Mosquitoes, ticks and bitey things.

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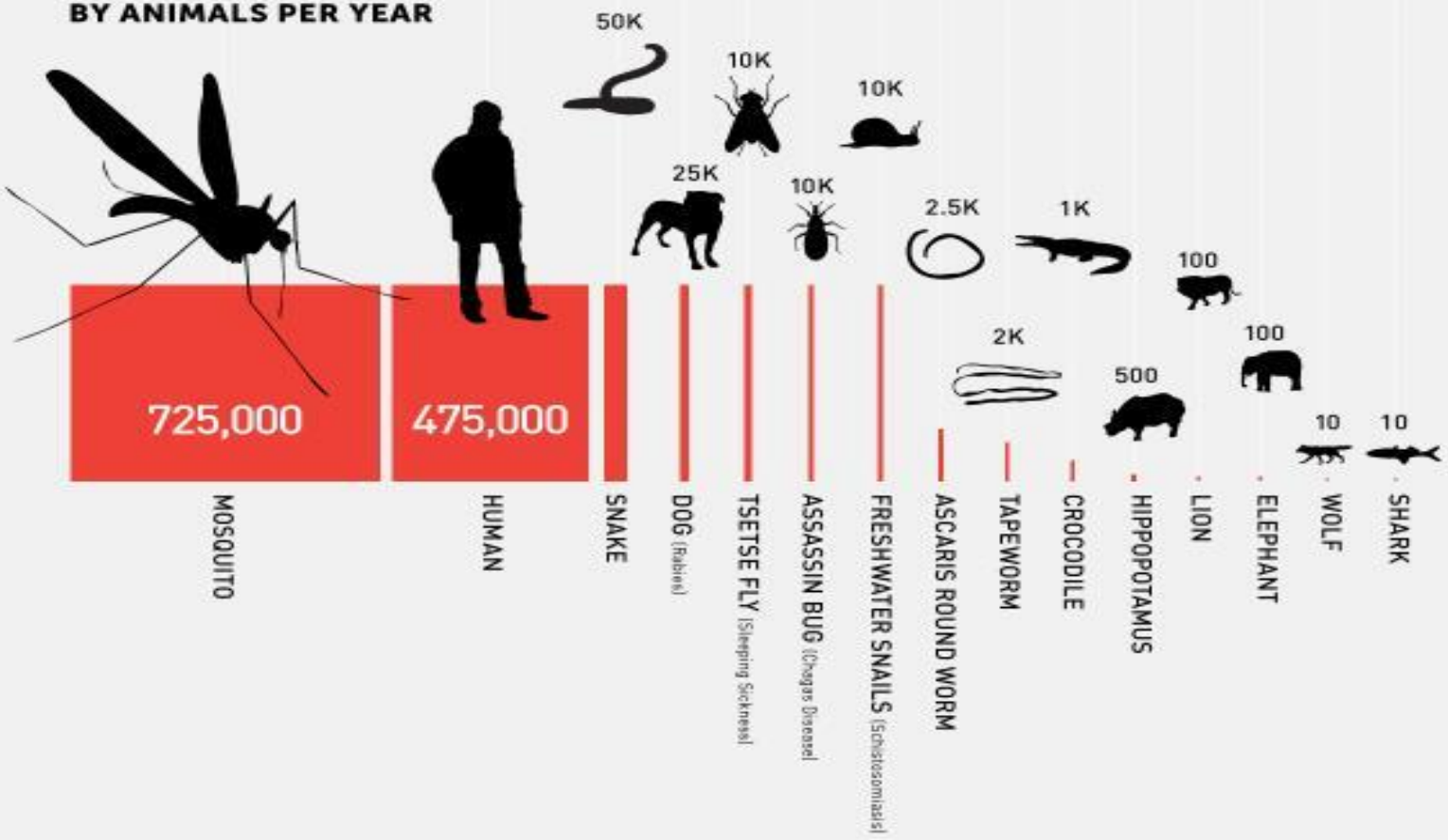
CT DEEP, Wetland Habitat and Mosquito Management Program

Bloomfield, 4/5/2023

WORLD'S DEADLIEST ANIMALS

NUMBER OF PEOPLE KILLED BY ANIMALS PER YEAR

MOSQUITOWEEK
on gatesnotes.com



SOURCES: WHO; crocodile-attack.info; Kasturiratne et al. (doi.org/10.1371/journal.pmed.0050218); FAO (webcitation.org/6Ogp585VO); Linnell et al. (webcitation.org/6ORL7DBUO); Packer et al. (doi.org/10.1038%2F436927a); Alessandro De Maddalena. All calculations have wide error margins.

Mosquitoes

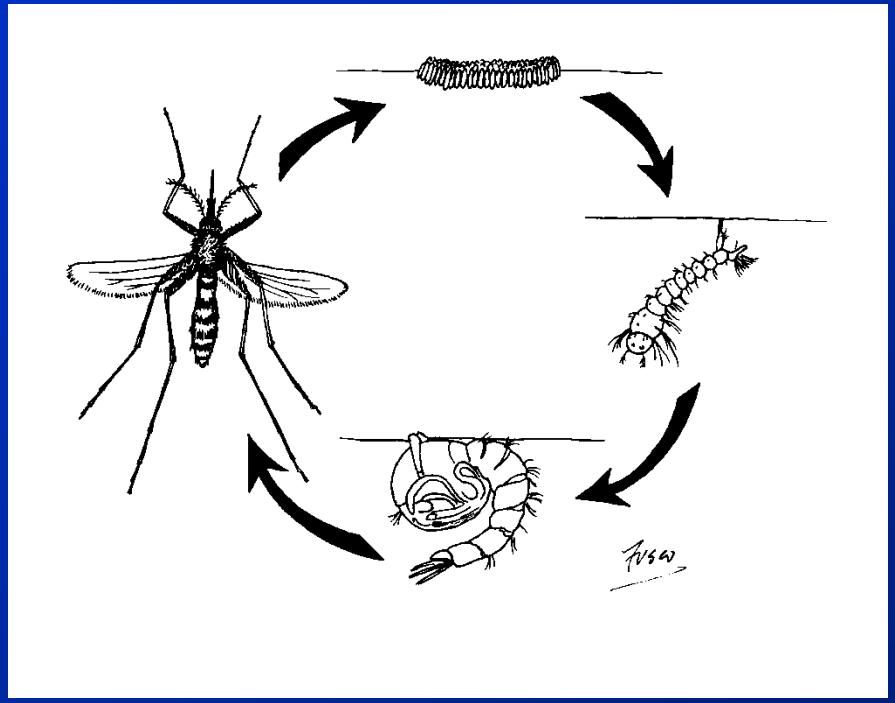
- 54 species in CT (~3000 worldwide, >200 in US)
- Only female bites (irritation and disease transmission)
- Univoltine vs. multivoltine (>risk)
- Overwintering strategies
- Specific vs. general feeding (>risk)

Exotic species

Aedes albopictus

Aedes japonicus

Mosquito Life Cycle



Complete metamorphosis

Connecticut Mosquito Management Program

- Mosquito surveillance - CAES
- Human surveillance - DPH/LHD
- Mosquito control/tech assistance - DEEP
- Domestic bird and animal - DoAg, UCONN
- Communication and public awareness - DPH/DEEP/CAES

