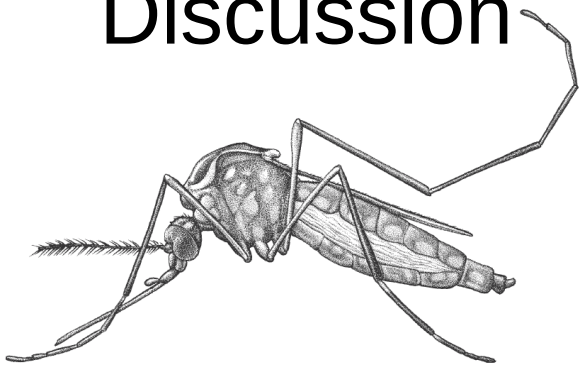
NACCHO Vector Control Summit: Pittsburgh, PA April 16, 2019

Integrated Mosquito Management Panel Discussion



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Director, Gem Co. MAD

President, American Mosquito Control Association

NACCHO
National Association of County & City Health Officials
The National Connection for Local Public Health

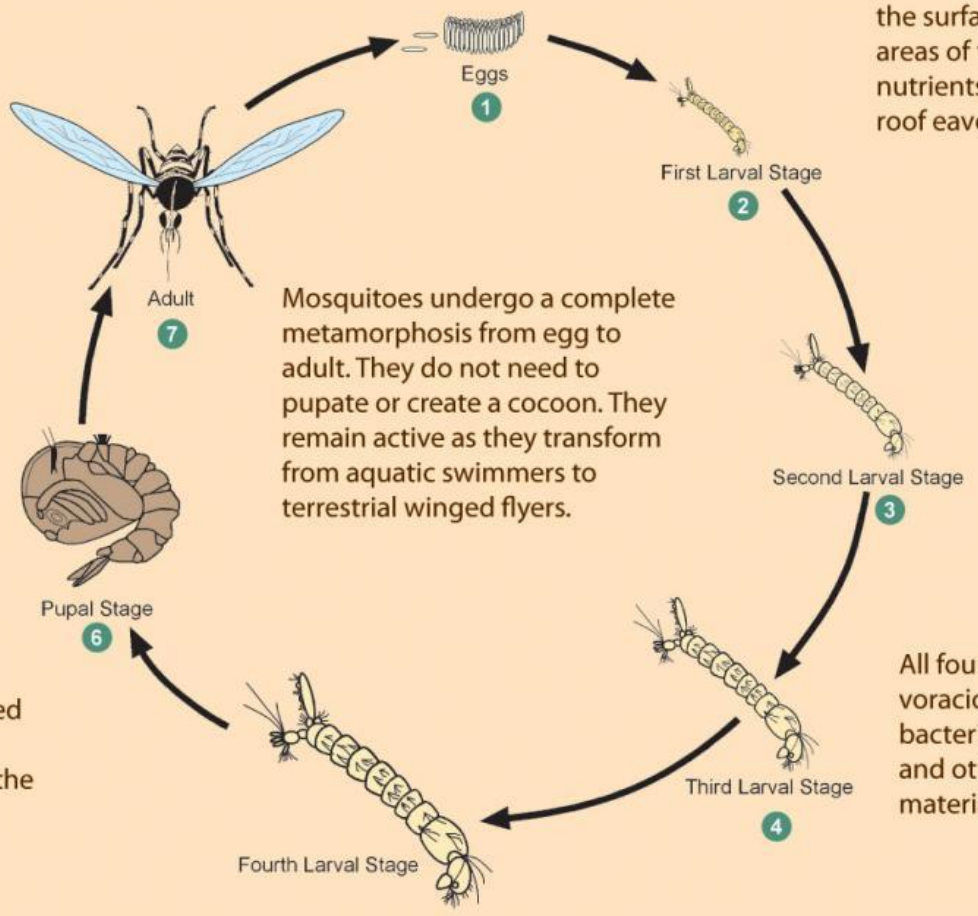
GEM COUNTY MOSQUITO ABATEMENT DISTRICT

AMCA®
THE AMERICAN MOSQUITO CONTROL ASSOCIATION

How We Control Mosquitoes…

- Integrated Mosquito Management (IMM)
  - An effective program that utilizes a combination of techniques to control mosquitoes at all life stages.
    - **Mosquito biology, ecology, identification**
    - **Surveillance and monitoring**
    - **Rational setting of action thresholds**
    - **Mapping and data visualization**
    - **Control techniques**
    - **Outreach and public education**
    - **Recordkeeping**
    - **Pesticide resistance monitoring**
    - **Environmental stewardship**

