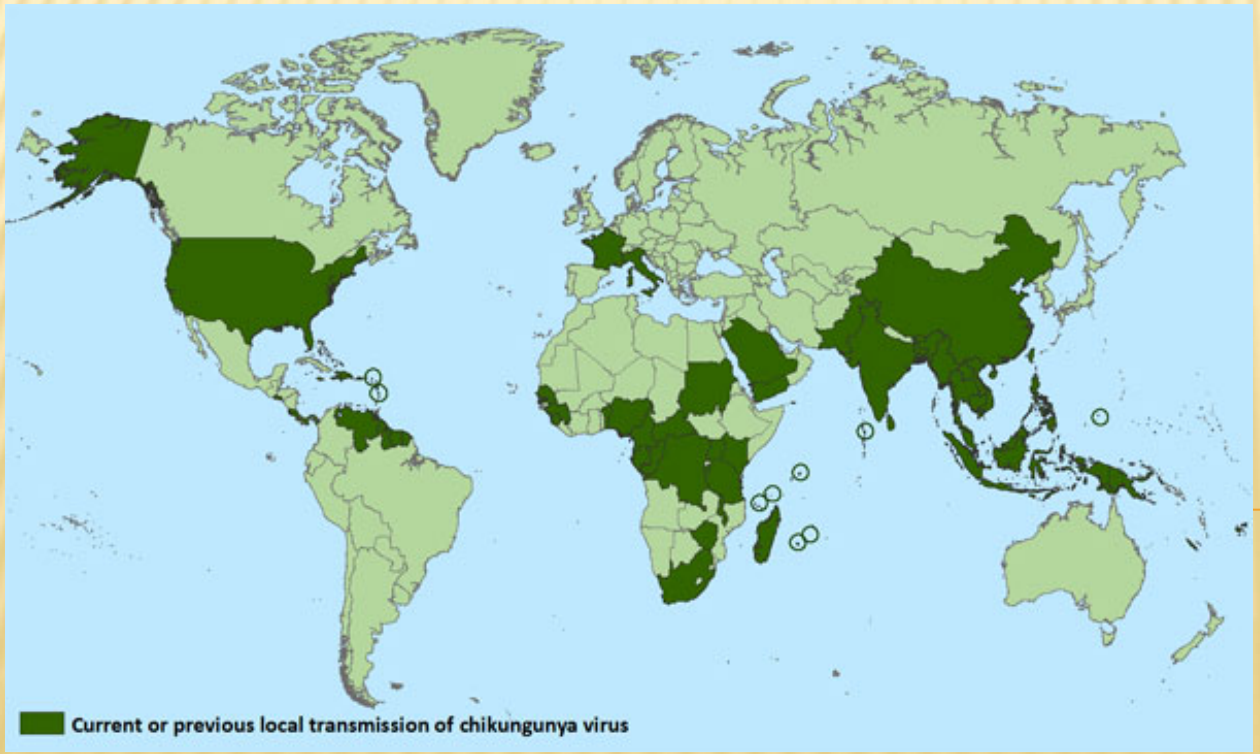
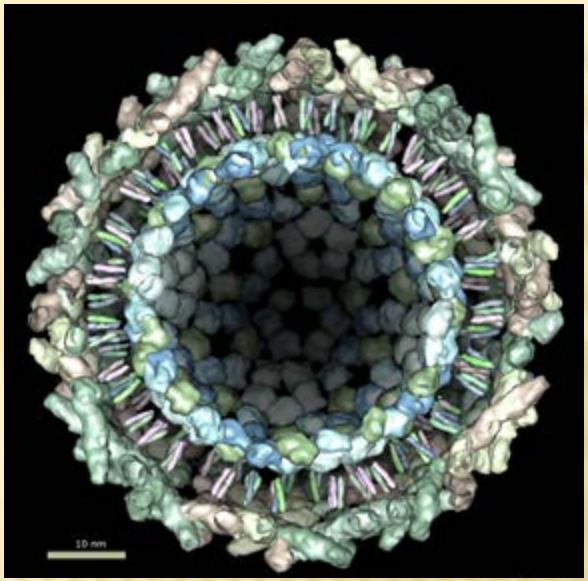
PREPARING FOR THE INTRODUCTION OF CHIKUNGUNYA VIRUS.....*IN YOUR COMMUNITY?*

