



Florida Keys Mosquito Control District

Key West Operational Overview



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Florida Keys Mosquito Control District Board of Commissioners



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Best Practices and Strategic Planning

- 3-year strategic plan
- Long-term planning for stable budgeting
- Technology to increase efficiency and reduce costs
- Emphasis on safety
- Proactive, not reactive



Florida Keys Mosquito Control District Capabilities

- ~\$15M Operating Budget
- 72 FT Employees
- 37 Inspectors
 - Upper Keys (6)
 - Middle Keys (6)
 - Lower Keys (14)
 - Key West (11)
- 5 helicopters
 - Airplanes recently removed from operations



One Community, Three Mosquito Operations



Urbanized Key West (*Aedes aegypti*)



Large Mangrove Sites (*Aedes taeniorhynchus*)



**Lower, Middle, and Upper Keys Neighborhoods
(combination)**



Inspectors Dedicated to the City



Mosquito Surveillance



ABC Light Trap



BG Sentinel Trap



Larval "Dips"



Egg Trap

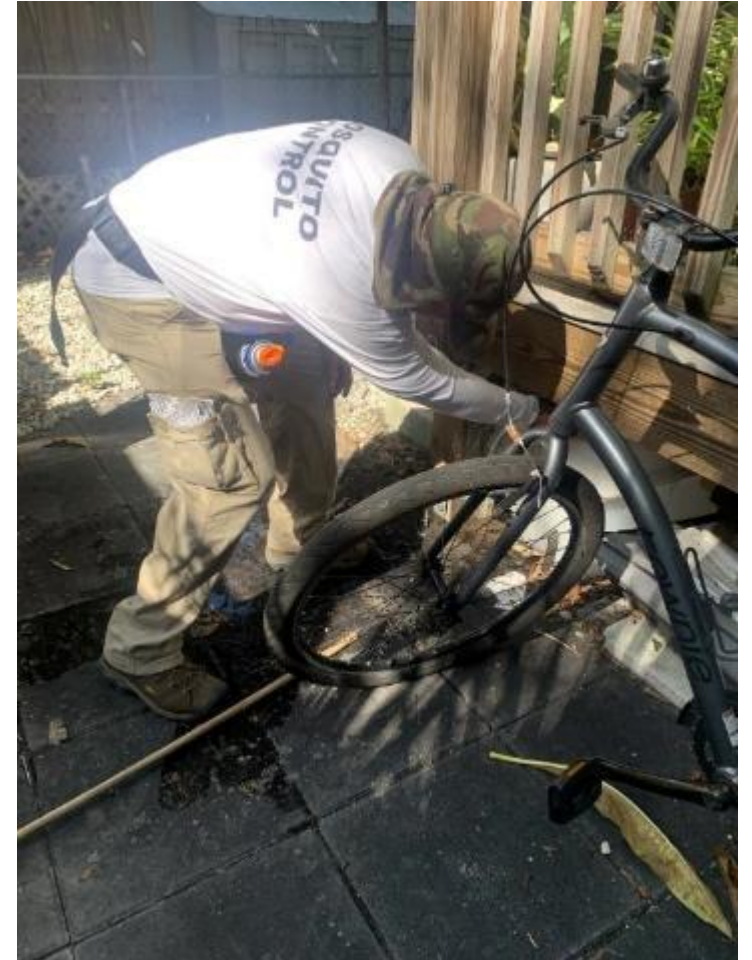




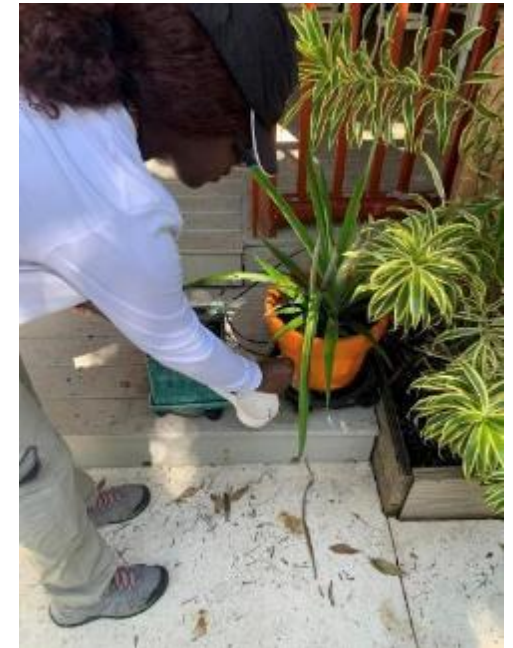


Home/Business Inspections

- **Site Inspections for Standing Water**
 - Look for larval and adult mosquitoes
- **Common Products**
 - *Bti*
 - *Bs*
 - Methoprene
 - Spinosad