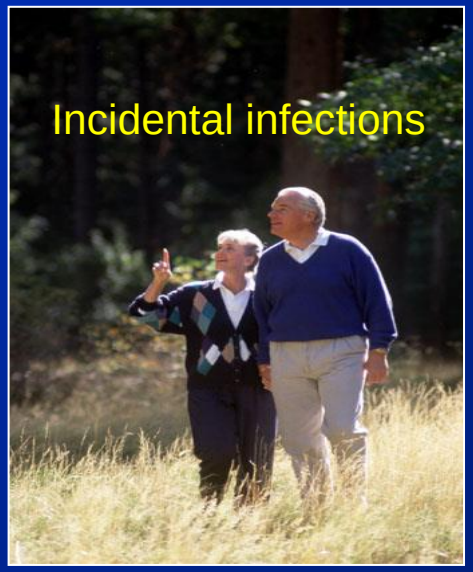
IPM for Mosquito Control (IMM)

- Monitoring and Surveillance
- Education
- Source Reduction/Water Management
- Personal Protection
- Biological control
- Chemical control
  - -Larvaciding
  - -Adulticiding

2020 Mosquito Trapping Stations

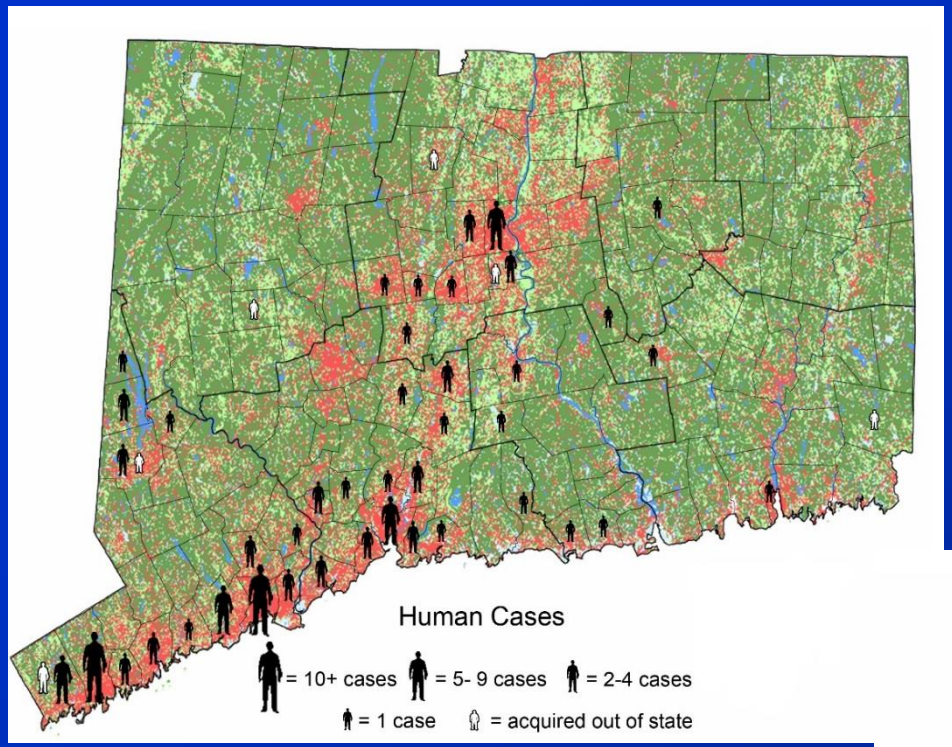
○= Mosquito Trap

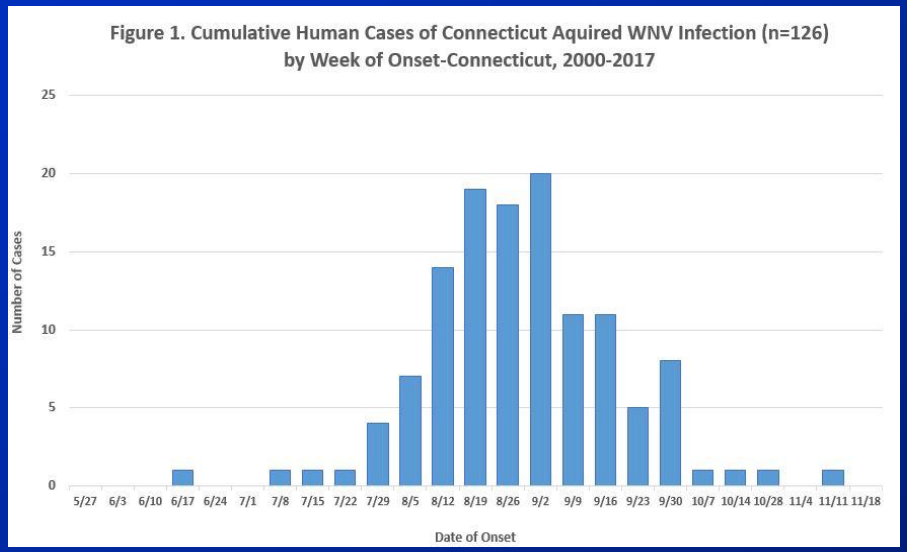
WNV/ EEE Transmission Cycle

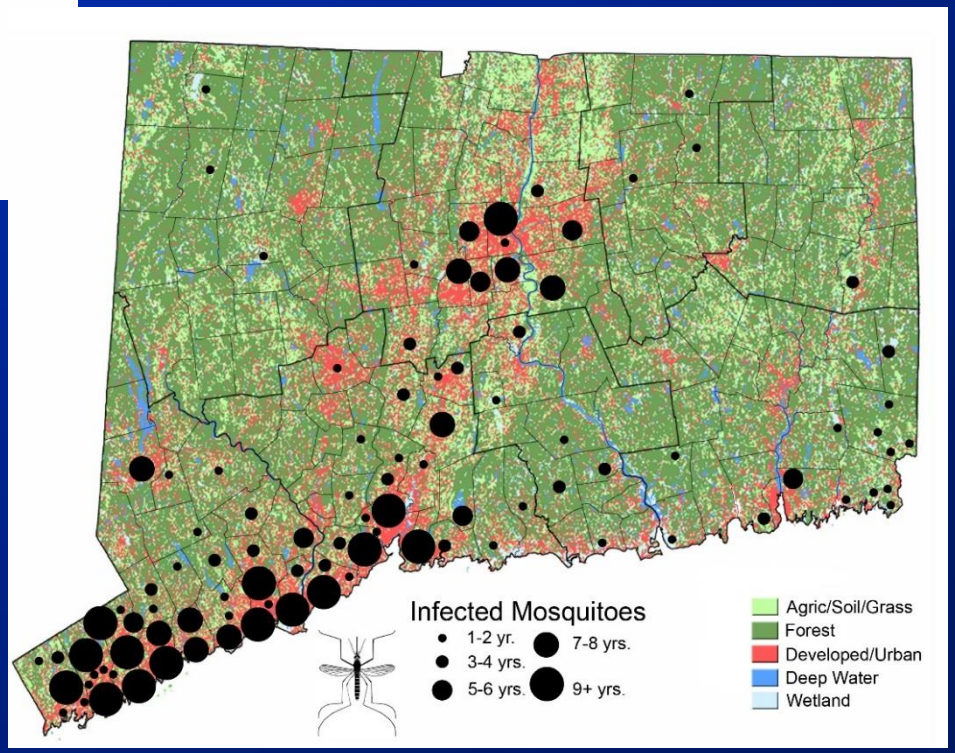


West Nile virus

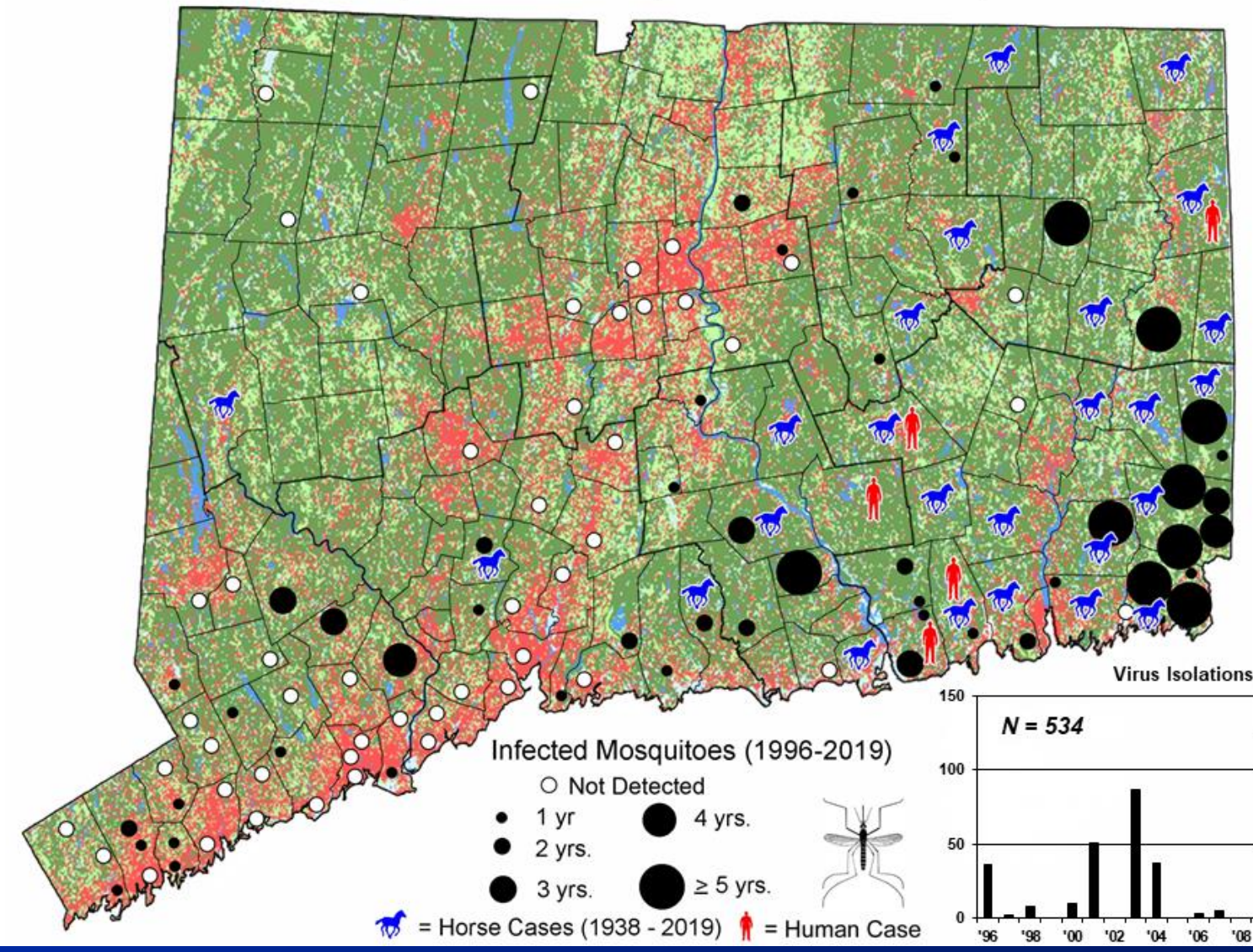
WNV 2000-2022: 178 human cases (4 deaths)







Eastern Equine Encephalitis Activity 1996-2019



Elements of a Municipal Mosquito Control Program

- Educate your constituents (sources of mosquitoes).
- Clean up yards/neighborhoods. Stress source reduction/personal protection.
- Enforce public health regs: e.g., abandoned pools
- If contracting with private company, use only DEEP licensed applicators (Cat. 7f)
- Consider catch basin larvaciding. Coordinate with DPW clean outs. Also parks, schools (check regs).
- Judicious use of adulticides is OK.

Source reduction

Eliminate standing water around home and workplace.

Created Wetlands/Stormwater Basins:


Photo: N. Read

Recommendations

- 1:3 or 1:4 side slopes
- Veg/beaver management
- <72 hrs. detention
- **maintenance!**

Personal Protection Measures to Prevent Mosquito Bites

- Minimize outdoors activities at dawn and dusk or when mosquitoes are most active.