Robert Moulis
Henry Lewandowski



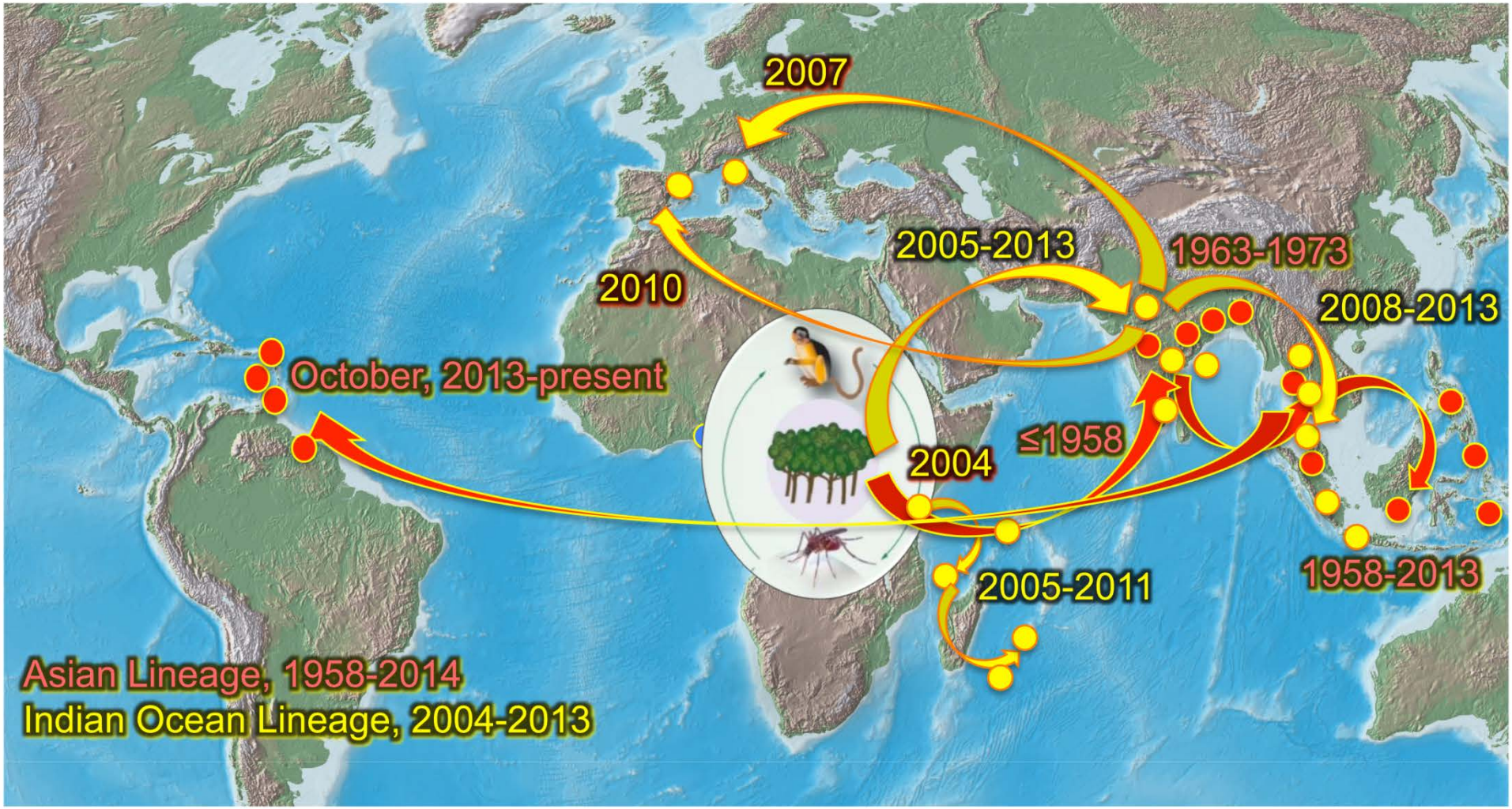
Chatham County
Mosquito Control

FUN FACTS



- Alphavirus in the family Togoviridae
- EEE
- Three Genotypes
  - Asian
  - East/Central/South African
  - West African
- *Aedes aegypti* is the principal vector
- Found in wild populations of *Aedes albopictus*
- Dengue-like symptoms with prolonged joint pain
- Amazing 72% - 93% infections with symptoms

PREPARING FOR CHIKUNGUNYA



RECENT ACTIVITY

- Confined to Africa, Asia and Europe until 2013
- October 2013 first found on St. Martin (Asian genotype)
- By December 2013 caught the attention of main stream media
- October 3, 2014: 739,410 cases; 34 countries and territories
- US statistics, October 7, 2014: 1326 travel associated, 21 in Georgia; 11 locally acquired in Florida

WHAT CAN WE EXPECT?

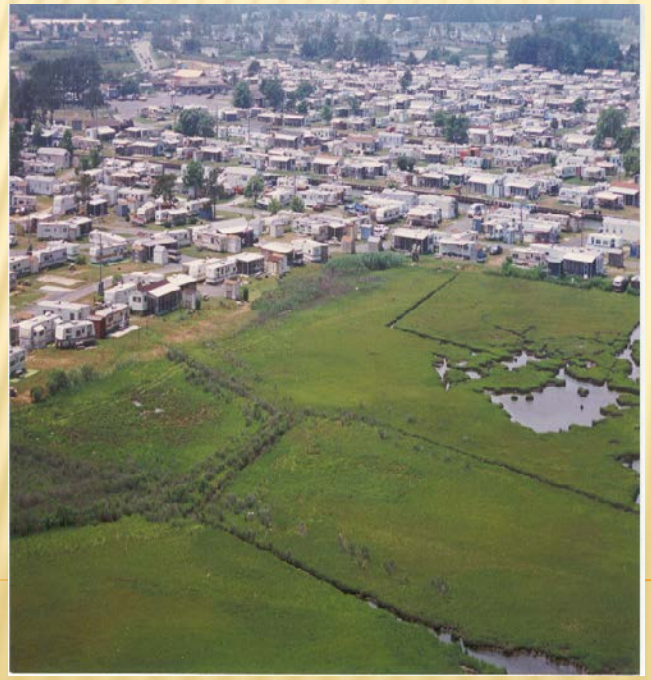
- Roger Nasci " urban epidemic cycles transmitted by *Aedes aegypti* and *Aedes albopictus*"
- Southeast U.S. is especially vulnerable
- First indications of local activity likely to be human illness
- Walter Tabachnick, "localized outbreaks with a low number of total cases." (Like recent Dengue outbreaks)
- Walter Tabachnick, "Florida agencies not well prepared to control container-breeding mosquitoes."

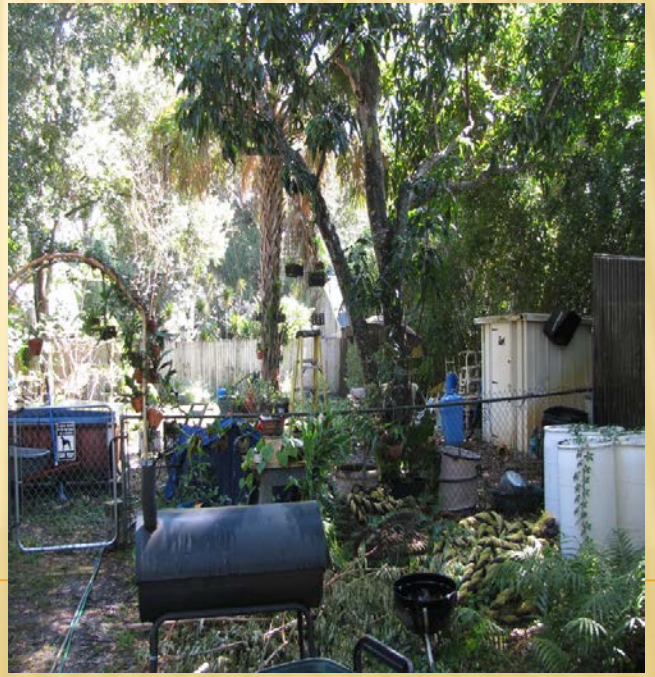
METHODS OF "TRADITIONAL" MOSQUITO CONTROL