Common Larval Habitats in Key West



Larval Inspection Decisions

- Size of area?
- Species of mosquitoes found?
- What stage of development are present?
- Rainfall or tidal activity?
- Disease concerns?
- Area with outdoor activity?



Aerial Granular Larviciding (*Bti*): Unimproved Areas



Aerial Application of Liquid Larvicide

- Liquid *Bti* over residential areas
- Application via helicopter



Additional Uses

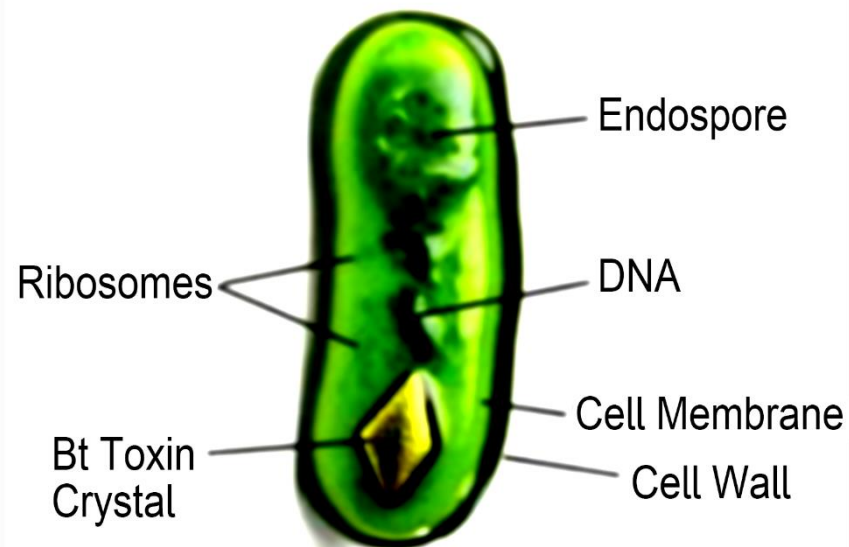
- Treatment for invasive species (i.e. *Aedes albopictus*)
- Ground treatments
 - Disease response
 - Areas with high vector populations
 - Backpack: areas with high number of breeding sites