- Cover arms and legs (pants, long sleeves). Wear light colored, loose fitting clothing.
- Repair holes in screens.
- Avoid camping near swampy areas. Use netting on tents and outdoor playpens.

Personal Protection Measures
Repellants

- Repellants (are pesticides):

  DEET (<30-40%), picaridin, oil of lemon eucalyptus, IR3535 (on clothes or skin).
- Sprays, creams, towelettes.
- Have an adult apply repellants to children. <10% DEET - not around eyes/nose/mouth. Wash off when you come indoors.
- Permethrin-based products to clothes only. Kills mosquitoes and ticks.

Biological control

The control of a pest by the introduction of a natural enemy or predator

- Gambusia (mosquito fish), guppies, dragonfly nymphs.
- *Introduction of non-native orgs in open waters is prohibited in CT
- OK in water gardens, abandoned pools, closed systems (no outlet).
- Mummichogs, fathead minnows, sunfish, ‘top minnows’ - OK

Chemical control

- Larvaciding
- Pupaciding
- Adulticiding

Larvacides

Applied to water where larvae are active or to areas likely to produce mosquitoes (pre-emergent).
Formulations: liquid, granular, pellets, briquettes, WP, EC

- Organophosphates (temephos) – not regist in CT
- Biologicals
  - Bti (Bacillus thuringiensis var. israelensis)
  - Bs (B. sphaericus)
  - Spinosad (Natular®)*
- Insect growth regulators (IGR's)*
  - Methoprene (can't use in coastal zone except in New Haven, PA13-197)

