Eastern Equine Encephalitis in New Hampshire and Massachusetts

Jason Stull, VMD, MPVM
Dianne Donovan, BSc
New Hampshire Dept Health & Human Services

Katie Brown, DVM, MSc, MPH
Cindy Stinson, D.Sc
Massachusetts Dept Public Health

Division of Public Health Services
New Hampshire Department of Health and Human Services

NH & MA Arboviral Surveillance Programs

- **<u>Surveillance</u>**

  NH: Town/city & minimal state-funded mosquito surveillance

  MA: MCPs & state-funded long-term trap sites

- **<u>State Public Health Laboratory Testing</u>**

  Mosquito, suspect human and veterinary cases, ± dead birds

EEE Transmission Cycle

Mosquito vector

Bird reservoir

EEE Transmission Cycle

Mosquito bridge vector

Bird reservoir

NH's EEE History

- **1970s and 1980s: several epizootics (horses); suspect human case (1980)**

Inclusion of EEEv in State arboviral surveillance program

- **2004: First detection of EEEv since 1982**
  - **3 horses, 3 emus and mosquito pools (19/1,180)**
- **2005: EEEv human outbreak**
  - **7 human cases (2 died)**
 - **9 horses, 4 alpacas, 1 llama, 2 emus, 54 wild dead birds, and mosquito pools (15/3,969)**

NH's EEE History

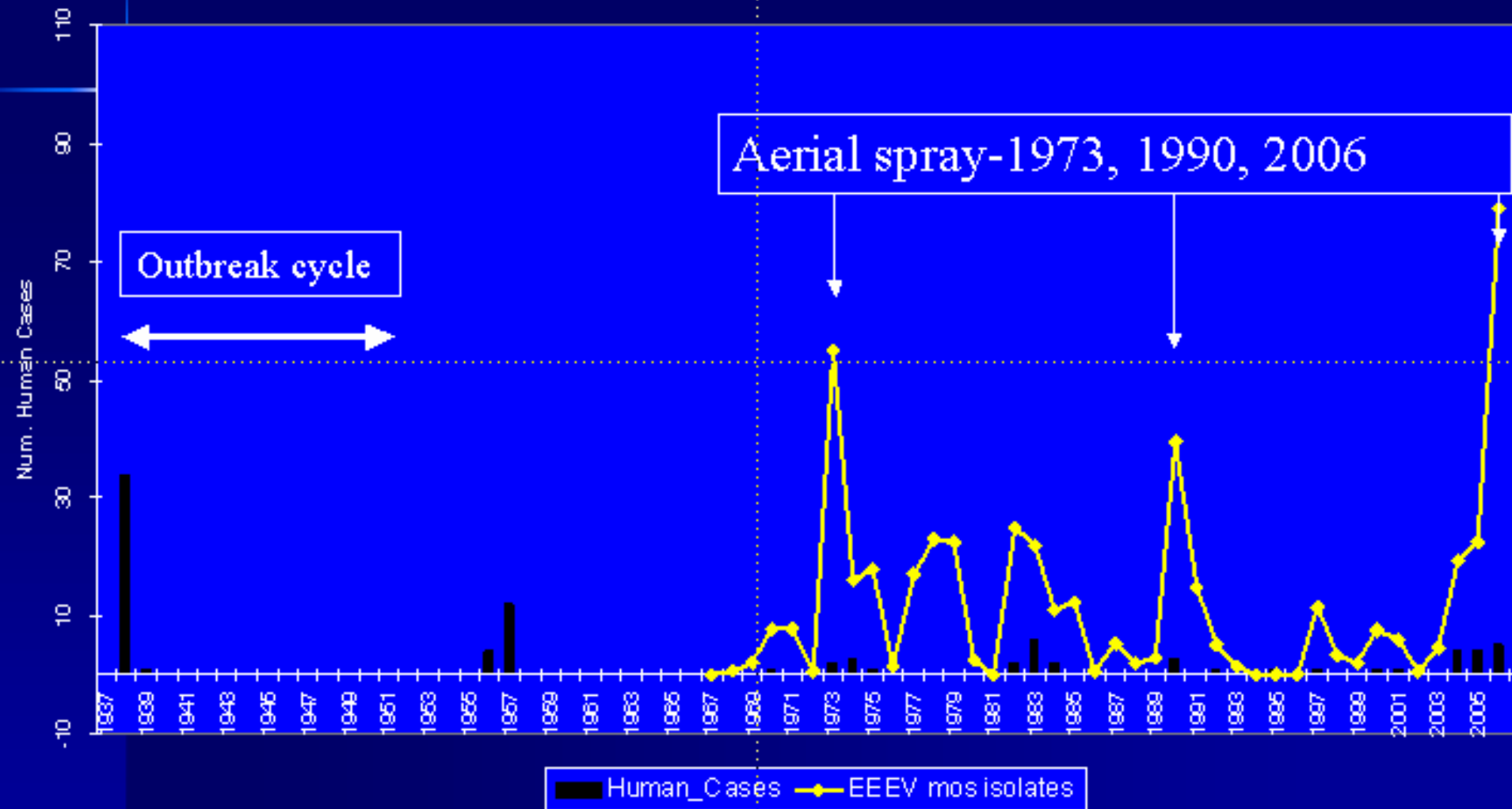**Further development of local and State EEEv surveillance**