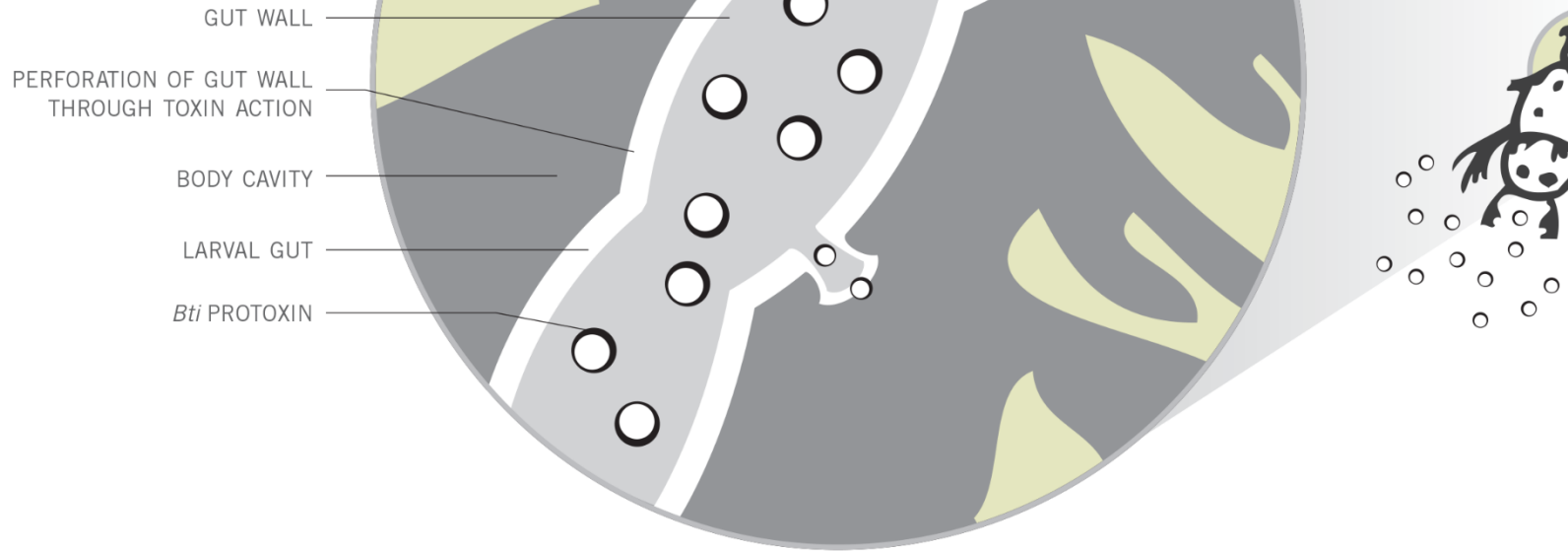
What is *Bti*?

- **Naturally-occurring Soil Bacterium**
- **Discovered in Israel in 1976**
- **First registered in US in 1983**
- **Only affects Mosquitoes and Black Flies**
- **Quick and effective for control**
- **Excellent safety record and very low mammalian toxicity**

Bacillus thuringiensis (Bt)



ENLARGED SECTION OF MIDGUT



- Crystals released in water
- Larvae ingest crystal
- Once ingested, specific pH of gut causes toxins to be released
- Toxins bind to gut wall of mosquito/black fly larvae
- Leads to perforation of gut



Frequently Asked Questions on *Bti*

Q: Does *Bti* pose health risks to humans?

A: No. *Bti* has no toxicity to people and is approved for use for pest control in organic farming operations.

Q: Are there any special precautions to be taken during *Bti* spraying?

A: No special precautions are needed.

Q: Is *Bti* harmful to wildlife including honey bees?

A: Studies indicate minimal toxicity to bees. *Bti* produces toxins that do not affect other types of insects including honey bees.