Life Cycle of the Mosquito



After resting to dry its wings, the adult flies off. A female usually mates only once, carrying the male's sperm inside her body to fertilize eggs as she lays them.

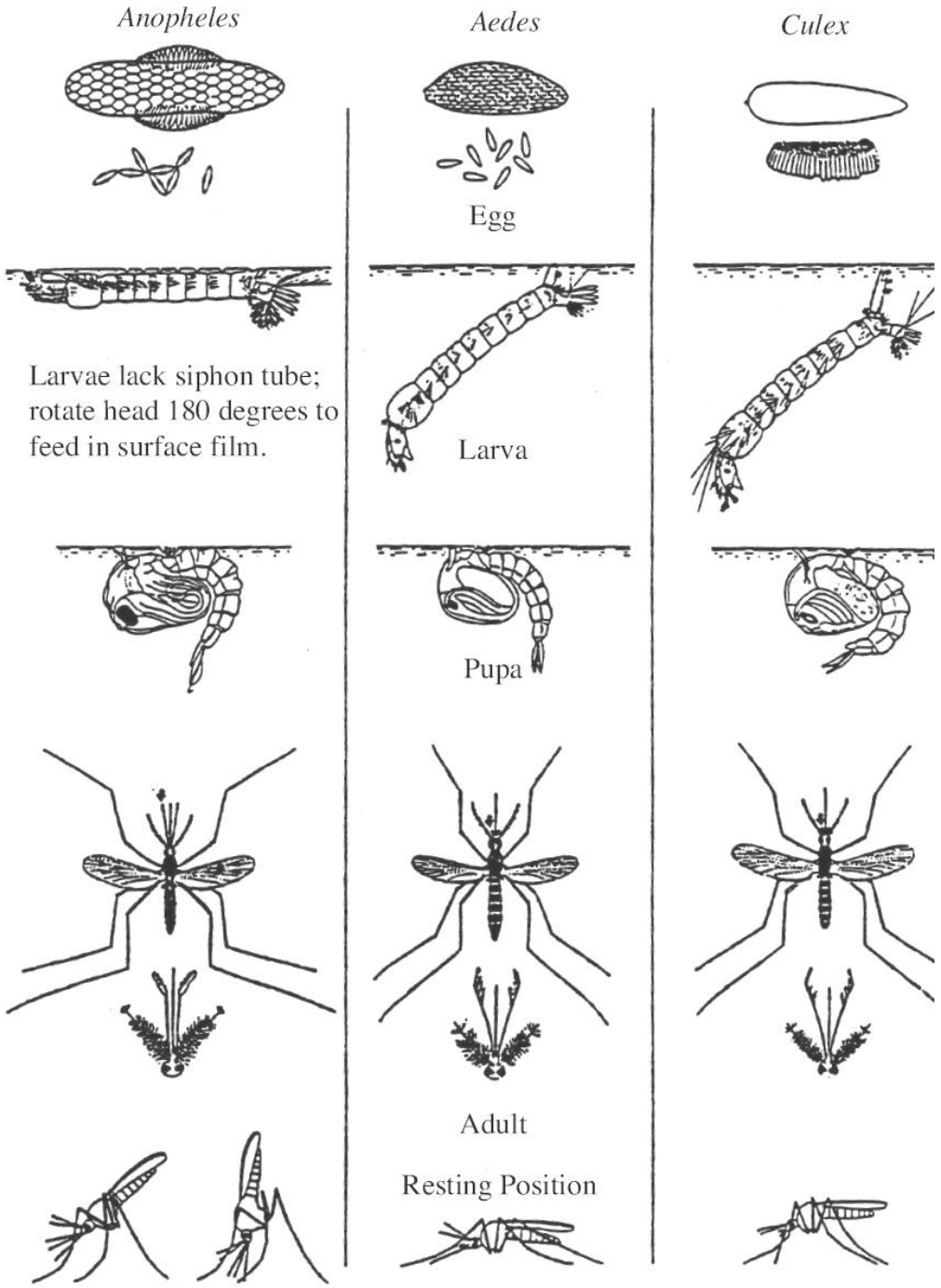
Females lay 100 to 250 eggs individually or in clusters on the surface of small confined areas of water rich in organic nutrients, such as birdbaths, roof eaves and tires.