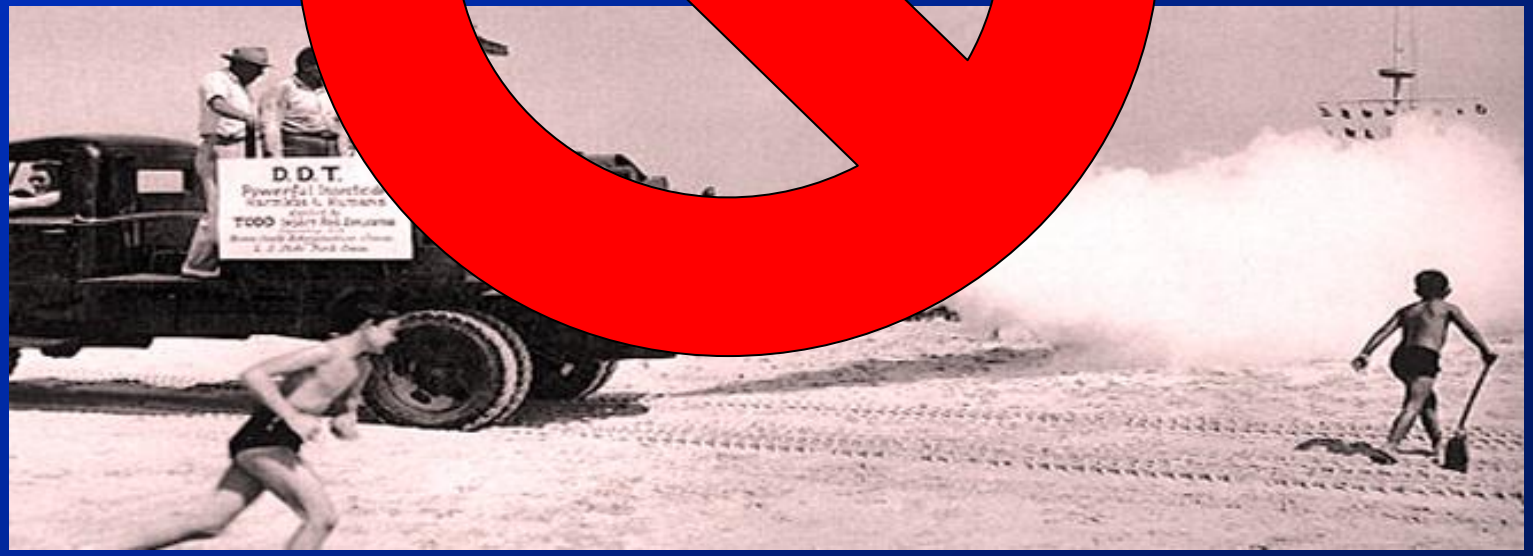
*requires Aquatic permit from DEEP

Pupacides
control of pupae and larvae by suffocation

- Surface films (Agnique MMF)
- Oils/alcohols

*requires Aquatic permit from DEEP

Adulticiding (“spraying”)



Adulticiding

Barrier spray

Adulticiding

Ultra low volume (ULV)

Truck mounted spraying

Aerial application

Adulticides

Organophosphates (OP's) - malathion

Natural pyrethrum – derived from chrysanthemums (very expensive)

Synthetic pyrethroids (most anything ending in "thrin"), resmethrin (1st gen syn py); -sumithrin, permethrin, deltamethrin, bifenthrin, etc. Potential for resistance.

Etofenprox (Zenivex®) – an ether vs. an ester.

EPA exempt products (25b)
may not hold up to mnfctr claims

- garlic, essential oils, torches, coils, plants, citronella candles, wristbands, a good cigar
  - buyer beware! CR report.
- "All Natural" doesn't mean all safe
  - arsenic
  - strychnine
  - hemlock (Socrates' "last call")

Other devices and myths

Sonic devices

Mosquito trap/”magnet”

Misting systems

Bug zappers

Bats and birds

“If they work for you, then they work – for you…”

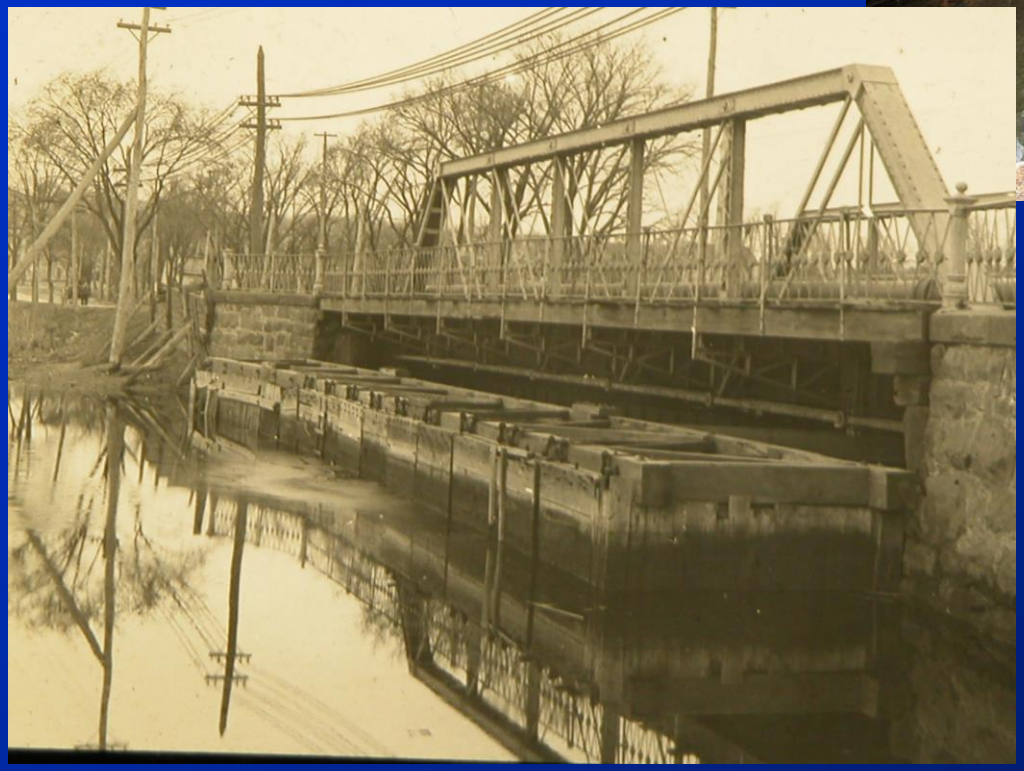
Integrated Marsh Management

- A holistic approach to wetlands management utilizing a variety of techniques to achieve site specific goals.
- These techniques can be simple or complex.
- IMM takes into consideration many aspects of wetland management/restoration including mosquito control, vegetation management, wildlife habitat enhancement, hydrologic modification and education.
- Often involves partnerships to share resources.