- **2006: High EEEv activity**
  - **Horse, 5 wild dead birds, mosquito pools (40/11,682)**
- **2007: EEEv human outbreak**
  - **3 human cases (0 deaths)**
  - **1 horse, 1 alpaca, and mosquito pools (6/10,674)**

Eastern Equine Encephalitis – Positive Test Results, 2003-2007
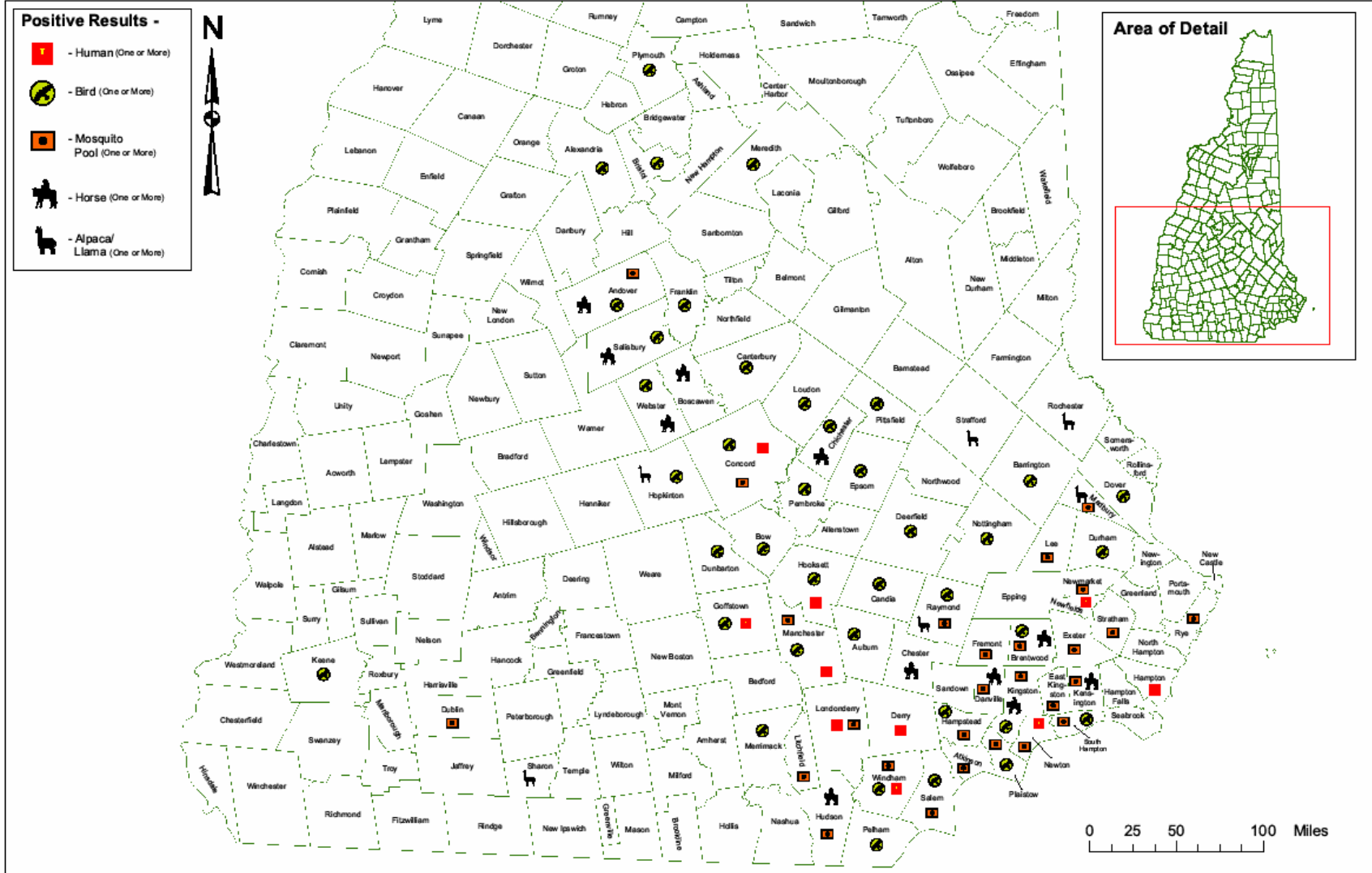
Division of Public Health Services
New Hampshire Department of Health and Human Services

