

# Mosquito-borne Disease

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# Overview

- **Mosquito Transmitted Diseases**
  - **Established, Potential & Emerging**
- **Current Status**
  - **National**
  - **Local**
- **Outlook & Economic Impact**



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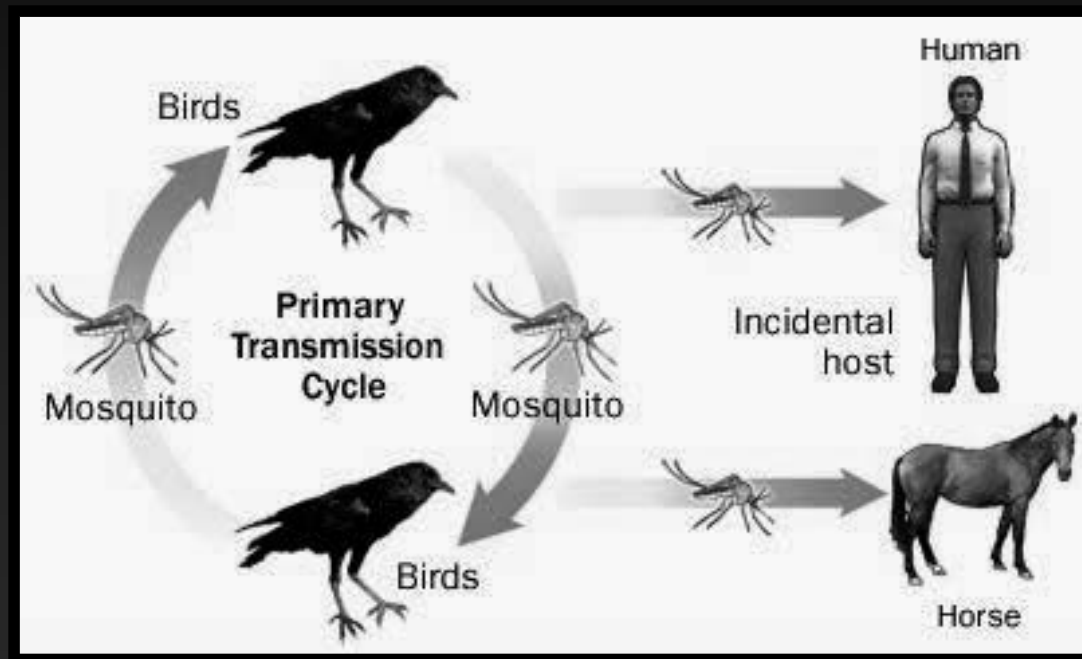
# Mosquito Transmitted Diseases

- **Established Diseases**
  - West Nile Virus
  - St. Louis Encephalitis
  - Eastern Equine Encephalitis
- **Potential to Become Established**
  - Malaria
  - Dengue
- **Emerging Diseases**
  - Rift Valley Fever
  - Chikungunya



# Mosquito Transmitted Diseases

## Mosquito-borne Arbovirus Life Cycle: ➤ West Nile Virus, SLE, EEE

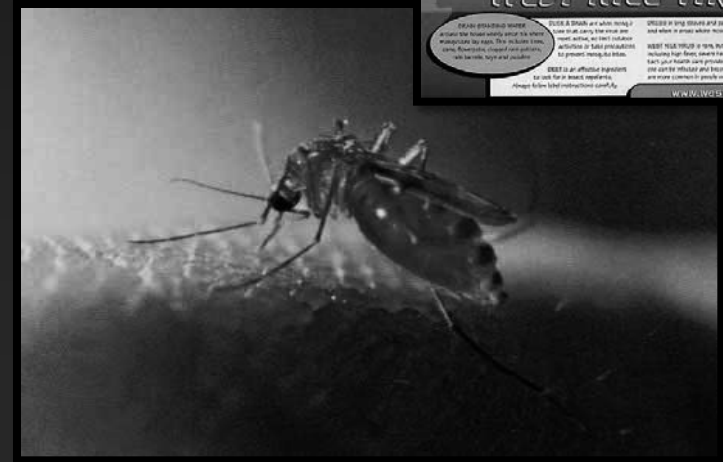




# Established Diseases

## West Nile Virus

- First appeared in U.S. in 1999
- 2001 Florida
- Florida SLE Mosquito
- 10-15% Mortality
- Hepatitis C

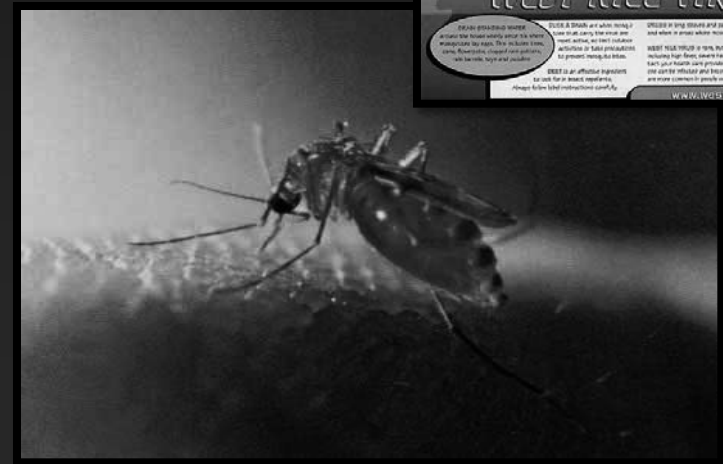




# Established Diseases

## West Nile Virus

- **Neuroinvasive:**
  - Meningitis, encephalitis
    - Usually less than 1% of cases
- **Non-neuroinvasive:**
  - “West Nile Fever”
  - 20% of infections
- 80% asymptomatic