Open Marsh Water Management (OMWM)

Tidal restrictions

undersized culverts



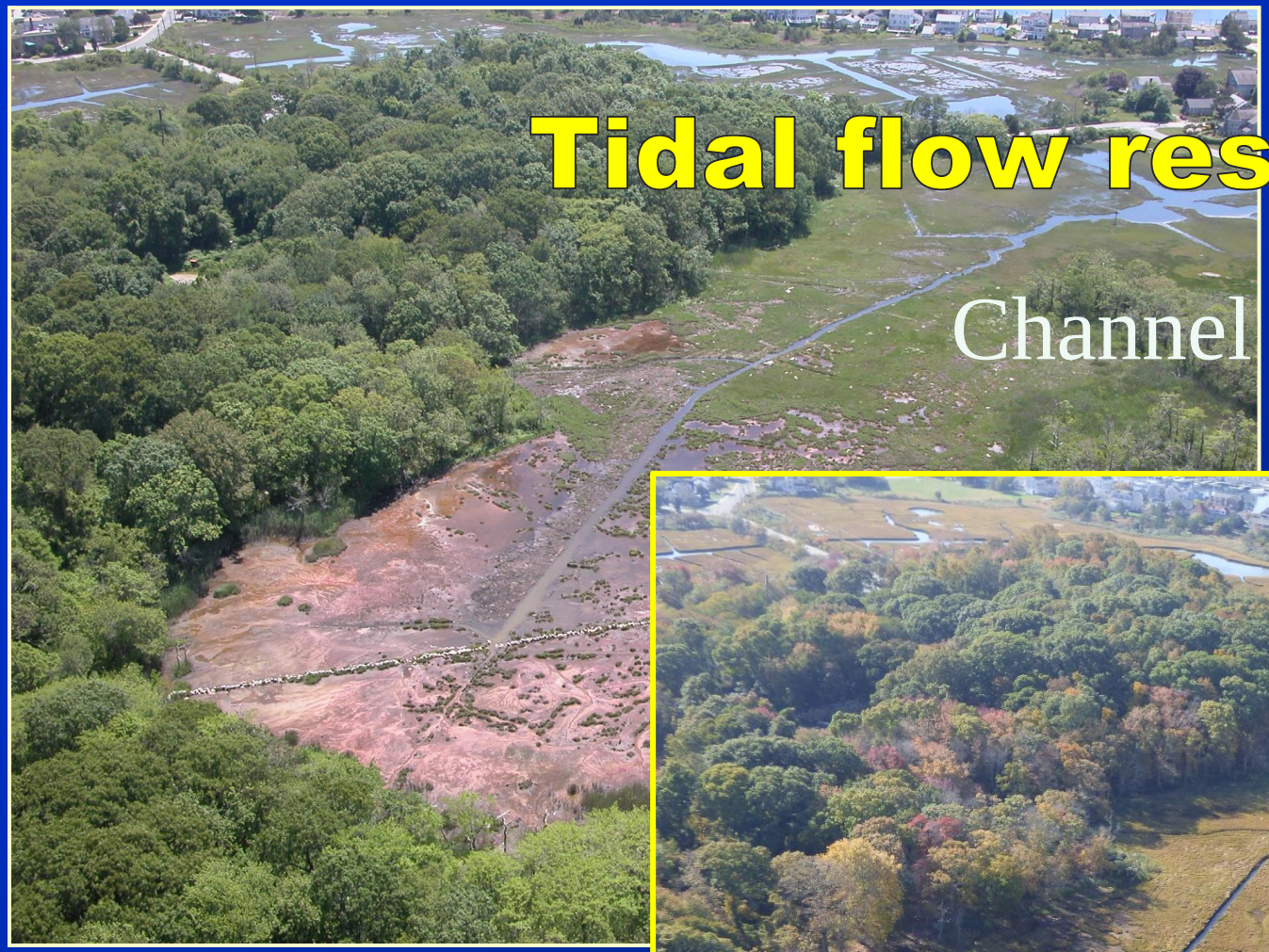
flapgate structures

Tidal Flow Restoration

Tide gate manipulation or removal

Tidal flow restoration

Channel recleaning



Want to know more?

CT Mosq. Mgt Program: www.portal.ct.gov/mosquito

Amer. Mosq. Control Assoc: www.mosquito.org

Nat'l Cent. Disease Contr. and Prev: www.cdc.gov

Rutgers Univ (NJMCA): vectorbio.rutgers.edu/outreach

NEVBD: neregionalvectorcenter.com

Tick-talk

Ticks in our area

Blacklegged (deer) Tick (*Ixodes scapularis)*

American Dog Tick (*Dermacentor variabilis)*

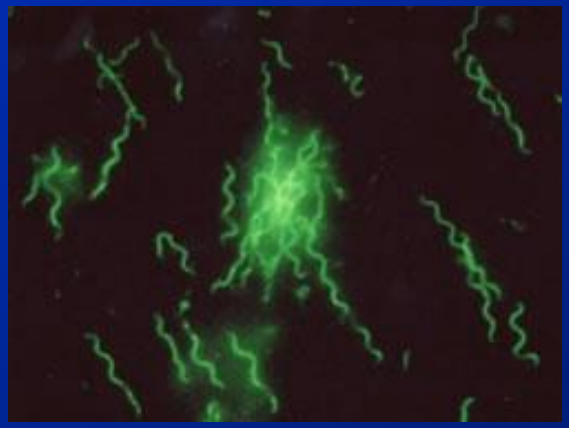
Lone Star Tick (*Amblyomma americanum)*

Asian Longhorn Tick (*Haemaphysalis longicornis)*

The deer tick (*Ixodes scapularis*) adult female, adult male, nymph, and larva on a dime.

What is Lyme Disease?

- A bacterial infection caused by a spirochete (*Borrelia burgdorferi*)
- Transmitted by infected blacklegged ticks (*Ixodes scapularis*)
  - Commonly known as the deer tick



Lyme Disease History

- **1883 to 1955 - European clinicians repeatedly described an illness with similar clinical manifestations to that of Lyme disease**
- **1975 - Unusual arthritis cases reported in Lyme, CT**
- **1977 - First 51 cases of Lyme arthritis described**
- **1977 - *Ixodes scapularis,* the deer tick, linked to transmission of Lyme disease**
- **1982 - *Borrella burgdorferi,* causative agent of Lyme disease, discovered**
- **1982 - brochure developed by Arthritis Foundation**
- **1984 - serologic testing becomes available**
- **1988 – Lyme disease gains national media attention**