Massachusetts 1938-2006:
Human EEE and EEEV Mosquito Isolates

Aerial spray-1973, 1990, 2006

Outbreak cycle

Human_Cases   EEEV mos isolates

Arbovirus Surveillance Program
Massachusetts Department of Public Health

MA's Recent EEEV Outbreak

2004

4 Human
7 Equine
1 Emu
1 Alpaca
39 Mosquito pools

2005

4 Human
4 Equine
1 Emu
45 Mosquito pools
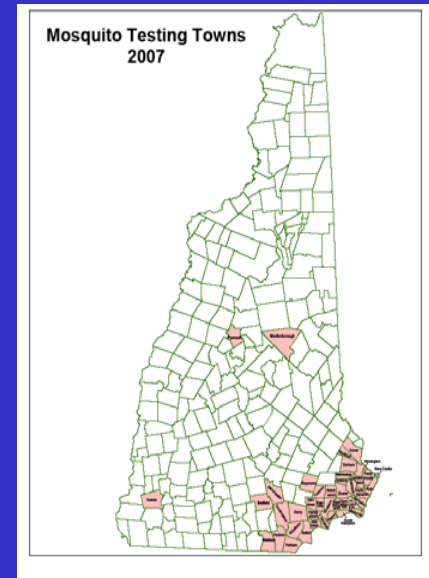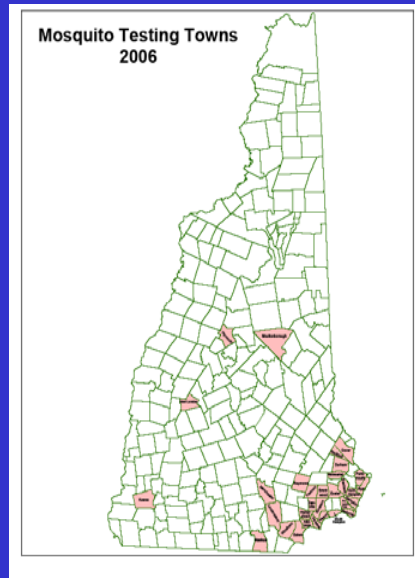
2006

5 Human
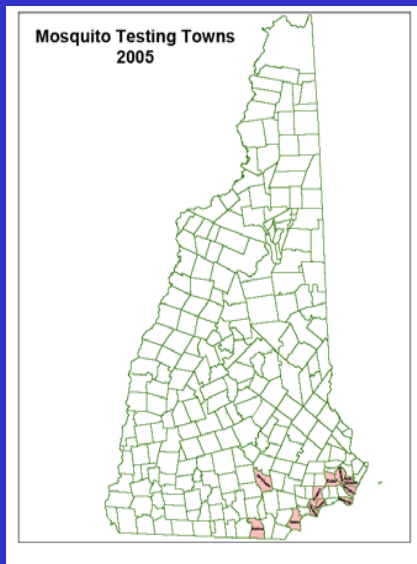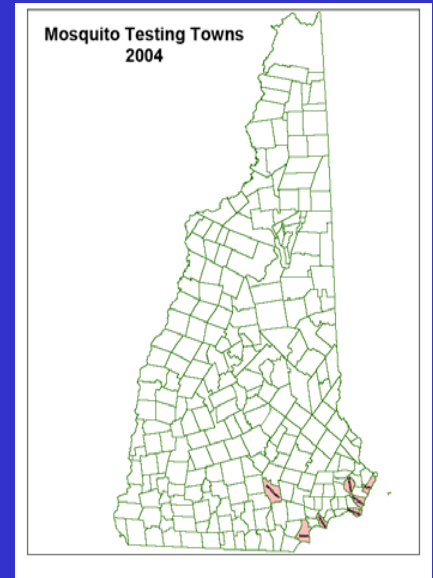6 Equine
1 Llama
157 Mosquito pools

Lessons Leaned?

Division of Public Health Services
New Hampshire Department of Health and Human Services

NH: Developing a Sustainable Surveillance System

- **WNV as a building block**
  - **Local interest temporally and geographically variable**

Division of Public Health Services
New Hampshire Department of Health and Human Services