"TRADITIONAL" HABITAT:
- -ISOLATED
- -CONCENTRATED BREEDING
- - ADULTS HAVE LONG FLIGHT RANGE
- -EASILY ACCESSIBLE
- - REMOTE/RURAL

AE. AEGYPTI/ALBOPICTUS HABITAT:
- - AMONGST HUMAN RESIDENTS
- - LARVAL AND ADULTS ARE DIFFUSE
- -ADULTS HAVE VERY SHORT FLIGHT RANGE = AREA OF LARVAL BREEDING
- - BREEDING HABITAT IS DIFFICULT TO ACCESS
- -URBAN, BUT CAN ENDO- OR EXOPHILIC

Lesser and Latham





WHAT CAN WE EXPECT?

- Can human to human transmission be sustained in the United States

- Sustaining viral transmission: three scenarios.

    1. Re-introduction

    2. Transovarial/Venereal

    3. Non-human host maintenance

WHAT DO WE NEED TO KNOW?

- Know your virus

  Caribbean outbreak caused by the Asian genotype. *Aedes aegypti* is a more important vector.

  The Réunion strain is a mutation of the ECSA genotype which facilitates replication in *Aedes albopictus*

  Fulton County *Aedes albopictus* had 22% infection rates with the Asian genotype (McTighe & Vaidyanathan, 2012)

WHAT DO WE NEED TO KNOW?

- Know your vectors and their biology:

Aedes aegypti (rare in Chatham County)

Aedes albopictus

100% infection rate; 74% transmission rate (ECSA genotype) (Mangiafico, 1971)

Ochlerotatus triseriatus

99% infection rate; 69% transmission rate (ECSA genotype) (Mangiafico, 1971)

WHAT DO WE NEED TO KNOW?

- Know your vectors and their biology
- We will focus our initial efforts on:

Aedes albopictus

Ochlerotatus triseriatus

WHAT DO WE NEED TO KNOW?

- Know your vectors and their biology:

  Aedes albopictus

  - Containers, natural and artificial
  - Vegetated areas vs. open areas
  - Mammalian, but opportunistic feeder
    - Diminishes vector potential?
  - Peak feeding time must be determined locally
    - Calcutta - 1 hr after daybreak
    - Japan – Dusk, but nighttime feeding > daytime
  - Wide distribution in Chatham County

WHAT DO WE NEED TO KNOW?

- Know your vectors and their biology:

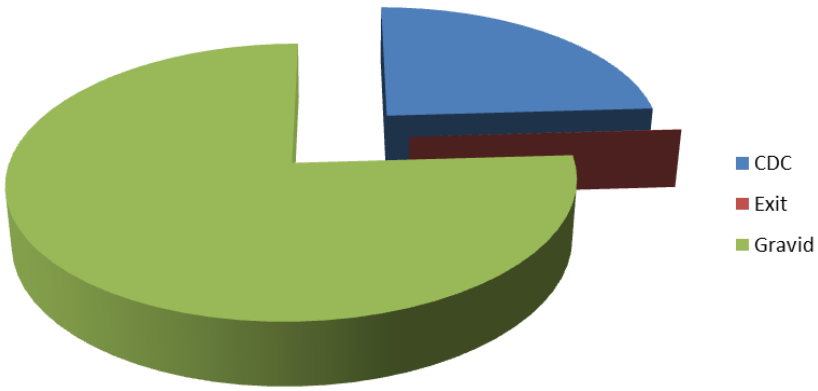
  Ochlerotatus triseriatus

  Natural vs. artificial, prefers tree holes
  Mammalian, but opportunistic feeder
  Peak feeding
    Daytime in TX with peak at dusk
    Afternoon before 1800 hrs. in Wisconsin
  Wide distribution in Chatham County

WHAT DO WE NEED TO KNOW?

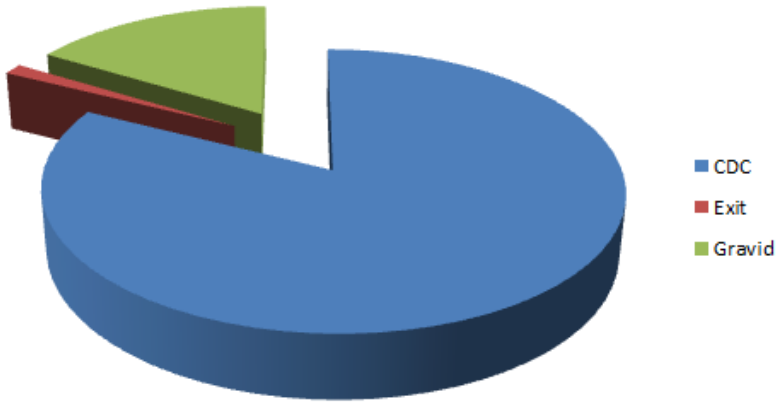
- Trap preferences

Figure 10. *Aedes albopictus* trap preference, 2003-2013



Aedes albopictus
Gravid Trap

Figure 11. *Ochlerotatus triseriatus* trap preference 2003-2013.



Ochlerotatus triseriatus
CDCTrap

WHAT DO WE NEED TO KNOW?