# Established Diseases

## St. Louis Encephalitis

- 1933 Virus Isolated
- Southern House Mosquito & Florida SLE Mosquito
- 5–30% Mortality
- Worse on Elderly



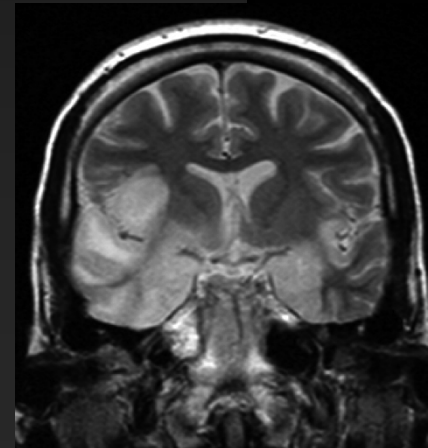




# Established Diseases

## Eastern Equine Encephalitis

- 1938 Massachusetts
- Cattail Mosquito
- 33% Mortality
- Half of survivors suffer serious brain damage
- Rubella

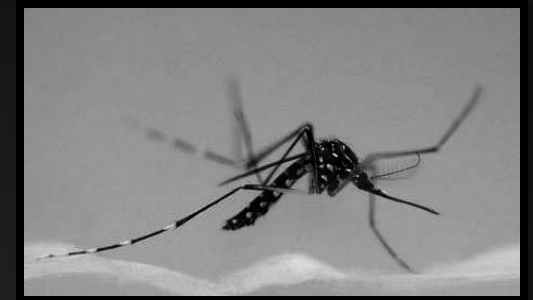




# Potential to Become Established

## Dengue

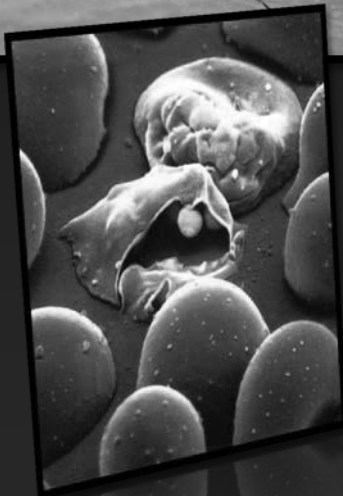
- Four Serotypes
- Yellow Fever Mosquito & Asian Tiger Mosquito
  - Difficult to control
- Humans act as sentinels
- 1-20% Mortality





# Potential to Become Established

## Malaria



- 4 Species of Human Malaria
- Last U.S. Epidemic 1945
- Common Malaria Mosquito
- 3 Imported Cases this year
- 20% Mortality



# Emerging Diseases

## Rift Valley Fever

1931

African Sheep

1951

20,000 Human Cases

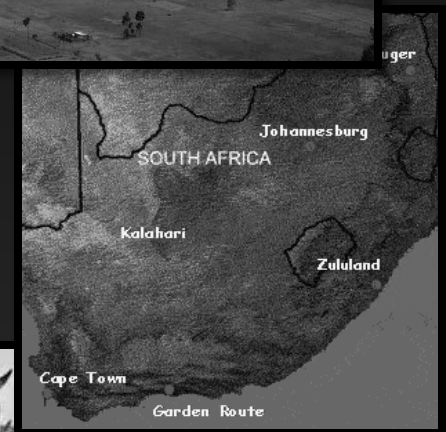
2000

Arabian Peninsula

2010

South Africa

Rift Valley, Kenya





# Emerging Diseases

## Rift Valley Fever

- **Infects Livestock & Humans**
- **Aedes & Culex species**
- **Up to 50% Mortality**
- **If established, livestock cannot be exported for 4 years**





# Emerging Diseases

## Chikungunya

- Swahili for “That which bends up”
- Mainly African & Asian

2006

Italy, 17 cases in travelers

2007

160 cases outside of tropics

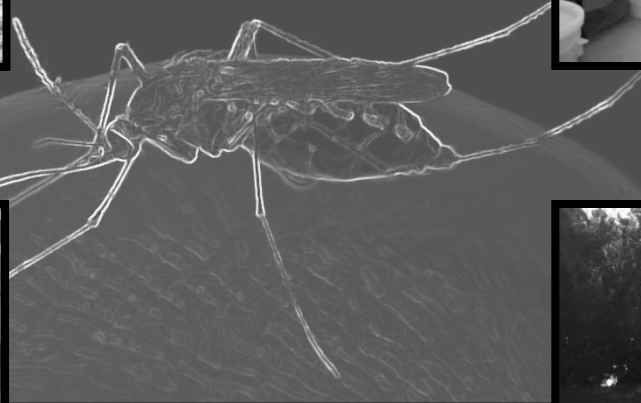




- Mosquito Transmitted Diseases
  - Dengue Fever
  - Malaria
  - Chikungunya
- Current Status
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- Outlook & Economic Impact