Mosquitoes undergo a complete metamorphosis from egg to adult. They do not need to pupate or create a cocoon. They remain active as they transform from aquatic swimmers to terrestrial winged flyers.

In about 10 days, the larva changes to a comma-shaped pupa. Two days later, after developing adult features, the pupa emerges as an adult mosquito.

All four larval stages are voracious eaters, devouring bacteria, fungal spores, algae and other microscopic organic material in the water.

Diagram taken from Yale Peabody Museum of Natural History – Yale University: http://peabody.yale.edu/exhibits/bloodsuckers/mosquito


Anopheles
Aedes
Culex
Egg
Larvae lack siphon tube; rotate head 180 degrees to feed in surface film.
Larva
Pupa
Adult
Resting Position

Mosquito Ecology and Behavior

- When are mosquitoes are actively host seeking?
- When do mosquitoes rest and fly?
- Understanding ecology/behavior allows for maximum control
    - It also allows for providing public advice

Mating swarms of *Ae. vexans*

Insect/Mosquito Identification

Culex spp.

Aedes spp.

- Determines what is causing the problem:
  - What mosquito species:
    - *Culex* species
      - Primarily vectors of WNv
    - *Aedes* species
      - Primarily nuisance mosquitoes
      - Zika virus vectors (*Ae. aegypti* and *Ae. albopictus*)

Surveillance and Monitoring

- Determines mosquito source

- Determines mosquito population numbers and timing of control efforts

- Determines if mosquito-borne viruses are present in mosquitoes so the Agency can act to limit transmission of disease

Surveillance and Monitoring

- Larval mosquito surveillance techniques:
  - Observation
  - Dipping – preferred method
    - Where to Dip?
      - In open water
      - Along banks
      - Under vegetation
      - Under grass hanging into water
    - How to Dip?