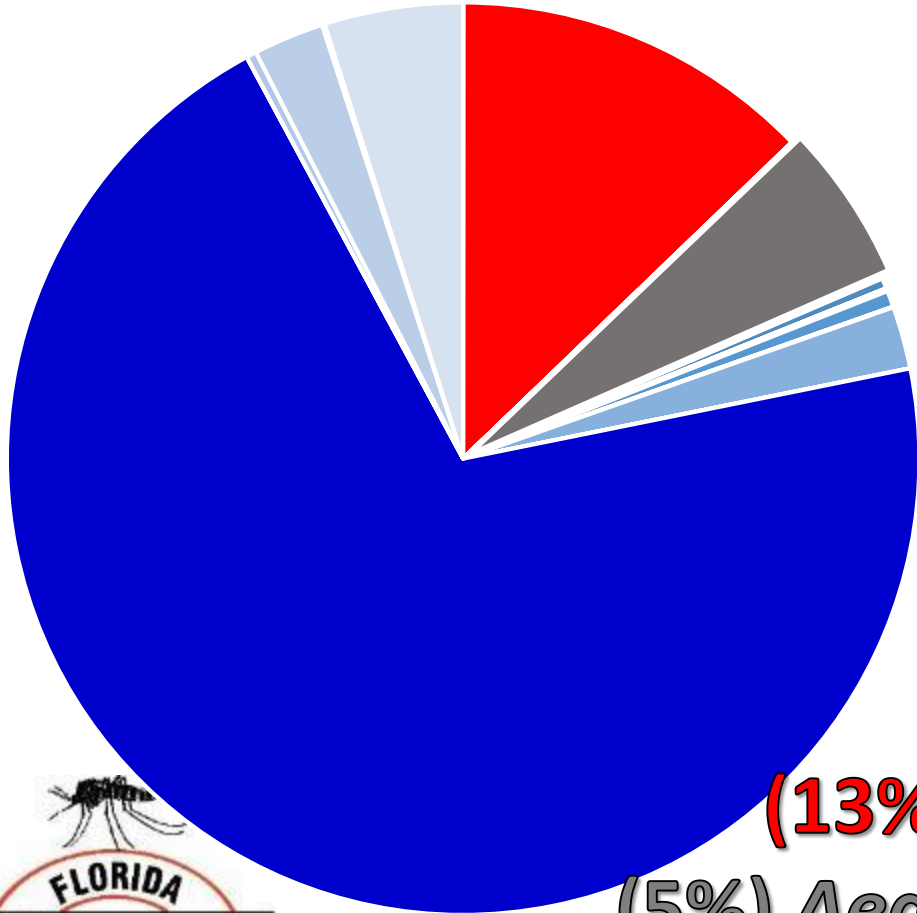
Aerial Liquid Larvicide Missions



Year	Number of Missions
2016	18
2017	13
2018	14
2019	13
2020	16
2021	11
2022	11
2023	14

Mosquitoes of Key West

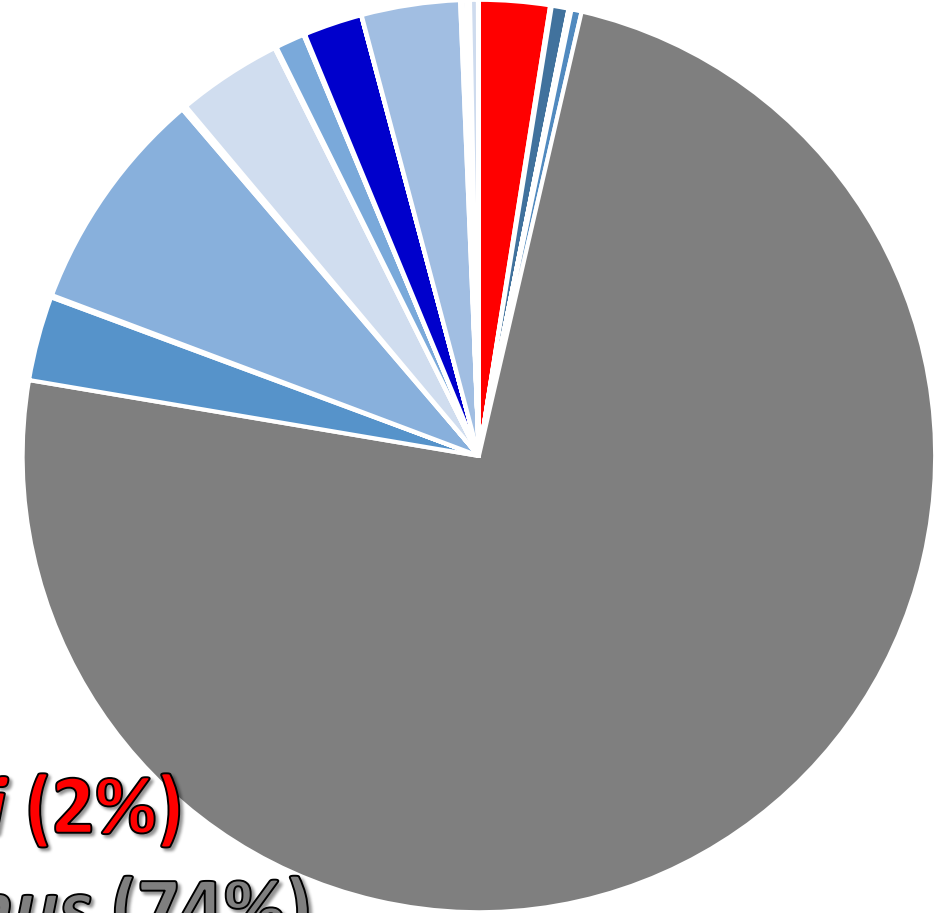
(Total female mosquitoes trapped 2020-2022, n = 46,981)