# Current Status - Operations







## Current Status - Operations

**2012 YTD\*    5 yr Avg.**

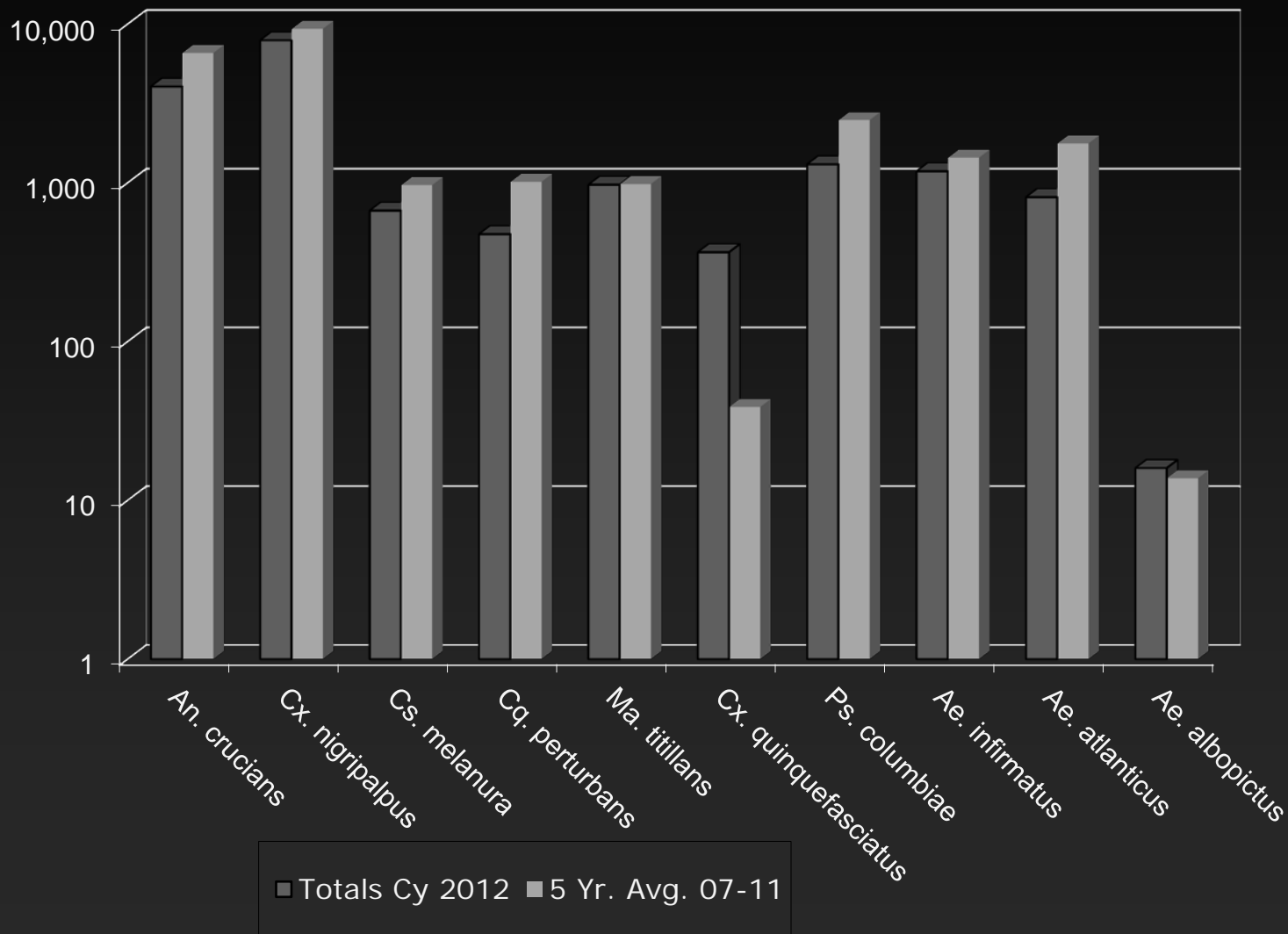
### **Operations:**

<b>Acres Sprayed</b>	<b>152,719</b>	<b>216,934</b>
<b>Service Requests</b>	<b>1,294</b>	<b>1,089</b>
<b>Serum Samples</b>	<b>2,396</b>	<b>2,592</b>
<b>Inspections</b>	<b>21,346</b>	<b>16,842</b>
<b>Miles Driven</b>	<b>184,149</b>	<b>205,187</b>

\*As of 8-31-12



# Current Status – Mosquito Species





## Current Status – Surveillance

<u>Flock Seroconversions</u>	<u>2012 YTD*</u>	<u>5 Yr. Avg.</u>
West Nile Virus	1	5
Eastern Equine Encephalitis	7	7.6
St. Louis Encephalitis	0	0.6
<u>Imported Disease</u>		
Malaria	3	7.2 (complete year)
Dengue	2	4 (complete year)