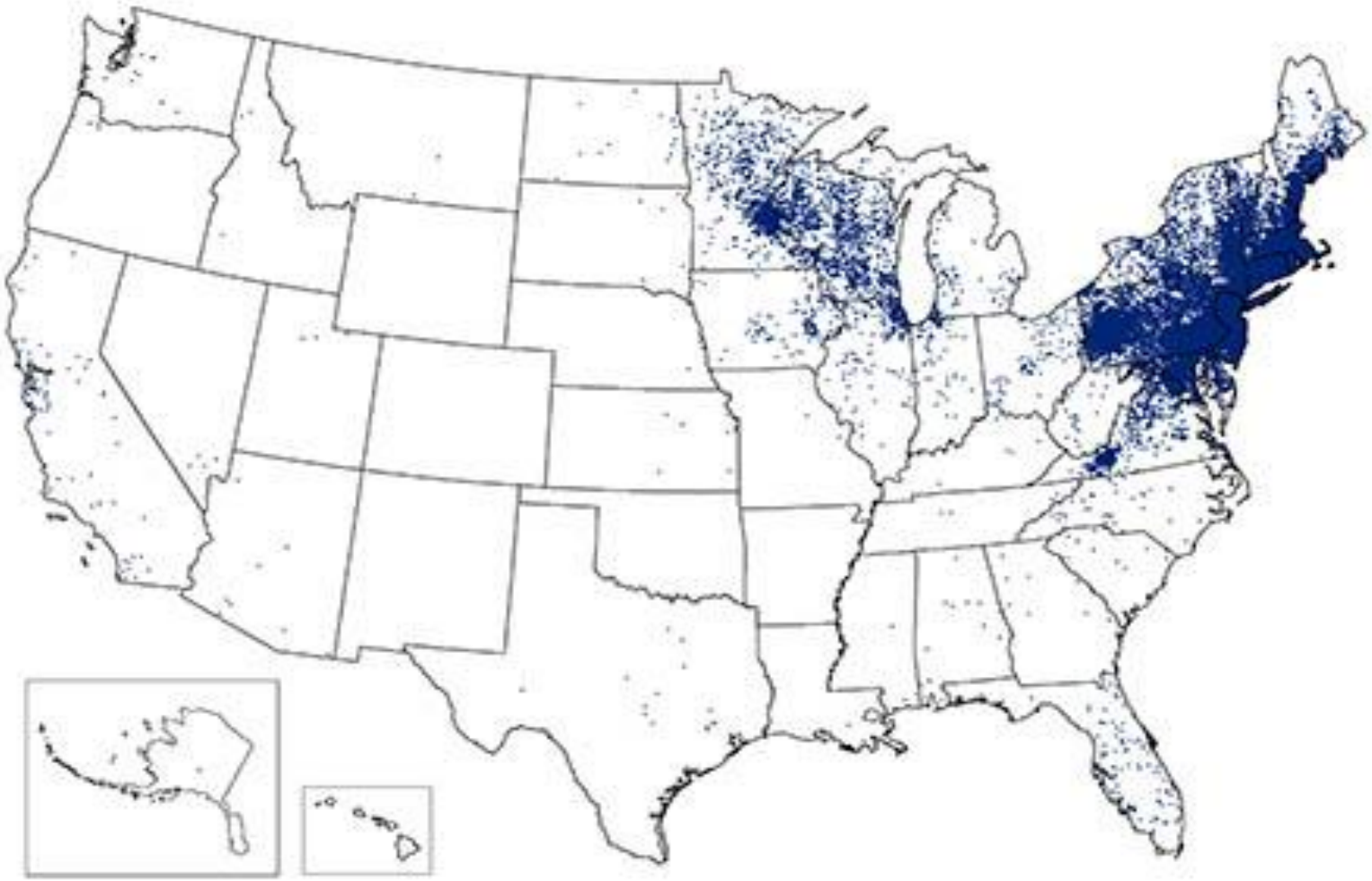
Fast Facts

Lyme disease does not occur nationwide;
Concentrated in the northeast and upper Midwest.
In 2013, 95% of confirmed Lyme disease cases were reported from 14 states:

(Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire. New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, Wisconsin)

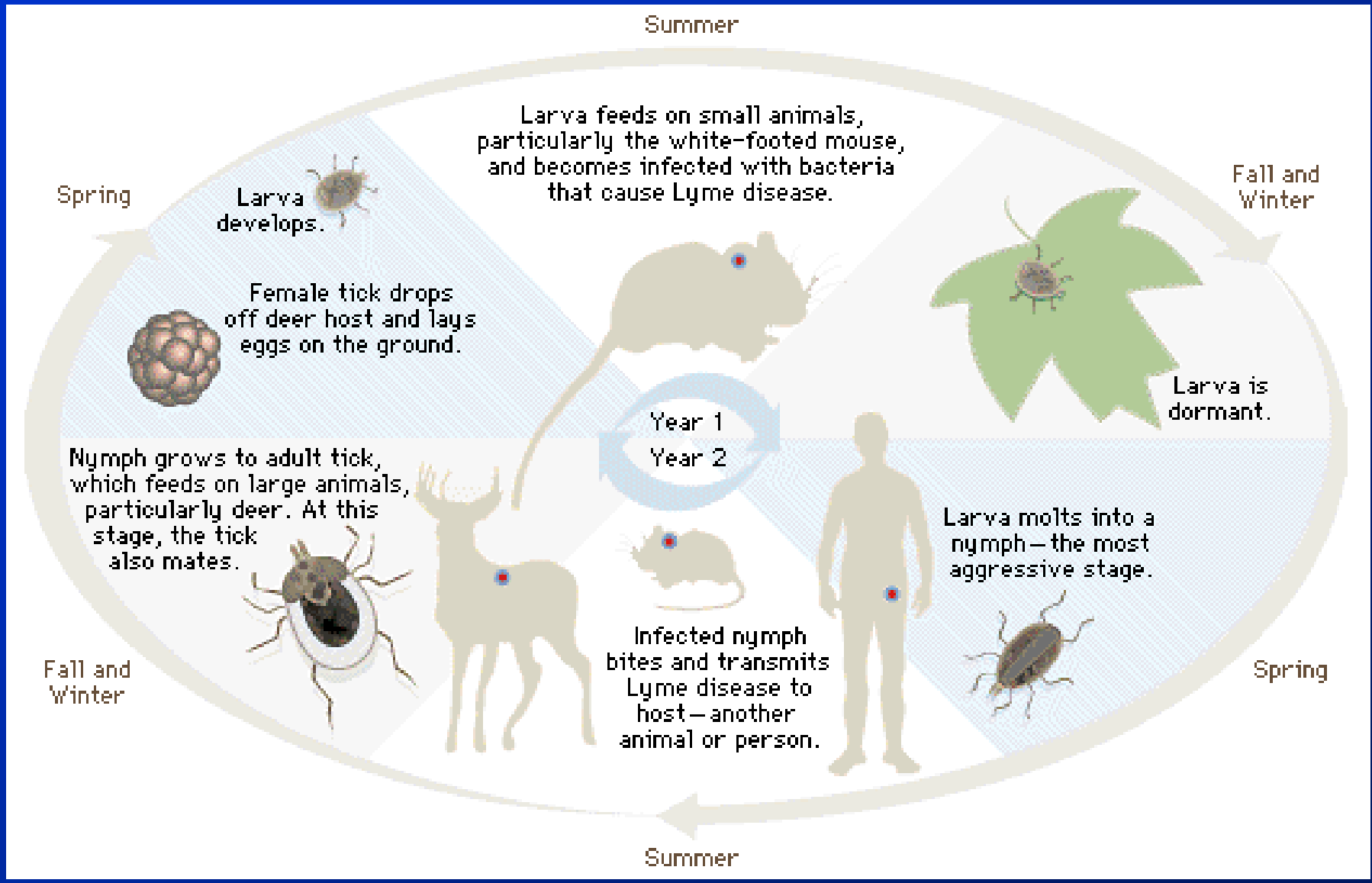
Lyme disease is the most commonly reported vector-borne illness in the U.S.
-5th most common Nationally Notifiable Disease.