- Trap preferences (Collection Bottle Rotator, John W. Hock)

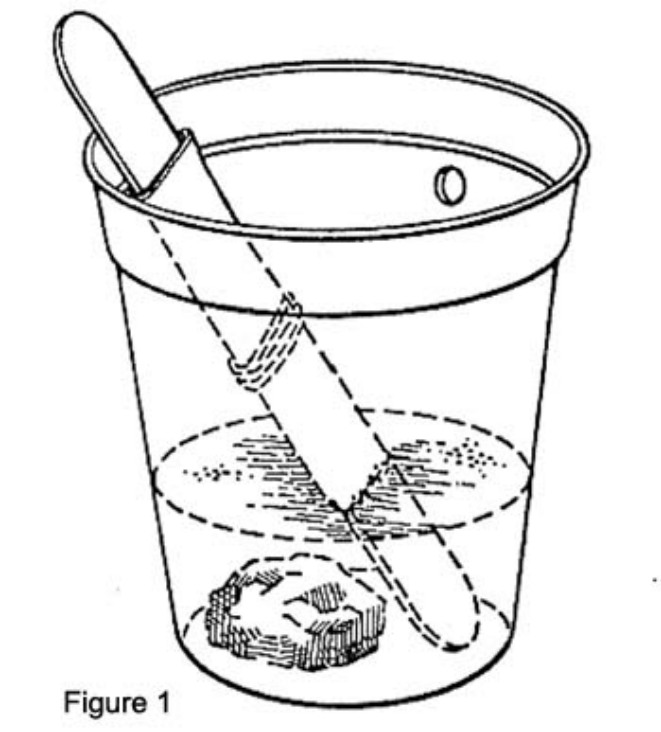
PREPARING FOR CHIKUNGUNYA

- Reducing the risk of Chikungunya (WHO Dengue Guidelines)
  - Vector surveillance.
  - Measure vector populations over time.
  - To make timely control decisions.

    - Egg production
    - Larval abundance
    - Pupal abundance
    - Adult abundance

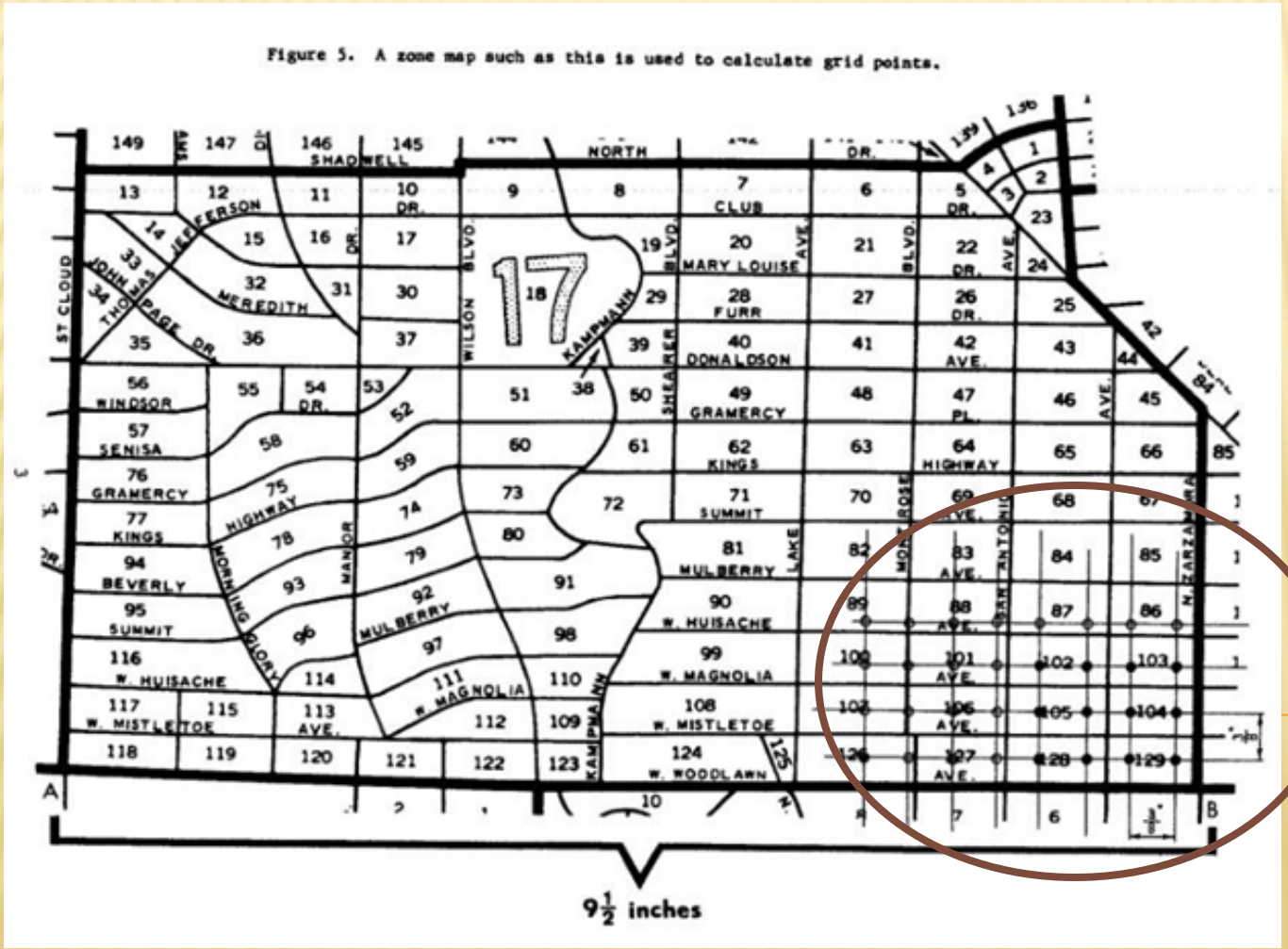
PREPARING FOR CHIKUNGUNYA

- Vector surveillance
  - Egg production



PREPARING FOR CHIKUNGUNYA

- Deploying ovitraps .