\* As of 8-31-12



# West Nile Virus - Human 2012

**Cumulative US Cases = 2636**  
**Total US Deaths = 118**

- **Texas = 1057**
- **Louisiana = 147**
- **South Dakota = 144**
- **Mississippi = 142**
- **Michigan = 136**
- **Oklahoma = 129**



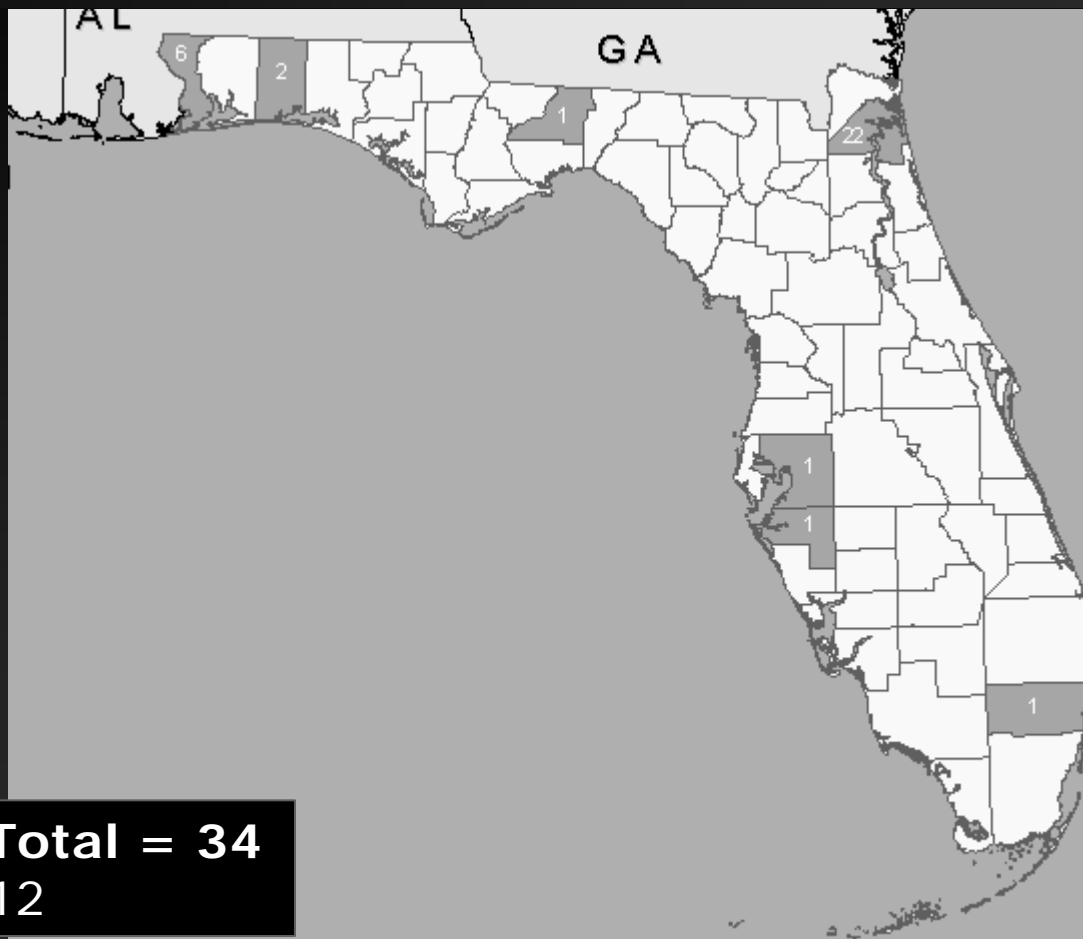
As of 9-11-12



# West Nile Virus - Human 2012

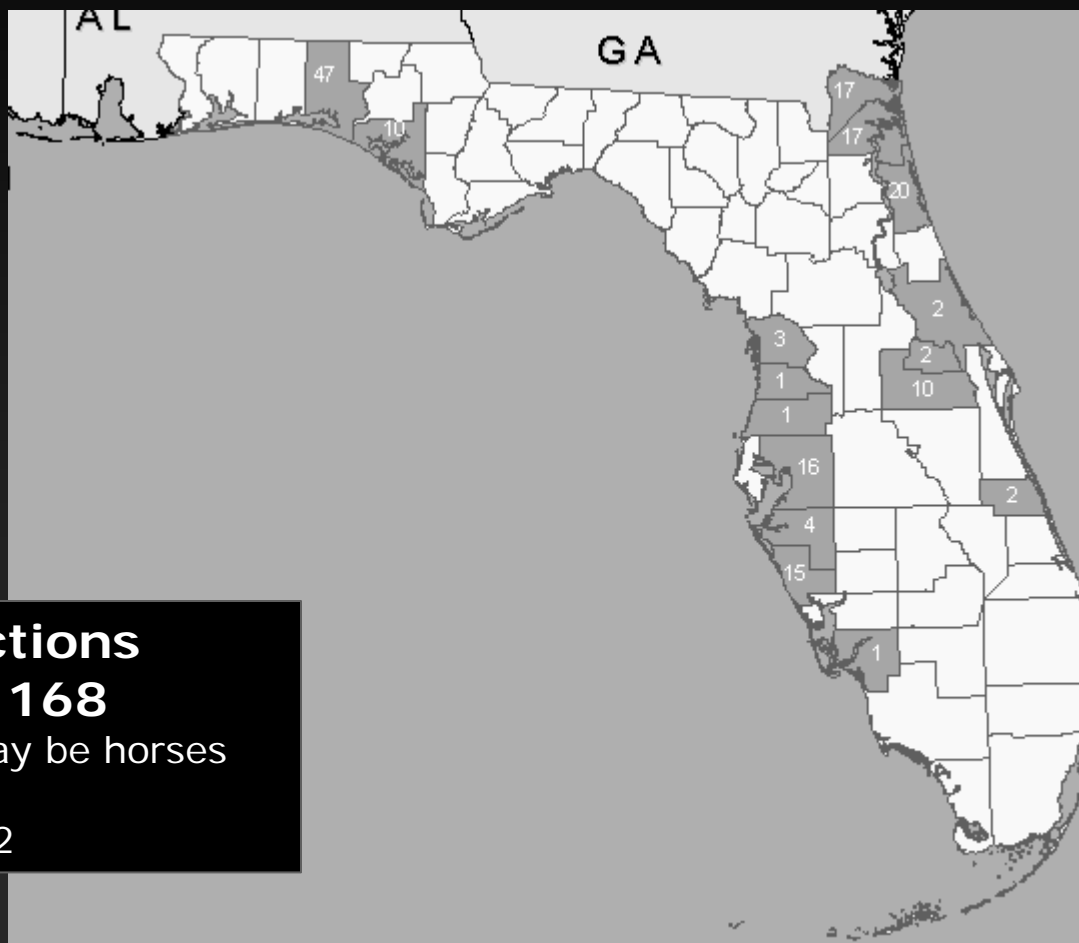
**Broward County = 1**  
**Duval County = 22**  
**Escambia County = 6**  
**Hillsborough County = 1**  
**Leon County = 1**  
**Manatee County = 1**  
**Okaloosa County = 2**