Town and State Sponsored Mosquito Testing
2001 · 2002 · 2003 · 2004 · 2005 · 2006 · 2007
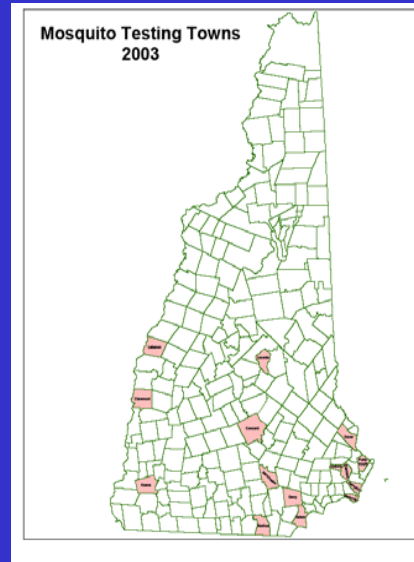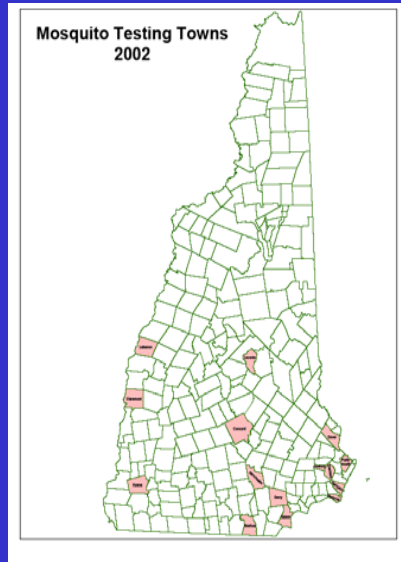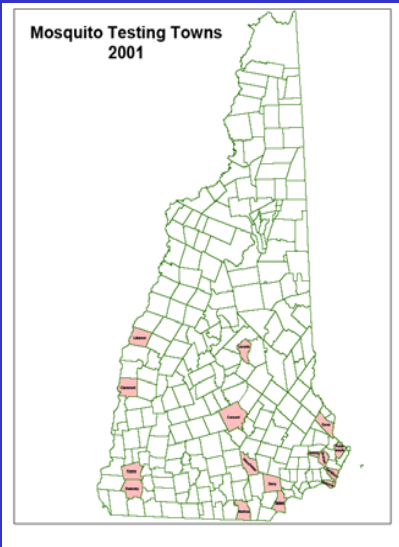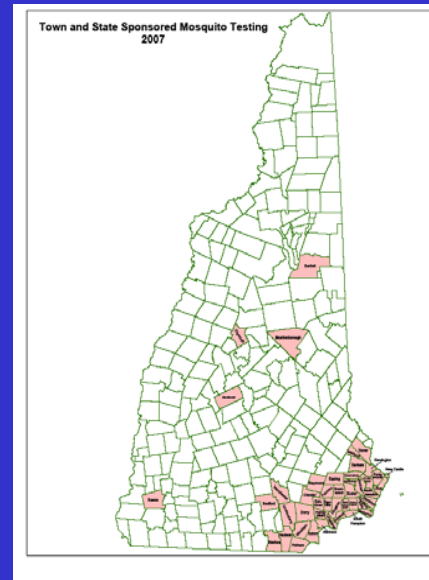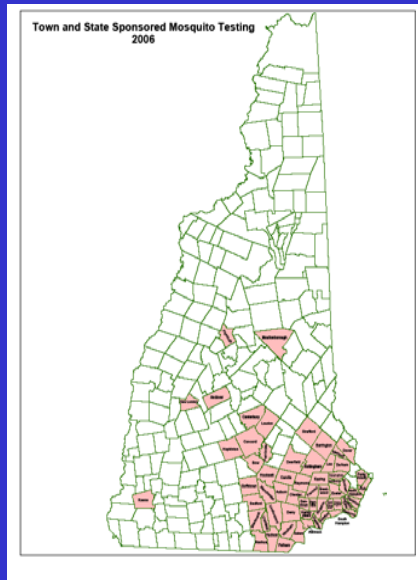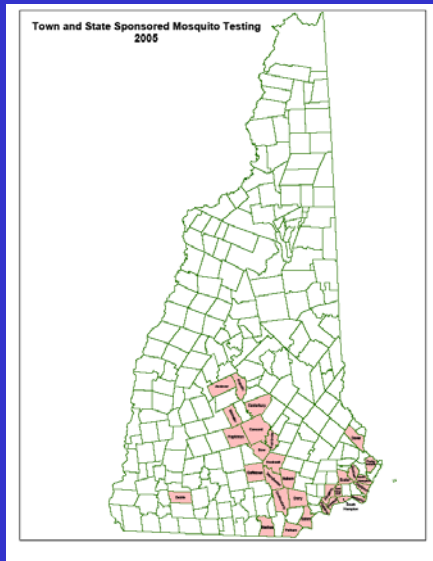
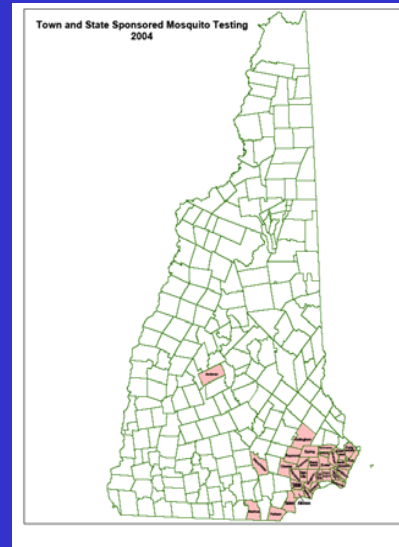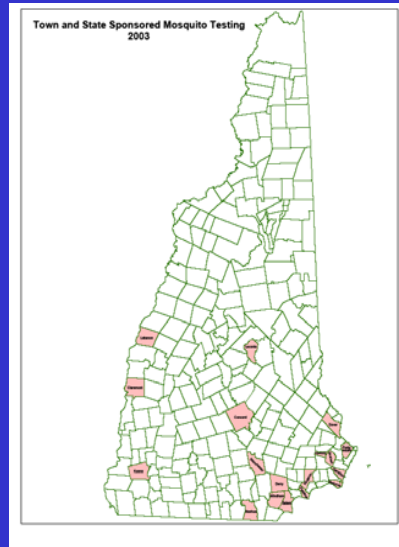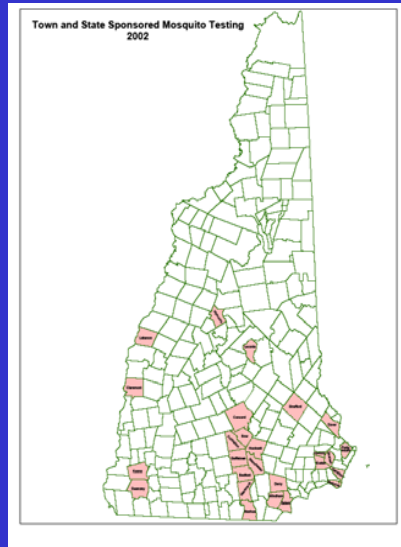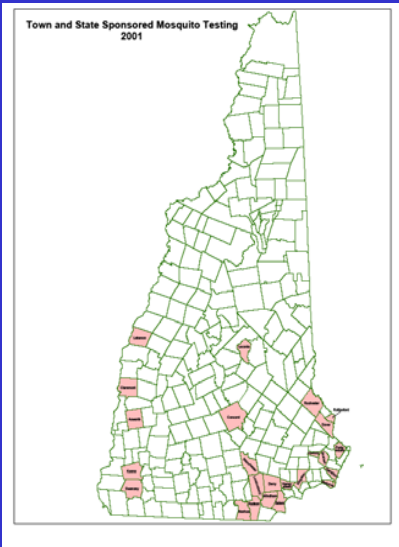**Division of Public Health Services**
New Hampshire Department of Health and Human Services