- 350’ Centers

Grid

PREPARING FOR CHIKUNGUNYA

- Vector surveillance
    - Larval sites (Pupae)

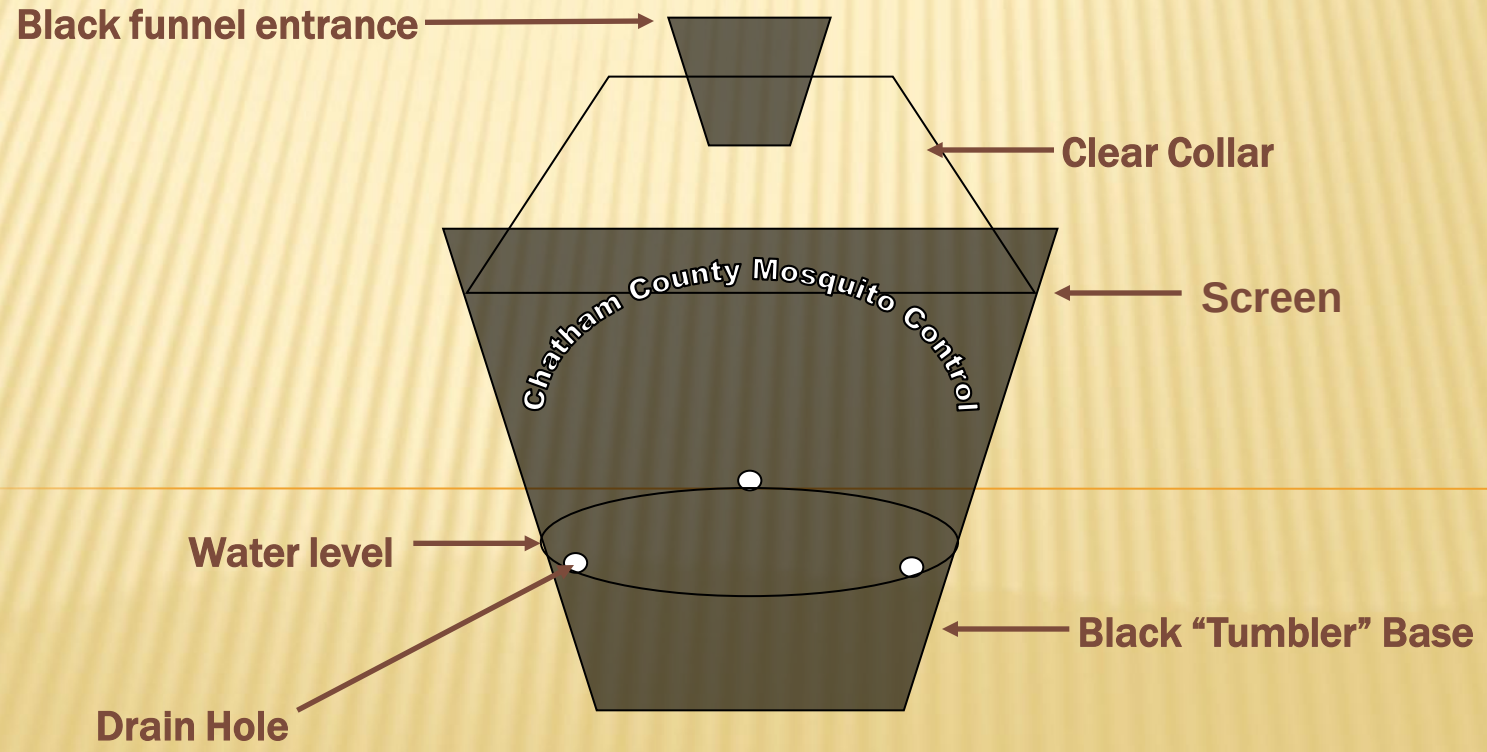
House Index - % of houses with larvae

Container Index - % of containers with larvae

Breteau Index - # positive containers per 100 houses inspected

PREPARING FOR CHIKUNGUNYA

- Vector surveillance
  - Adult abundance
    - Lethal Ovitrap



PREPARING FOR CHIKUNGUNYA

- Other methods of adult mosquito surveillance.
- BG Sentinel Trap

Aedes albopictus
Aedes aegypti

PREPARING FOR CHIKUNGUNYA

- Other methods of adult mosquito surveillance.

Ochlerotatus triseriatus

?

PREPARING FOR CHIKUNGUNYA

- Quantifiable thresholds for proactive vector control efforts to minimize WNV transmission. (300/100)

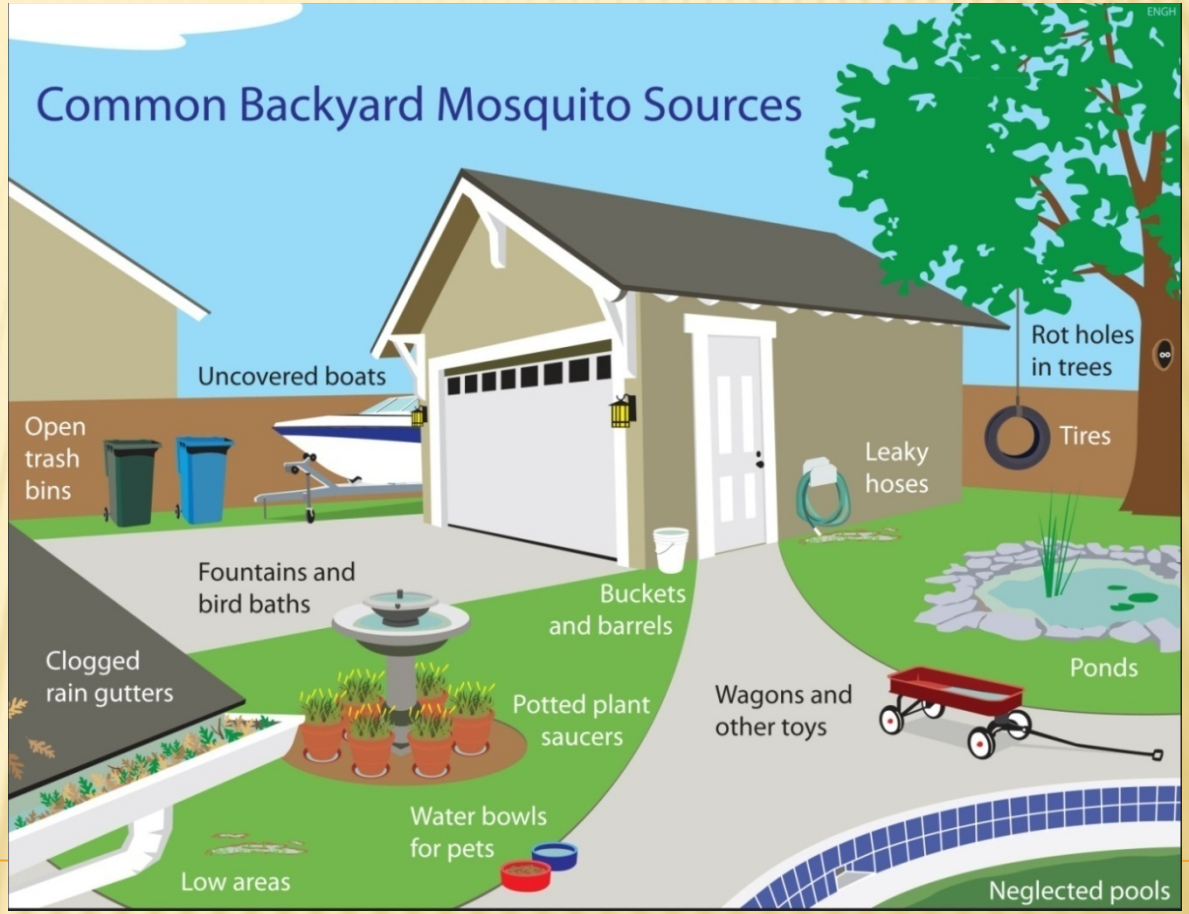
- Relating survey results to human risk.