**Florida Statewide Total = 34**  
As of 9-11-12





# Virus – Sentinel 2012 West Nile

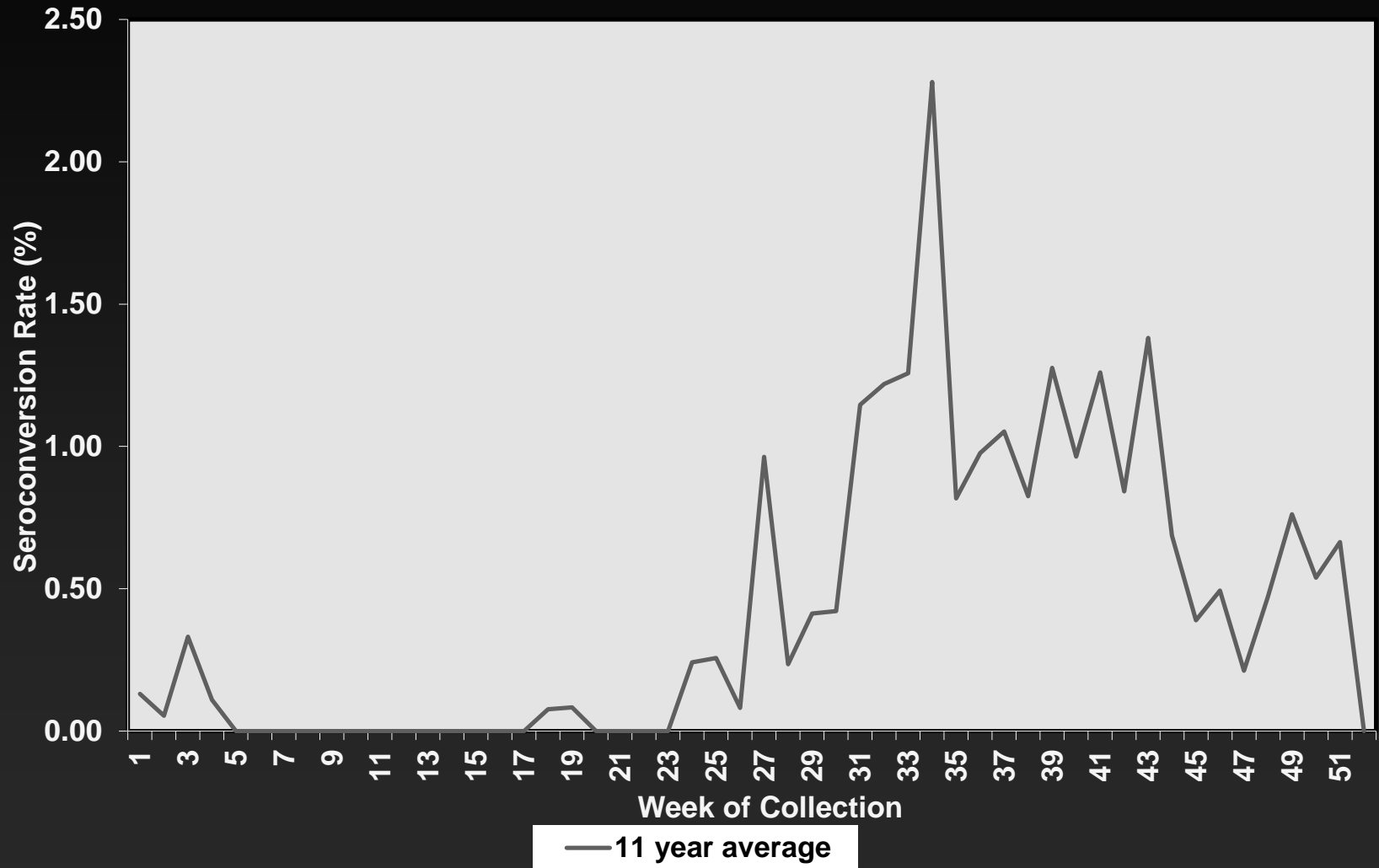


**Sentinel Infections**  
**Statewide = 168**

Usually chickens, but may be horses  
and/or birds  
As of 9-11-12



# Sentinel Seroconversions to WNV in Orange County





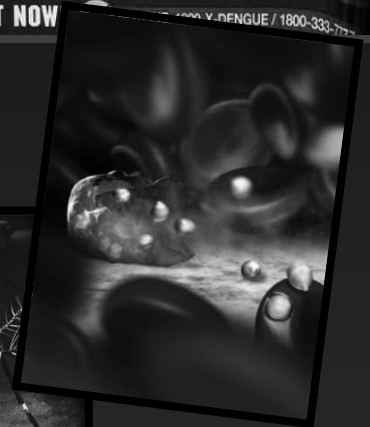
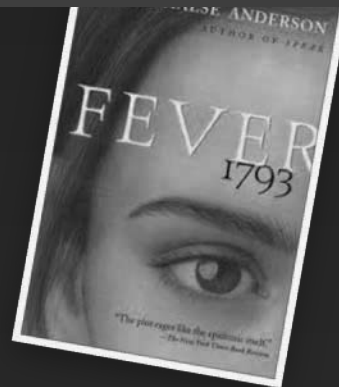
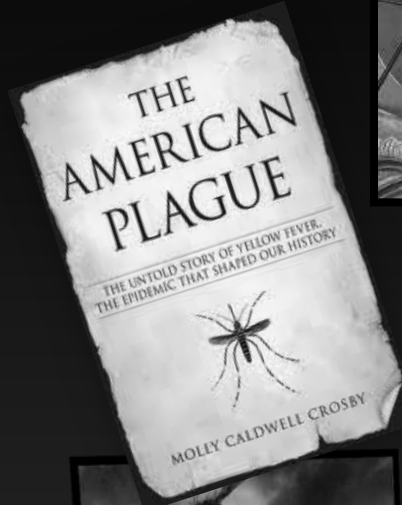
# Overview

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  - Dengue fever, Malaria, Chikungunya
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# Outlook & Economic Impact





# Outlook & Economic Impact

## West Nile Outbreak

- **Sacramento County, CA 2005**
  - 163 Human Cases
  - Emergency Vector Control Costs
    - \$701,790 for additional spraying
    - \$4,305/case
  - Total Economic Impact
    - \$2,980,000, including medical costs
    - \$18,282/case