Developing a Sustainable Surveillance System

- **WNV as a building block**
  - **Local interest temporally and geographically variable**
    - **Intense education and program development**
    - **Financial "carrots"**
  - **Dead bird surveillance**

NH: 2005 Dead Bird Results

Developing a Sustainable Surveillance System

- **WNV as a building block**
- **Timeliness, validity…**

2005 EEEV Results
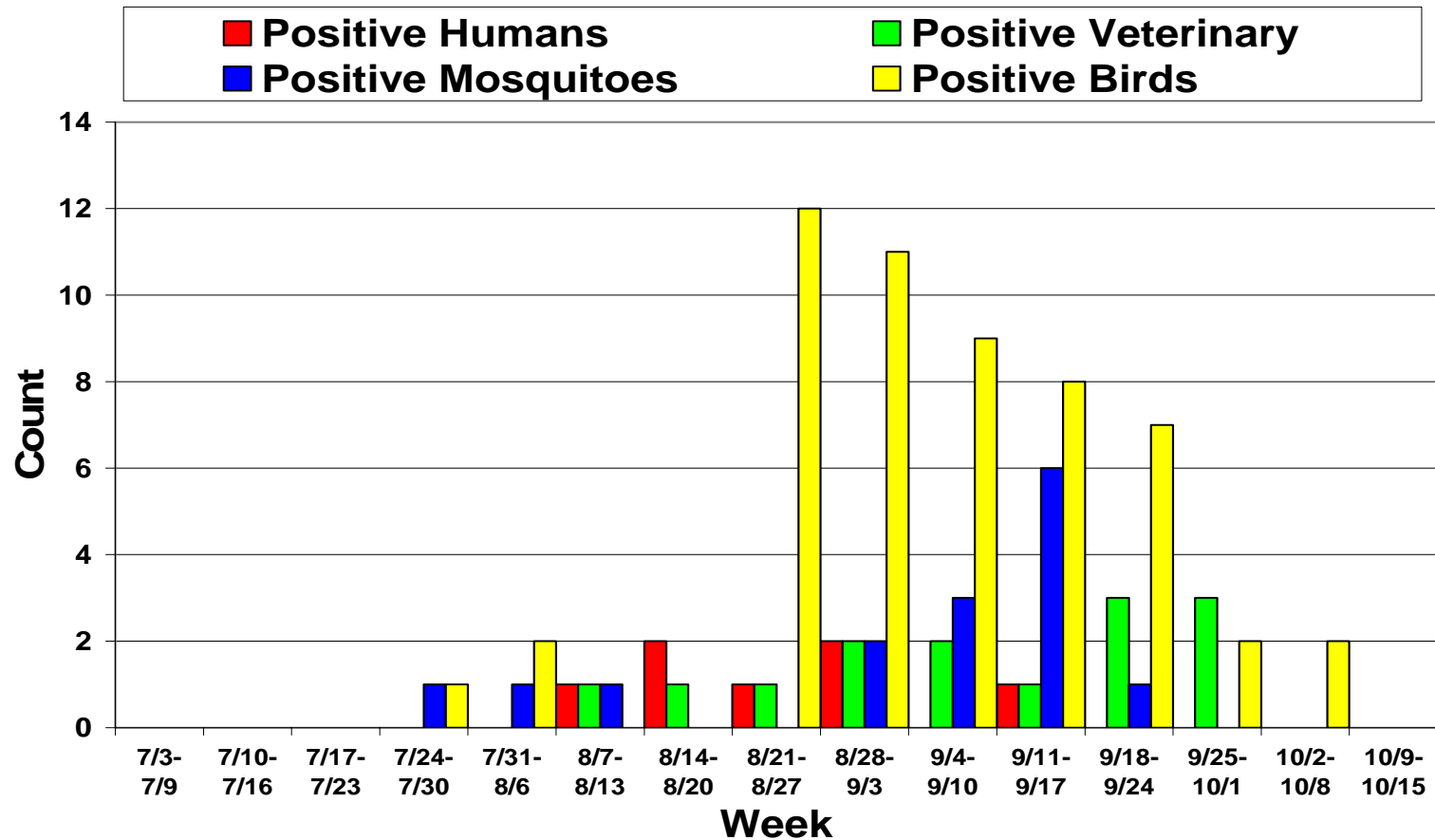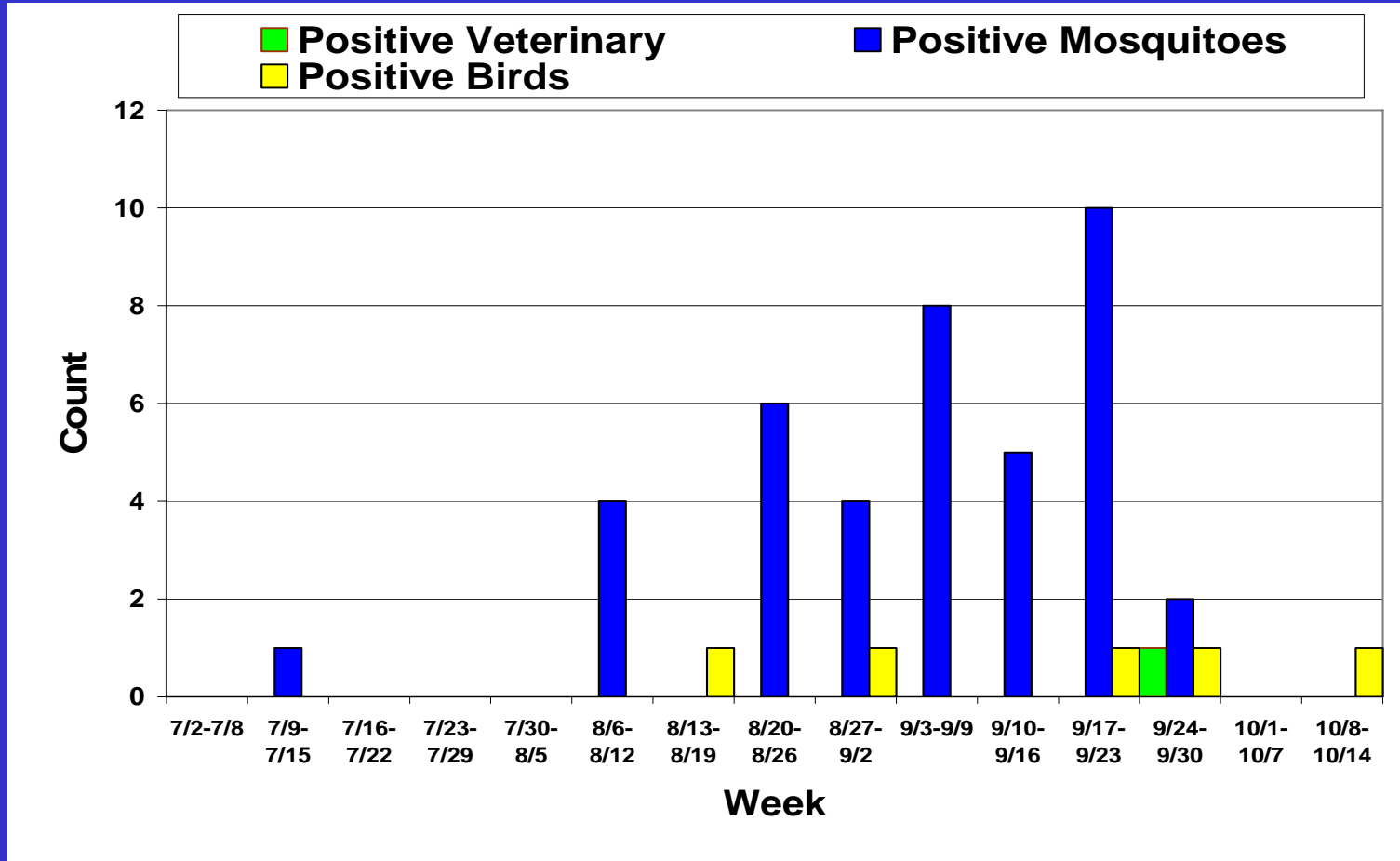
2006 EEEV Results
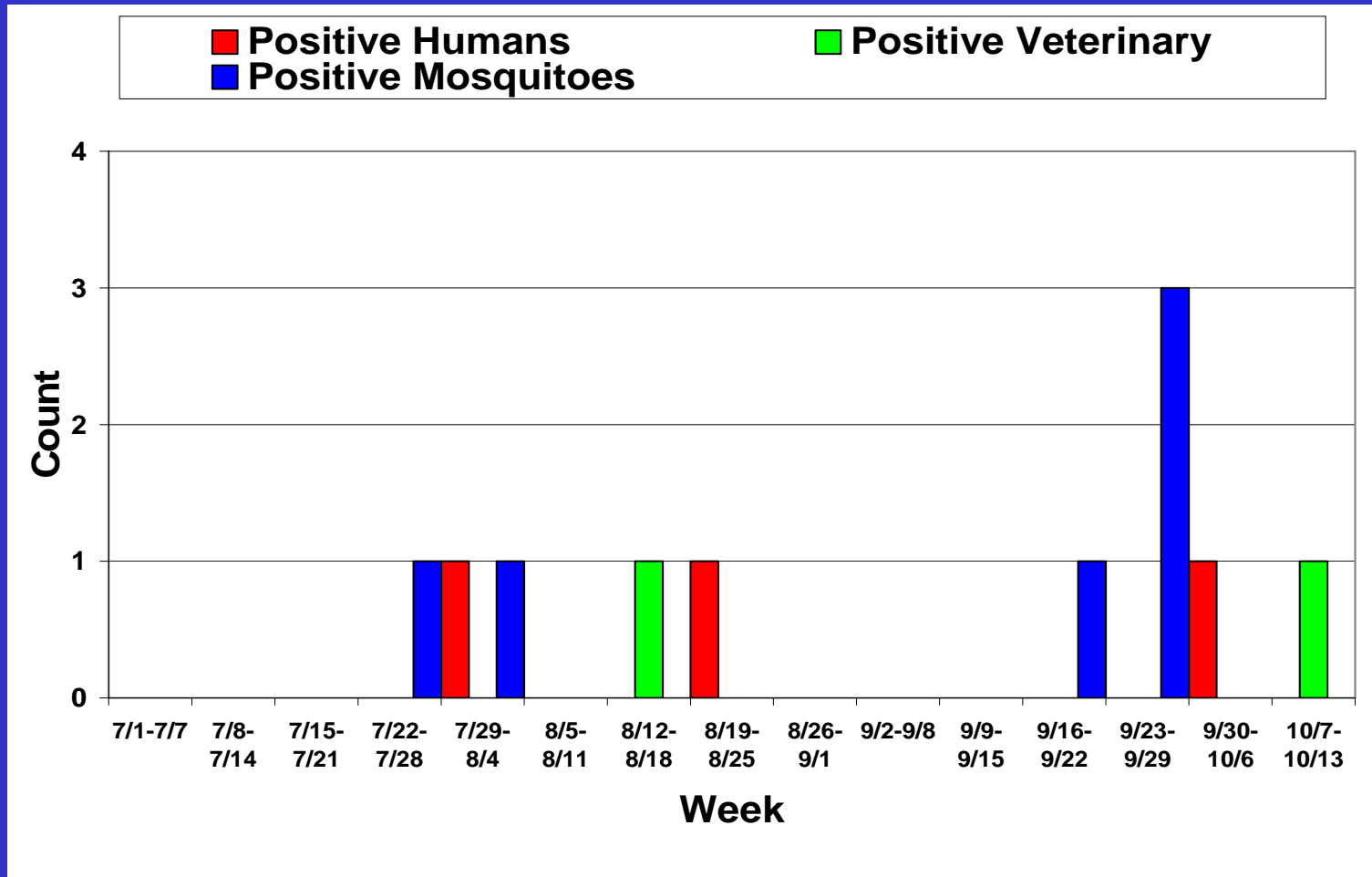
2007 EEEV Results