	Year													
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mosquito Pools		9	67	39			36				214	38	108	5
Humans			9	1		1					10	1	1	
Human Fatalities			1											

PREPARING FOR CHIKUNGUNYA

- Mosquito Control
  - Source reduction
  - Household prevention
  - Community prevention

- "Sanitation is most effective, but it doesn't happen" - *Chris Lesser*



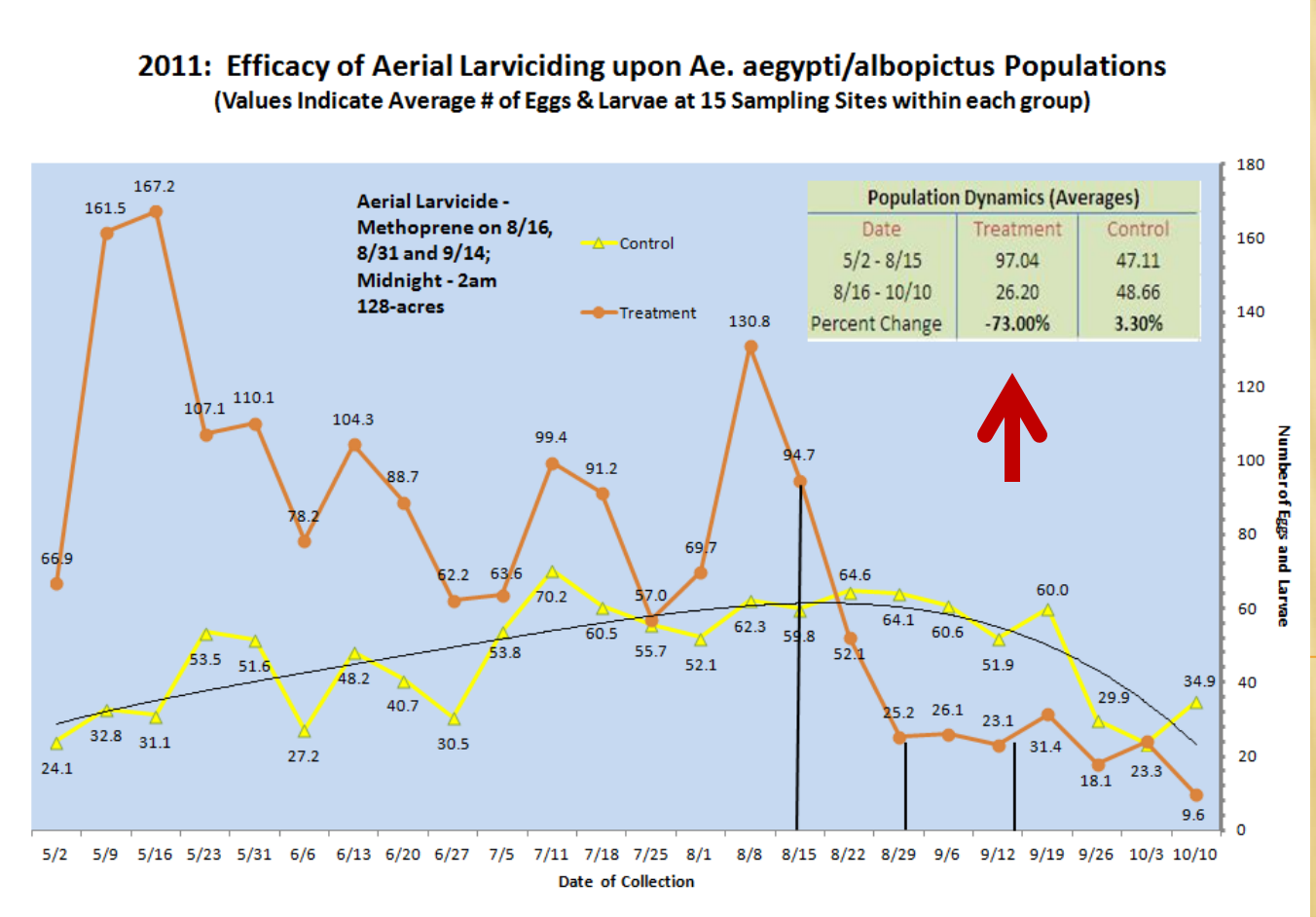
PREPARING FOR CHIKUNGUNYA

- Mosquito Control
  - Adulticiding

PREPARING FOR CHIKUNGUNYA

- Mosquito Control
  - Larviciding and Adulticiding.