Reported Cases of Lyme Disease -- United States, 2015



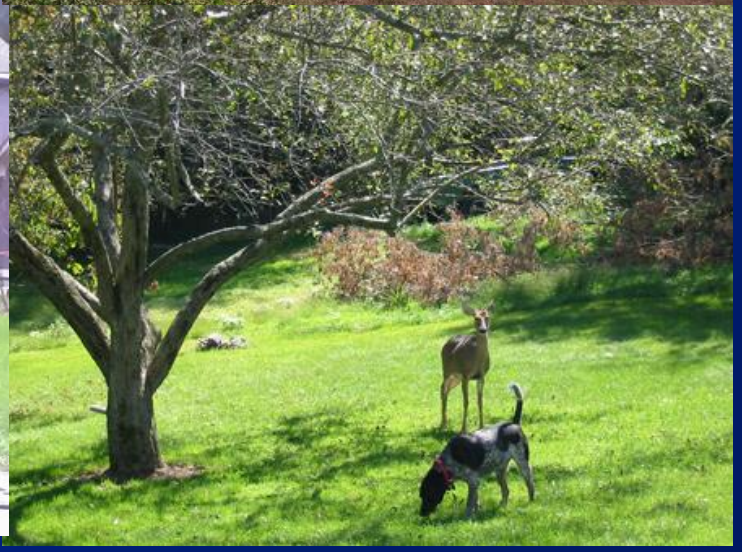
1 dot placed randomly within county of residence for each confirmed case

Lyme Disease Cycle



White footed mouse

Deer/human interaction



Tick Removal

- Use thin tipped tweezers
- Grasp tick close to skin
- Pull straight upward, slowly and steadily
- Avoid squeezing tick
- Clean wound with antiseptic
- Consider saving tick for identification

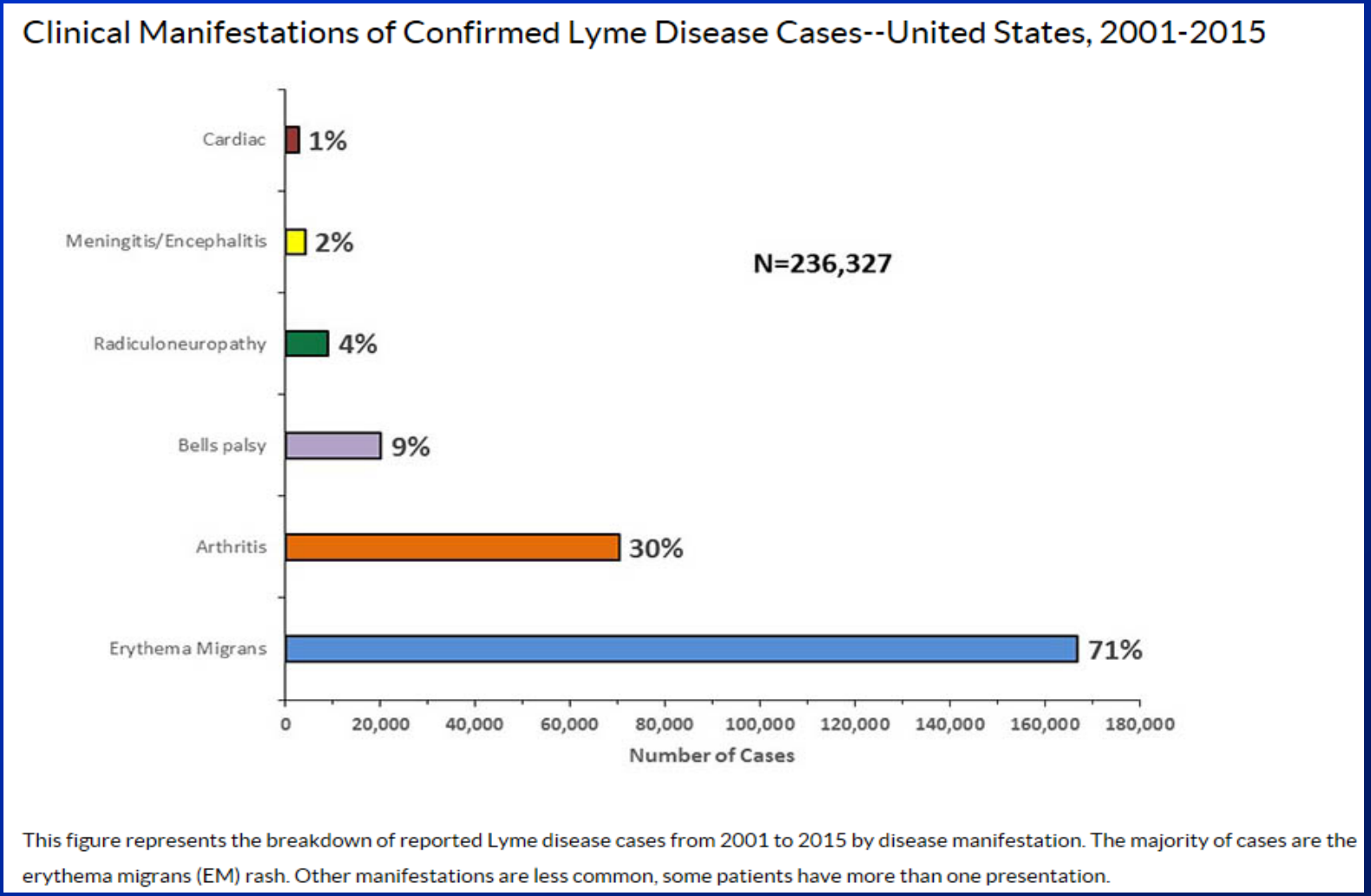
EARLY LYME DISEASE

- Erythema migrans (expanding red rash)
- Fatigue, headache, stiff neck
- Pain or stiffness in muscles or joints
- Bell’s palsy
- Slight fever
- Swollen glands or conjunctivitis

LATE LYME DISEASE

- **Joints**
- **Heart**
- **Nervous system**
- **Skin**

Clinical Manifestations of Confirmed Lyme Disease Cases in U.S., 2001-2015



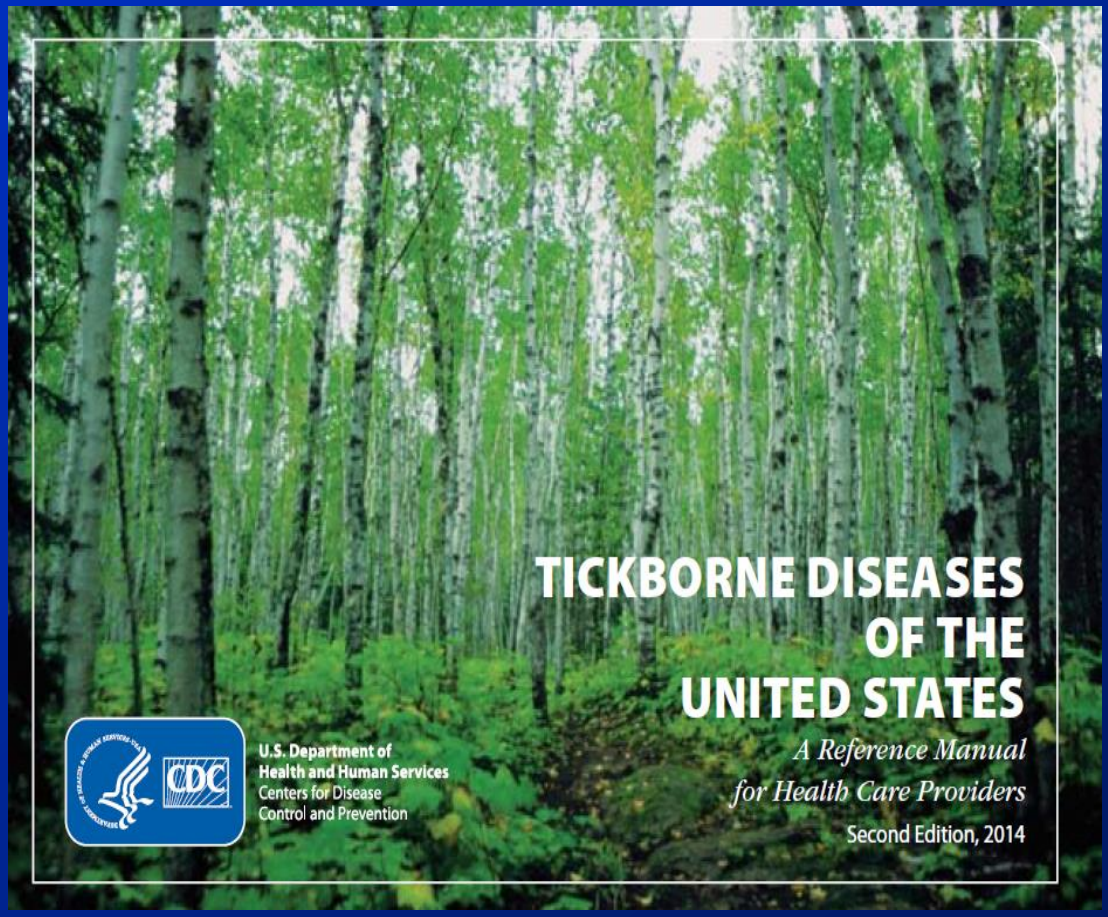
This figure represents the breakdown of reported Lyme disease cases from 2001 to 2015 by disease manifestation. The majority of cases are the erythema migrans (EM) rash. Other manifestations are less common, some patients have more than one presentation.

