

- September 22, 2004

Dead Birds Reported	1,651
Birds Submitted	99
Birds Tested	77
Birds Positive	7
Mosquito Pools Positive	14
Horses Positive	0
Humans Positive	0

Eastern Encephalitis

- 30-50% mortality
- Of the survivors, most have severe permanent neurological damage
- Most common in SE Mass.
- Has been found in Westboro (1989, horse)
- 3 cases in Mass. in 2004 (to date) with 2 fatalities

MA EEEV Surveillance Summary

- September 22, 2004

Mosquito Pools Positive	36
Horses Positive	2
Humans Positive	3

Eastern Encephalitis Cycle

- Similar to WNV cycle
- Birds are the host
- Mosquitoes transmit and increase the infection in birds (*Cs. melanura)*
- Mammal-biting species transmit to horses and humans

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MOSQUITO BIOLOGY 101

4 stages of development

- Egg
- Larvae
- Pupae
- Adult

Mosquito Eggs

- Damp soil
- Containers
- Permanent water
- Emergent vegetation

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

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Mosquito Adult

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

MOSQUITO HABITATS IN MASSACHUSETTS

HABITAT TYPES

- Retention/Detention areas
- Vernal 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.*

Retention/Detention Pond Benefits

- Wet detention ponds can decrease the potential for downstream flooding and streambank erosion, and provide improved downstream water quality.
- Water quality is improved through removal of suspended solids, metals, and dissolved nutrients using natural biological and physical processes.
- Properly designed and maintained wet detention ponds can also enhance landscape aesthetics as well as provide wildlife habitat.

Retention/Detention Pond Disadvantages

- Sediments from upstream industrial or highly contaminated runoff areas may constitute a hazardous waste requiring special disposal/treatment.

- Creation of mosquito breeding habitat, especially hard to control species *Cq. perturbans*

Vernal pools

- Have a wet period followed by a dry period
- Little or no vegetation
- Important habitat for many vertebrate and invertebrate species
- Protected by state laws


SPRING
SUMMER

Common Vernal Pool Species:

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

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

Reflood areas

- Include vernal pools, and
- 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

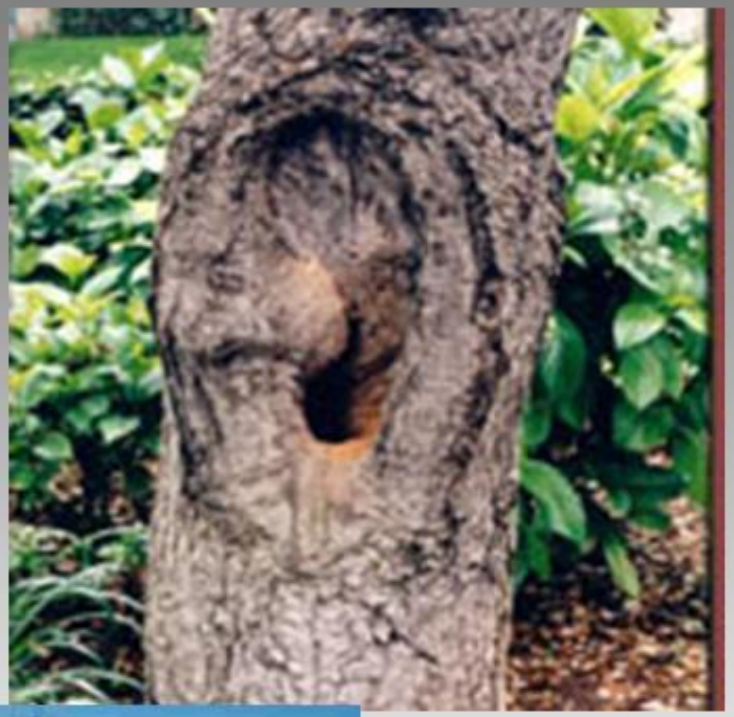

CATTAIL MARSH - *Typha spp.*
(T. latifolia, T. angustifolia, T. glauca, T. domingensis)

Degraded Ditch systems

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

Container species

- *Oc. triseriatus*
- *Oc. japonicus*
- *Culex spp.*



Salt Marsh

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

Invasive 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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Q & A