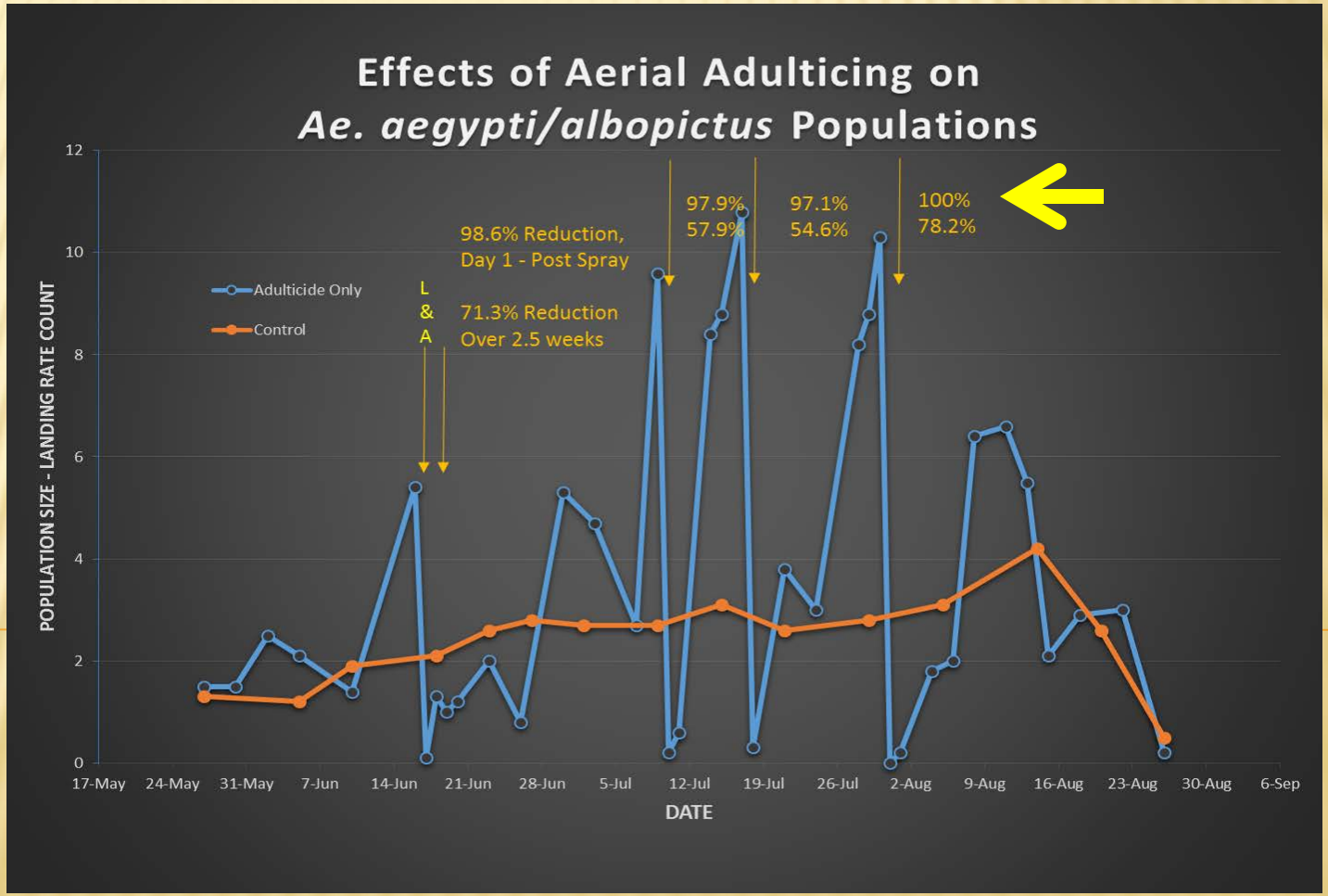
Lesser and Latham



PREPARING FOR CHIKUNGUNYA

- Mosquito Control
  - Larviciding and Adulticiding.