Annual Collection of EEE Species

NH: Developing a Sustainable Surveillance System

- **Timeliness, validity…**
  - Short lag between detection of virus by surveillance system and human case onset
  - Best for regional measures of risk
  - No concrete association of MIR, abundance, or # EEEV pools with epizootic activity
    - "Fine tuning" NH's mosquito surveillance system
    - Not the case in MA

MA: Timeline of Arboviral Activity, 2006

Time Period	Risk Indicators
Pre-Season	**-Prior year activity, mild winter, elevated groundwater**
Early Season	**--Wet spring, larval counts, abundance levels**
July	**-EEEV Isolates, MIR, abundance, onset of EEE in horse**
Aerial Spray: August 8, 2006	
Post- Spray	**EEEV Isolates, MIR, onset of human cases**
Aerial Spray: August 22-24, 2006	

New Hampshire Department of Health and Human Services

NH & MA: Risk Communication

- **Challenge of low incidence & high morbidity/mortality illness; juvenile cases**
- **Importance of aggressive media campaign**
  - **Press conferences highlighting disease risk and precautions**
  - **Education through websites, media, local officials**
  - **Targeted education to higher-risk populations**
- **Frequent updates to surveillance results (MA: daily)**

NH & MA: Agency Communication

- **Communications with local, regional, and federal partners**
  - **Prior, during and post-season**
- **Immediate surveillance updates to key stakeholders**
- **HAN announcements**
- **Weekly summary reports**

MA: Interactions with the Public and Public Representatives

Stakeholders:
- ❖ **Public health – state and local**
- ❖ **Vector control**
- ❖ **Patient advocates/families**
- ❖ **Environmentalists**
- ❖ **State legislators**

DPH Message:

Data suggests aerial spray was effective in breaking transmission cycle

Public Interpretation:

Stakeholders held conflicting viewpoints which resulted in both support and criticism of the aerial spray event

NH & MA: Post-Season Inter-Agency Collaboration

- **Strategies to Strengthen Public/State/Advocacy Group interactions:**
  - **Workgroups with multiple stakeholder involvement**
  - **Clarification of agency roles/responsibilities – put in writing for distribution**
  - **Continued review and improvements of DPH response plan based on risk levels**

Updated Response Plan: Defined Risk levels

- **Separate guidelines for WNV and EEE**
- **Risk category assigned based on surveillance, ecosystem, and climatic data**
- **Risk category corresponds with probability of human outbreak:**
  - **Risk Category 1-5 (Remote - Critical Probability)**
- **Each category has set of recommended responses**
- **As surveillance data changes, the risk category changes**

MA: Risk Category 5 - Critical

Recommended Response:

- **Recommend restriction of outdoor activities during peak mosquito activity hours**

- **Confer with partner agencies to determine response - may include aerial spraying**

- **Initiate active surveillance of emergency rooms and health care providers in the event of aerial spraying**