      “Seven Ways to Successful Dipping Career,” O’Malley, 1995

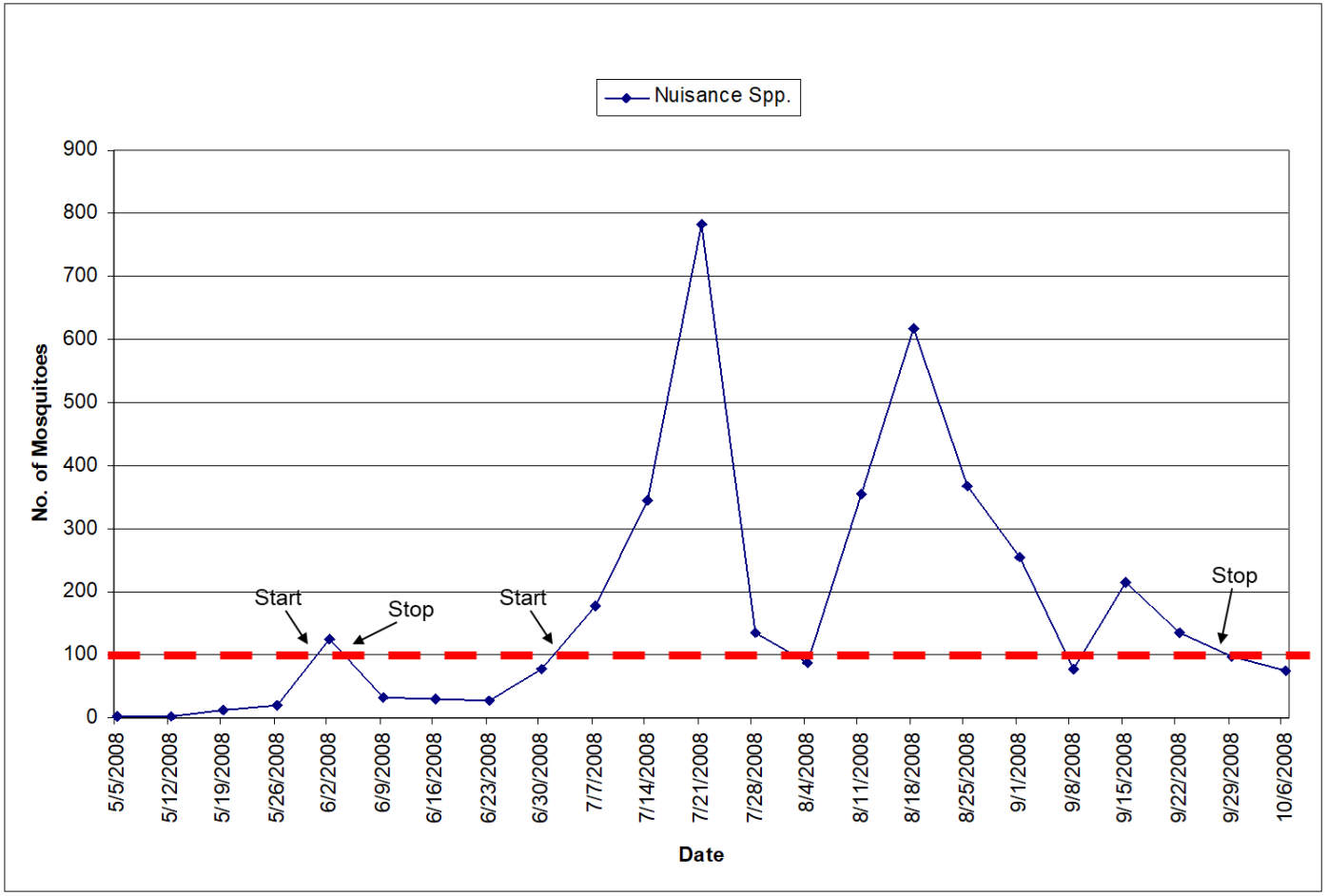
Surveillance and Monitoring

- Adult mosquito surveillance techniques:
  - Surveillance traps (many types)
    - CDC CO2-baited
    - BG Sentinel
    - Gravid
    - New Jersey
  - Citizen requests
  - Landing rates