# Outlook & Economic Impact

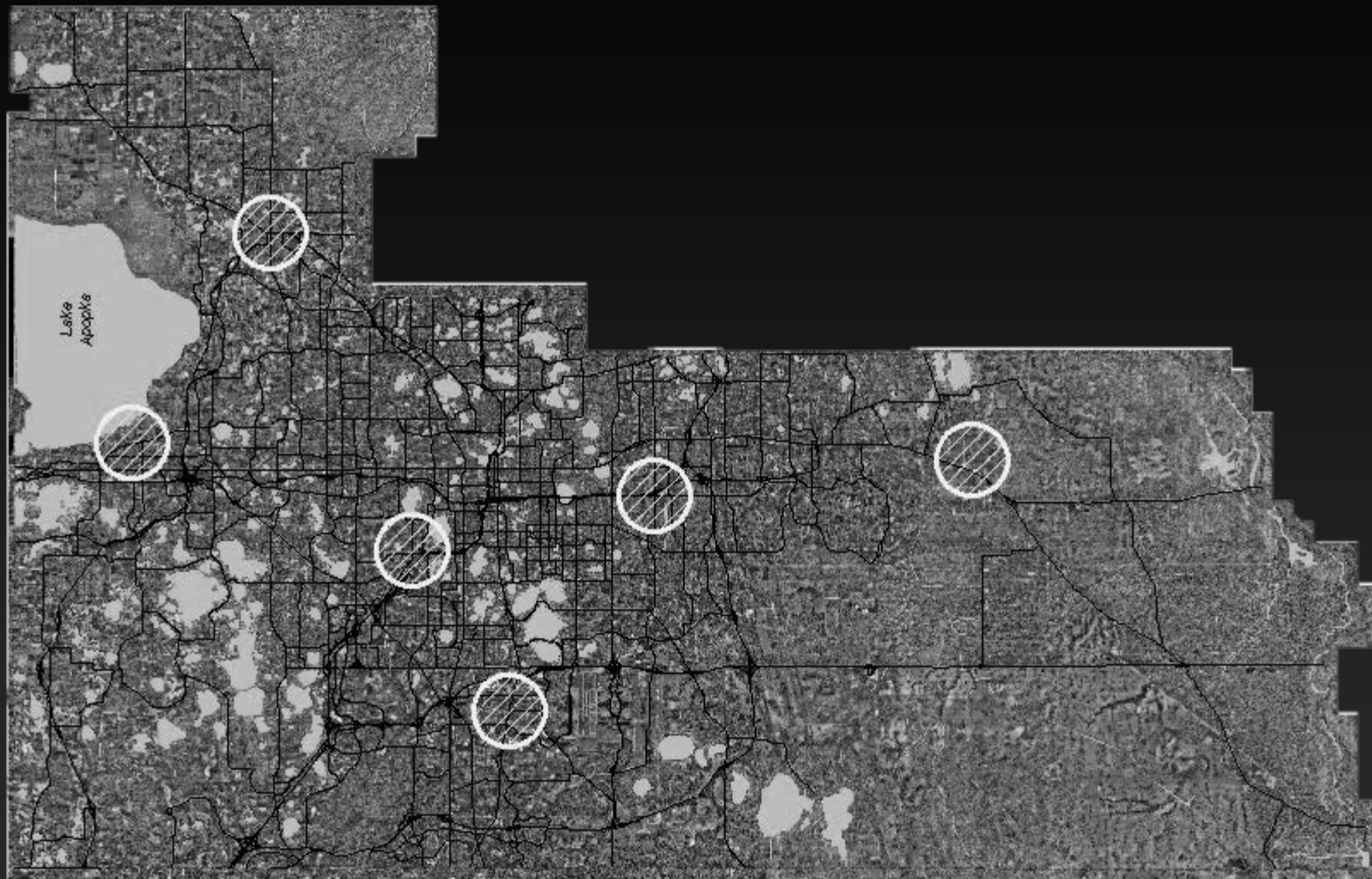
## Dengue Outbreak

- **Key West, Florida 2009**
  - 20 Human Cases
  - 2 Month Duration
  - 5 Square Miles “Old Town”
  - 25 Staff Members, Door to Door
  - Ground/Aerial Spray Daily
  - \$400,000 for Mosquito Control