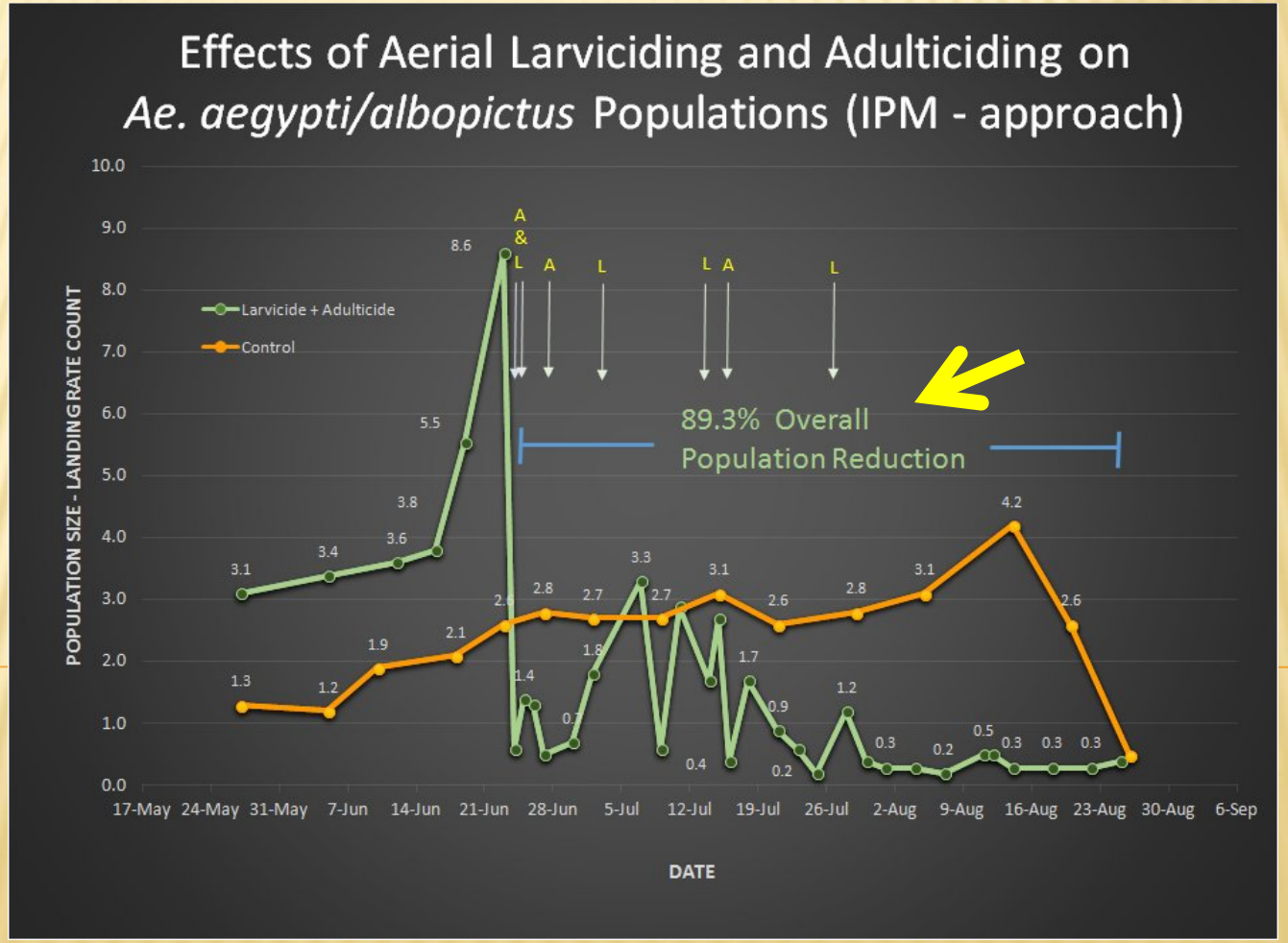
Lesser and Latham



PREPARING FOR CHIKUNGUNYA

- Mosquito Control
  - Larviciding and Adulticiding.

Lesser and Latham



PREPARING FOR CHIKUNGUNYA

- Mosquito Control
  - Personal protection

PREPARING FOR CHIKUNGUNYA

- Mosquito Control
  - Public education

PREPARING FOR CHIKUNGUNYA

- Dr. Walter Tabachnick's thoughts on controlling Chikungunya
  - Establish a relationship with your local health Dept.
  - Know the distribution of the vectors
  - Know their peak activity times
  - Choose an efficient surveillance technique
  - Establish a public information campaign
  - Use an integrated approach to control
    - Source reduction
    - Larviciding with truck or aircraft
    - Adulticiding with truck or aircraft
    - Small area control with hand foggers

PREPARING FOR CHIKUNGUNYA

- Summary
  - It's coming….to a town near you!
  - Lessons learned from WNV will be useful
  - Know the biology of the mosquito species involved
  - Know how to survey for the mosquitoes
  - Determine the value of survey methods
  - How or if the virus will become established is unknown
  - Control may be a challenge, be prepared to try several options

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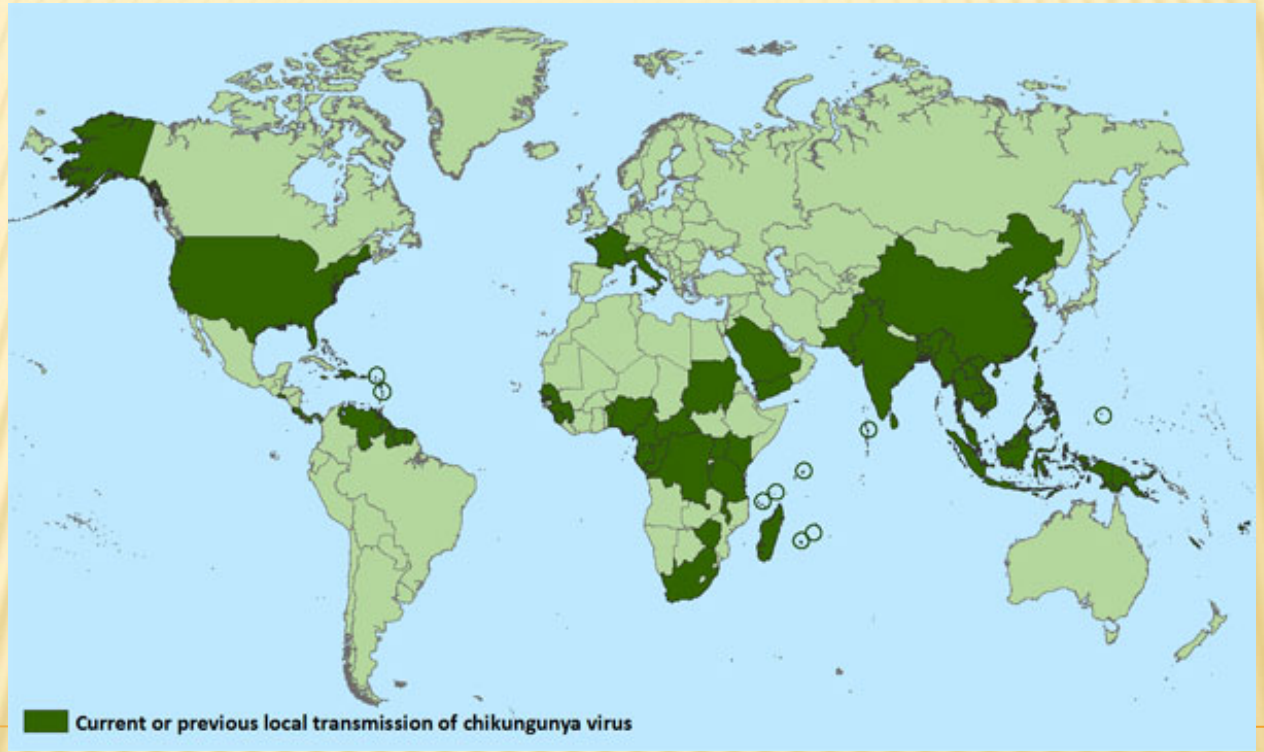

Thank You!