BG Sentinel trap

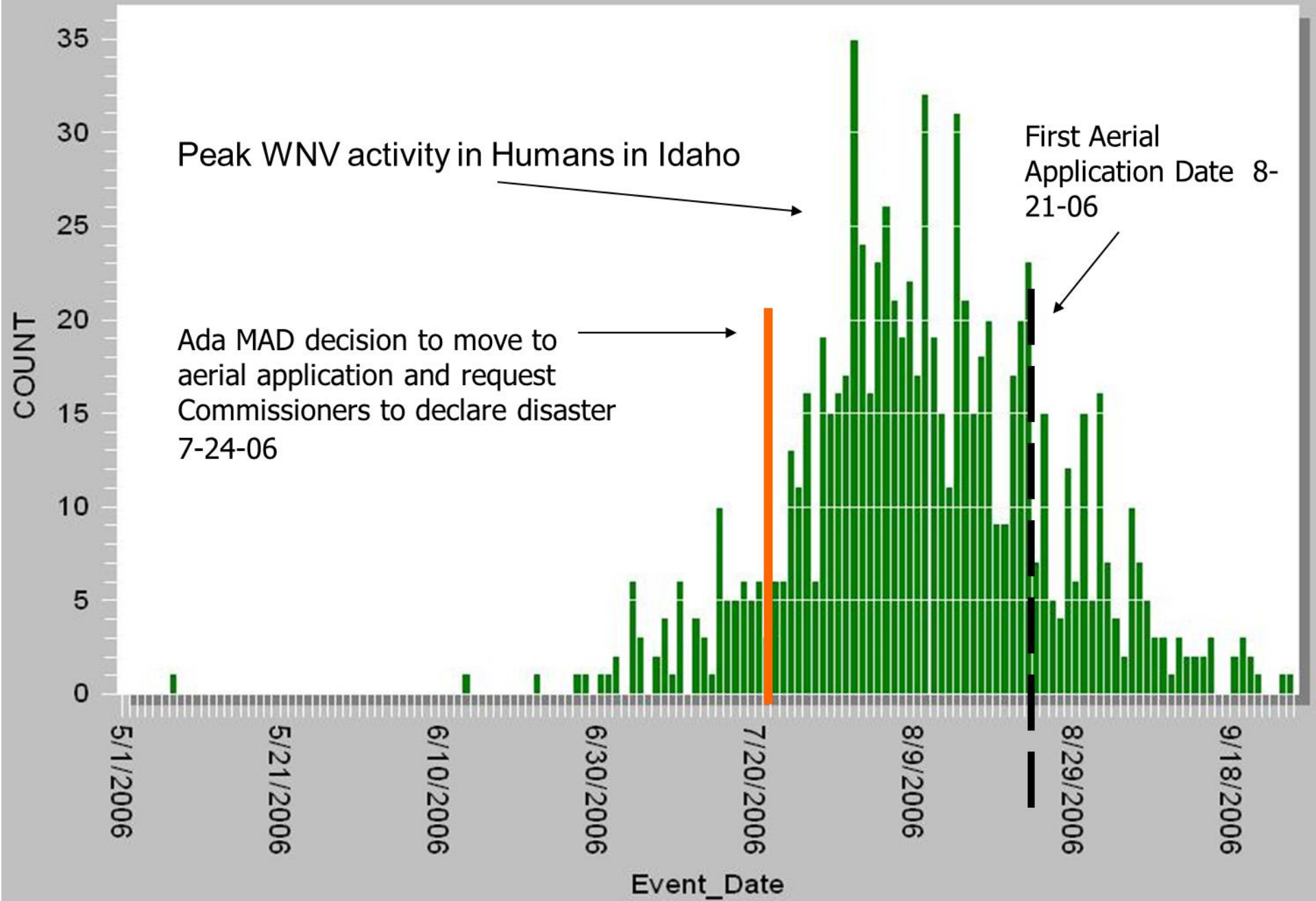
NJ Light Trap

The Surveillance Says?



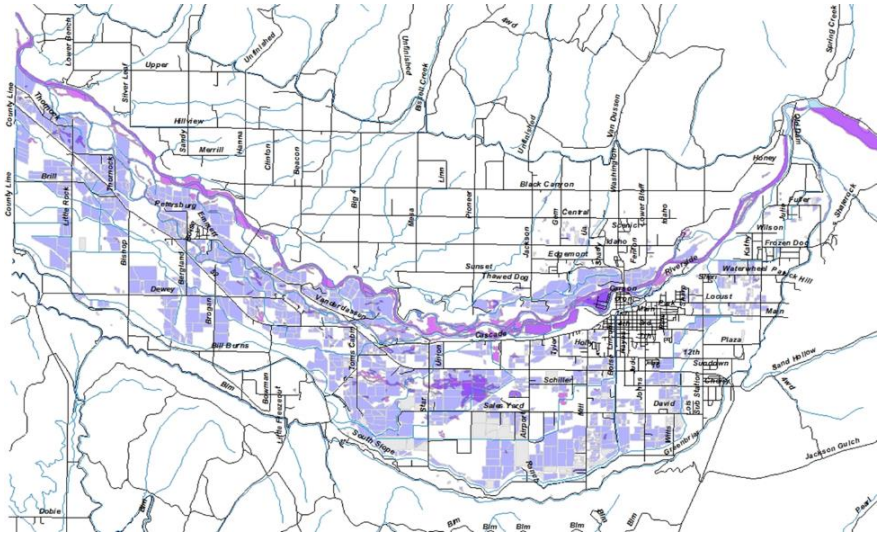
WNV cases (all classifications) by event* date, Idaho, 2006