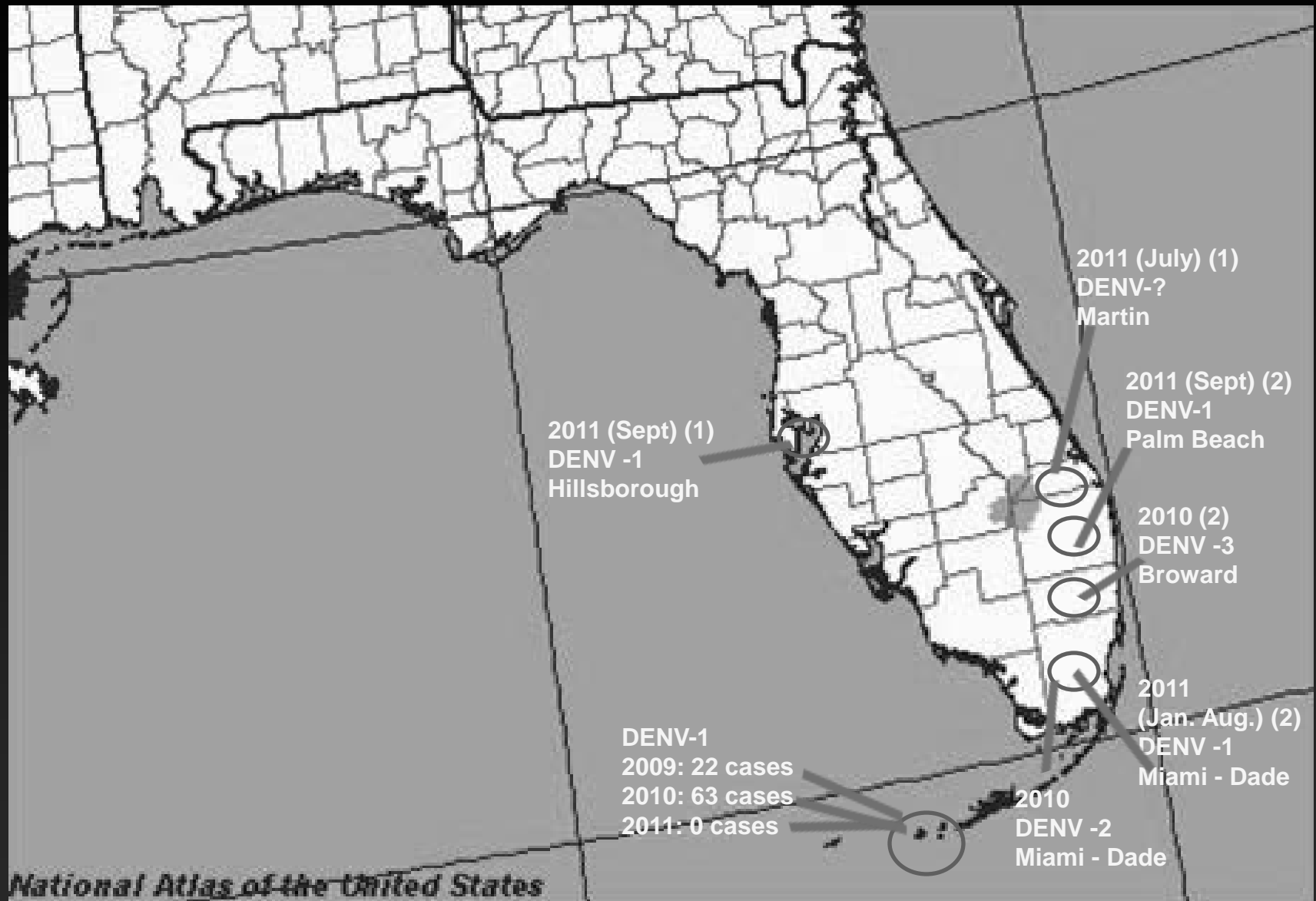




# Example of Five Square Miles



## DENGUE TRANSMISSION IN FLORIDA 2009-2011



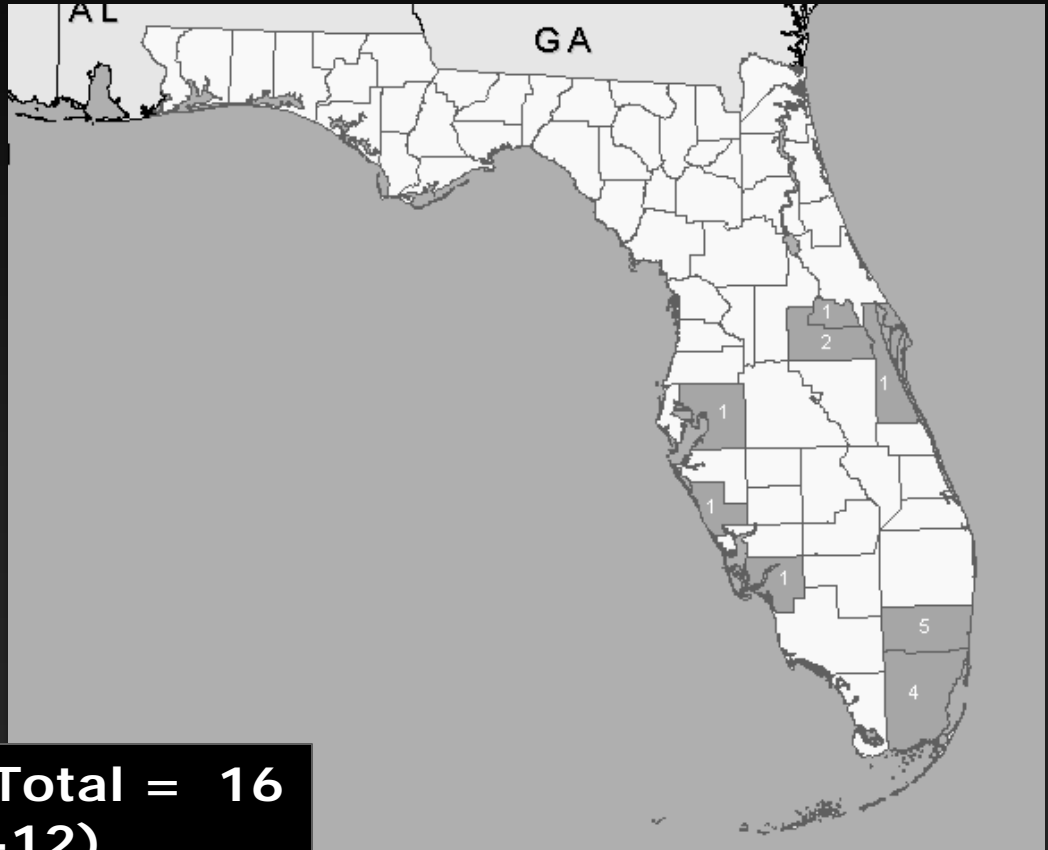


# Outlook & Economic Impact

## Dengue Fever (imported) 2012

Brevard County = 1  
Broward County = 5  
Hillsborough County = 1  
Lee County = 1  
Miami-Dade County = 4  
Orange County = 2  
Sarasota County = 1  
Seminole County = 1

**Florida Statewide Total = 16**  
(as of 9-11-12)



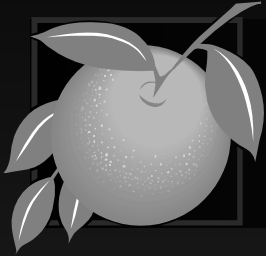


# **Outlook & Economic Impact**

**Mosquito-borne Disease  
Contingency Planning Meeting  
Emergency Operations Center**

**September 5, 2012**

**18 Attendees  
5 Local Agencies**



# Mosquito Control

*Public Health's First Line of Defense  
Against Mosquito-borne Disease*