- **Designate high-risk areas where individual no-spray requests may be pre-empted**
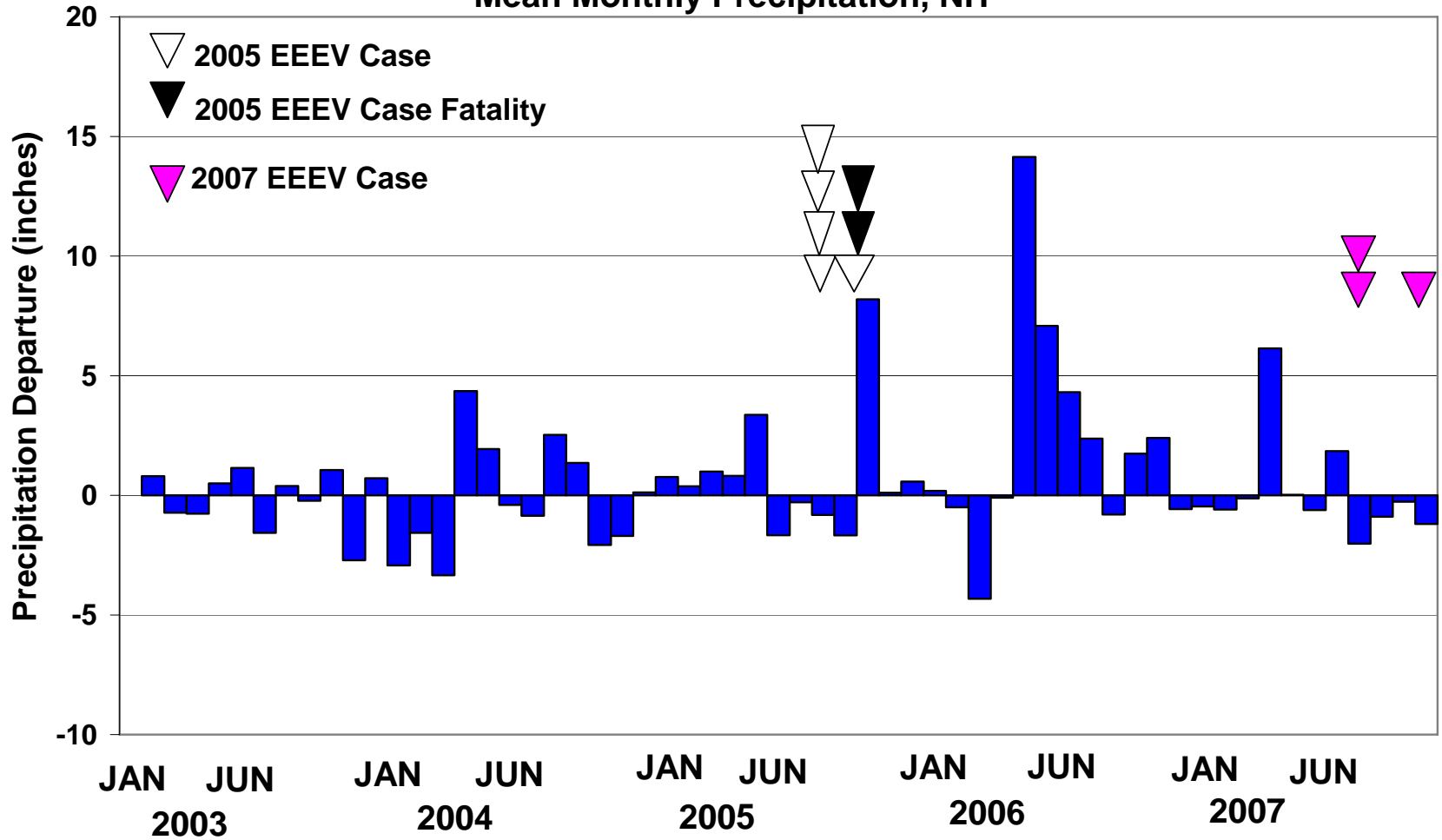
NH & MA: Risk Levels and Risk Communication

- **Risk levels defined at "focal area" unit, determined by DPH**

- **Frequent updates to public and stakeholders**

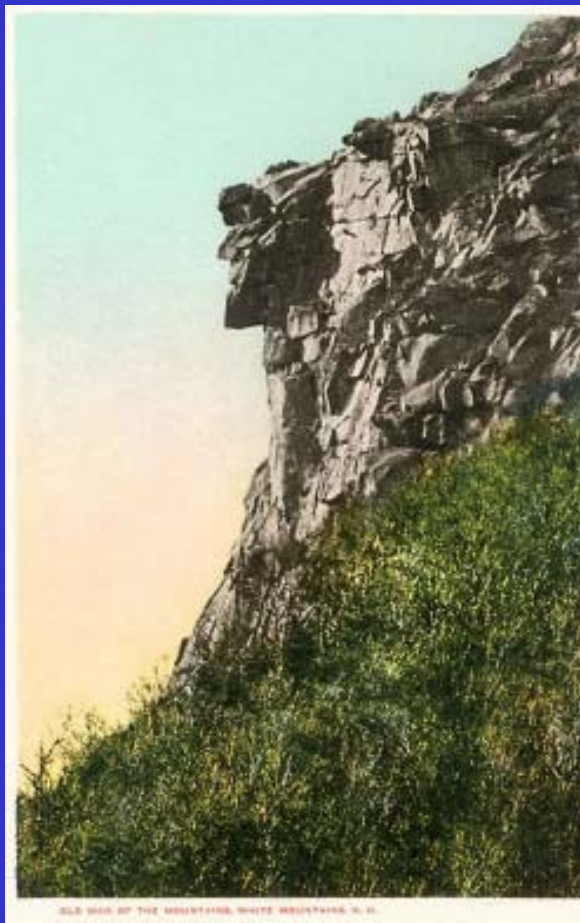- **Improves risk communication and prevention messaging**

Why NH in 2004-2007?

- **History of EEEV activity in NH**
- **Improved surveillance**
- **Introduction of novel variant?**
  - **Research in MA indicates that EEEV genetic variants exist and there are geographically independent foci**
- **Changes in abundance of vector species?**
- **Weather?**

Division of Public Health Services
New Hampshire Department of Health and Human Services

Questions?

Division of Public Health Services
New Hampshire Department of Health and Human Services