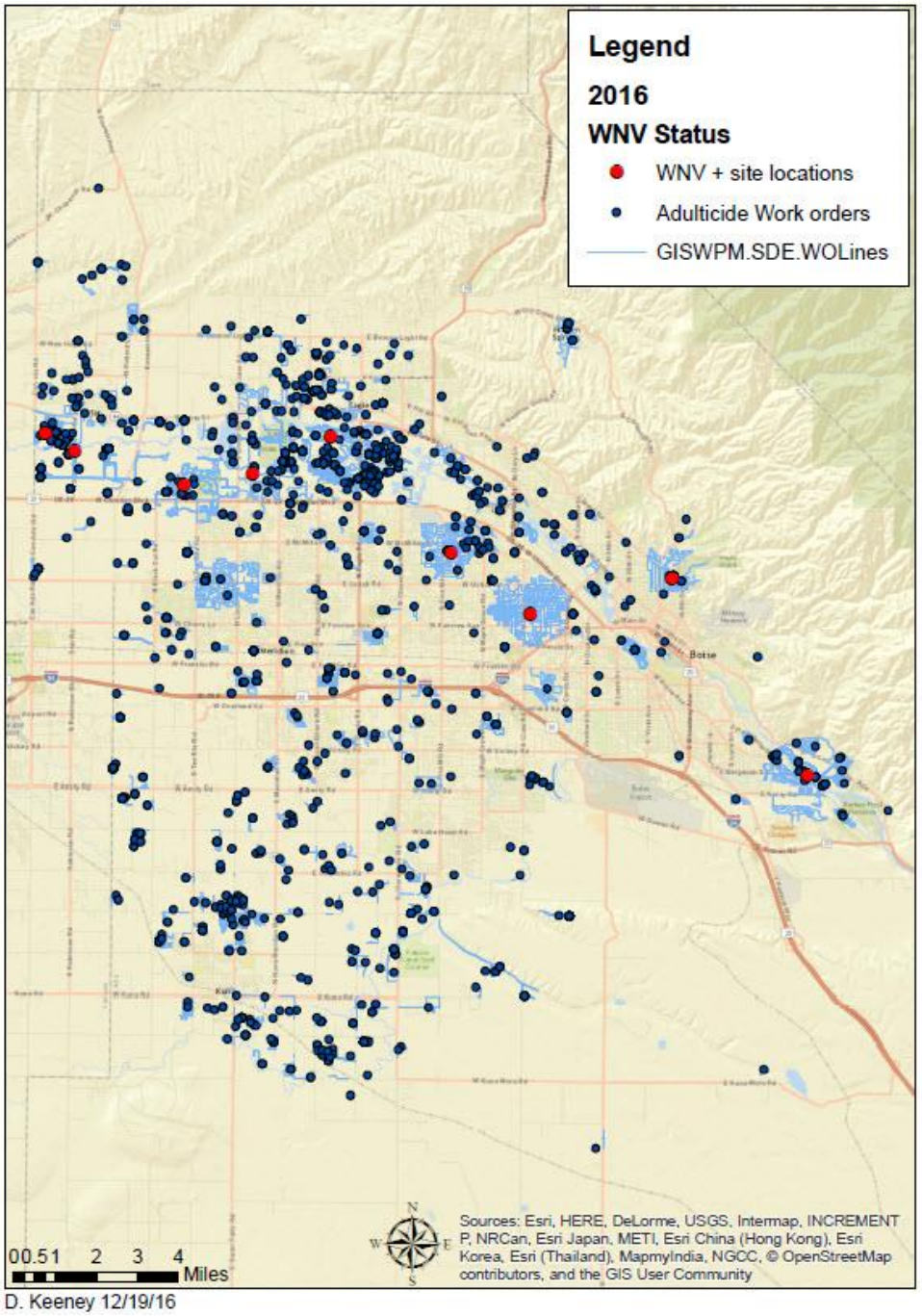
*Event date defaults to this order: onset, diagnosis, lab report, report to district, report to state, record creation date



Mapping

- Used to visualize surveillance data





D. Keeney 12/19/16

What We Use To Control Mosquitoes…

- Cultural Control:
  - Convince citizens to limit activity outdoors during times when mosquitoes are most active
  - Change an irrigation practice
- Physical Control:
  - Eliminate sources where mosquitoes can develop
- Biological Control:
  - Employ natural predators to reduce the number of mosquitoes
- Chemical Control:
  - Use insecticides to control mosquitoes