Lyme Disease and Pets

- Fever
- One or more swollen, hot, painful joints
- Severe pain and/or reluctance to move
- Intermittent lameness
- Poor appetite

Other tick-borne diseases

- Anaplasmosis
- Babesiosis
- Ehrlichiosis
- Rocky Mt. Spotted Fever
- Tularemia
- Powassan
- Colorado Tick Fever
- Tick-borne Relapsing Fever



Take Precautions

- Before returning indoors - check for ticks
- Inspect your body, children, and pets
- Search through hair, around hairlines
- Inspect body folds
- Wash clothing after outing

Take Precautions - Outdoors

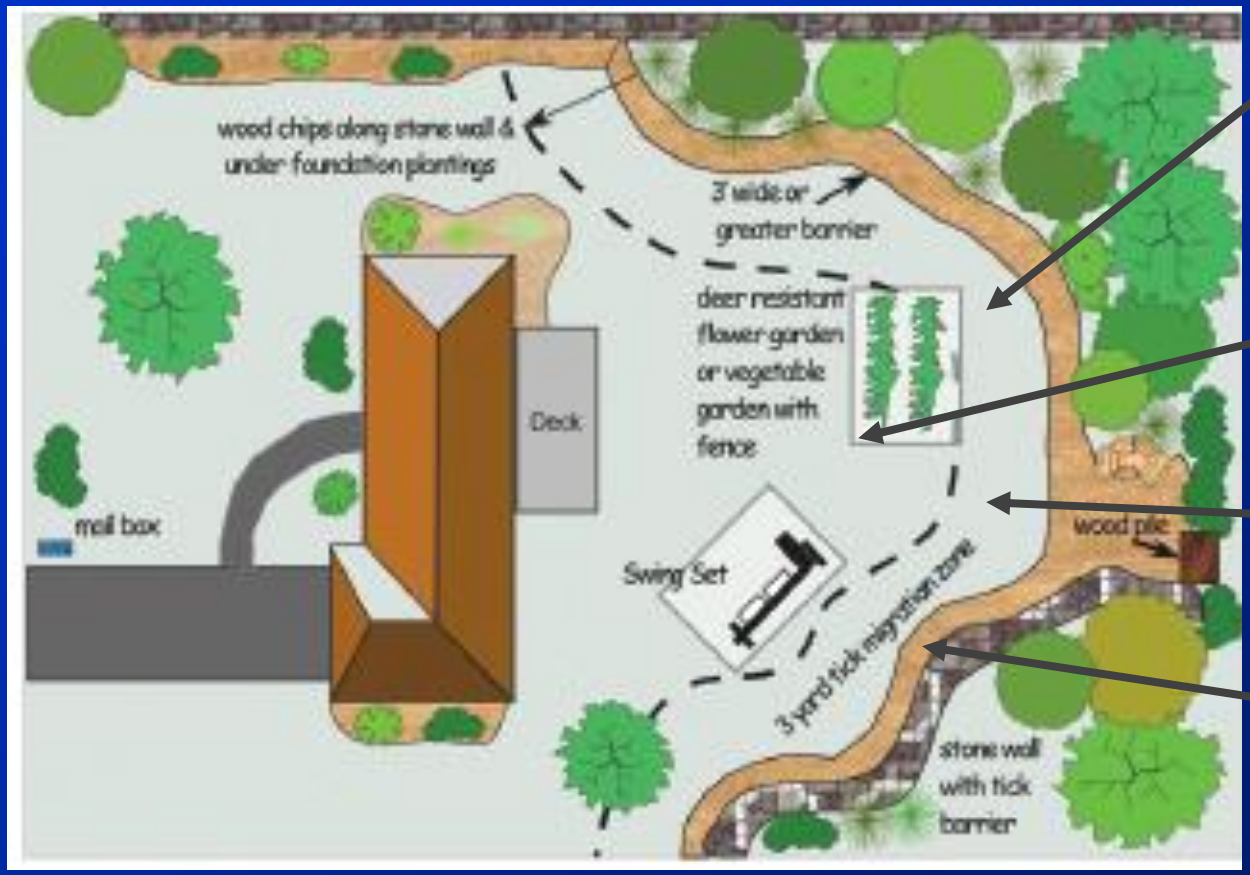
- Wear light color clothing
- Wear closed shoes
- Wear socks pulled over pants
- Use repellents containing DEET or permethrin (on clothing only)
- Protect your pets

Control Measures for the Yard

- Keep lawn mowed
- Clear leaves and brush
- Move potential mouse nesting sites (rock walls, wood piles) away from house
- Move bird feeders away from house
- Consider using an acaricide or hire licensed applicator

Pre-Exposure Lyme Disease Environmental Intervention

"Tick Management Handbook", K. Stafford, CT Ag Exp Station



Plant shrubs/trees less palatable to deer

Remove leaf litter

Keep grass cut short

Create border with dry wood chip

For more info:

CT Agricultural Experiment Station
portal.ct.gov/CAES

CDC:
cdc.gov/ticks

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Other Biting Flies

Greenhead Fly (Tabanidae)

Coastal saltmarshes

Horse and Deer Flies (Tabanidae)

Brackish and freshwater wetlands/mud

Biting midges ("No-See-Ums") (Ceratopogonidae)

pond bottoms and coastal marshes

Black Flies (Buffalo gnats) (Simuliidae.)

freshwater streams and rivers

Stable Fly (Muscidae)

compost, manure, rotting vegetation

House fly

Bedbugs (Hemiptera)

OK, so it's not a fly…