Cost Share Project SR2019-01

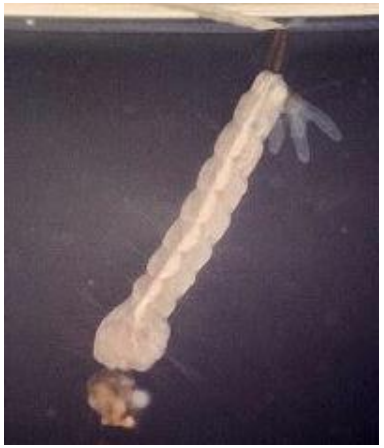
Larval mosquito control ATV unit

Integrated Mosquito Management

- The goal of IMM and control techniques:

  To control mosquitoes (or any pest) at all stages of the life cycle

Egg



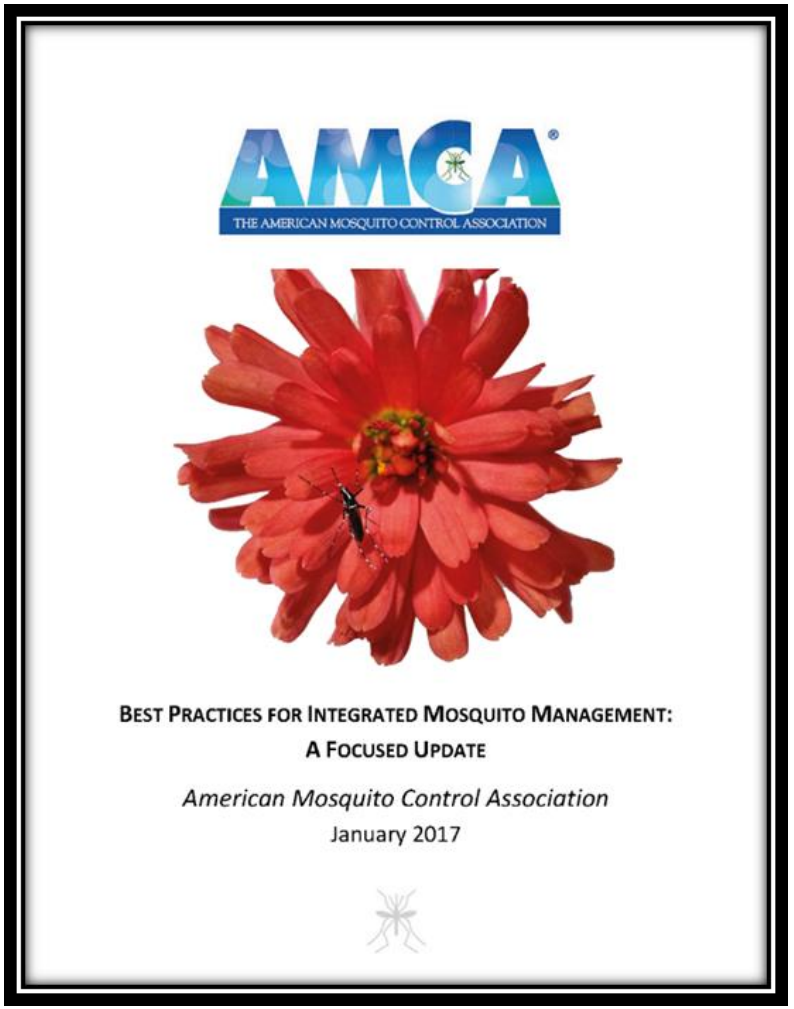
Larva

Pupa

Adult

Resources Available

- AMCA Best Practices Manual:
  - Recently updated from 2009 version by the AMCA expert advisory panel in 2017
  - Part of the CDC sole-source contract for Establishment of Training and Certification Programs for Mosquito Surveillance and Control
  - AMCA Website: www.mosquito.org



Thanks!!

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Desiree Keeney, Deputy Director

Ada County Weed, Pest, and Mosquito Abatement