(13%) *Aedes aegypti* (2%)
(5%) *Aedes taeniorhynchus* (74%)
(71%) *Culex quinquefasciatus* (2%)

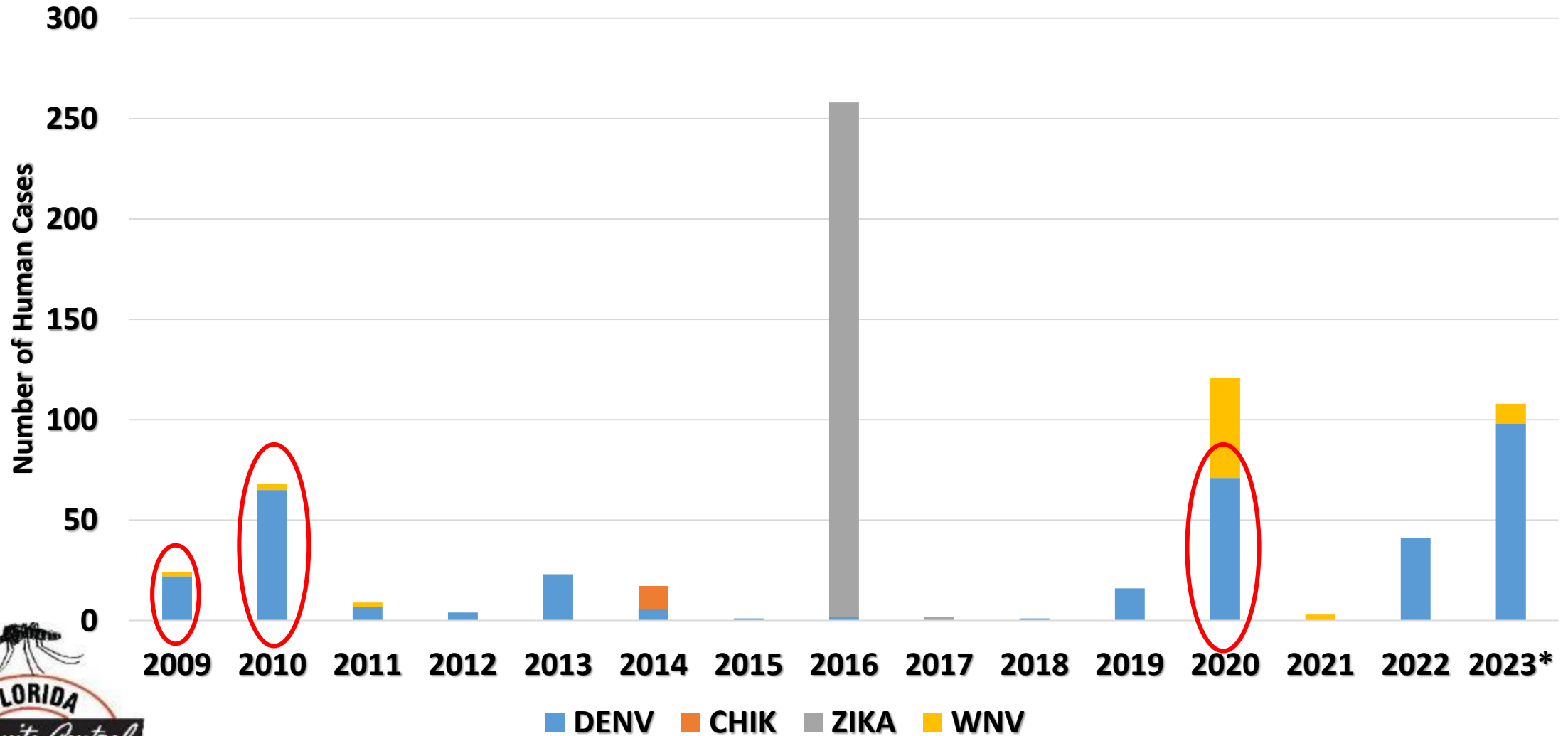
Mosquitoes of the Florida Keys

(Total female mosquitoes trapped 2020-2022, n = 2,135,452)



(13%) *Aedes aegypti* (2%)
(5%) *Aedes taeniorhynchus* (74%)
(71%) *Culex quinquefasciatus* (2%)

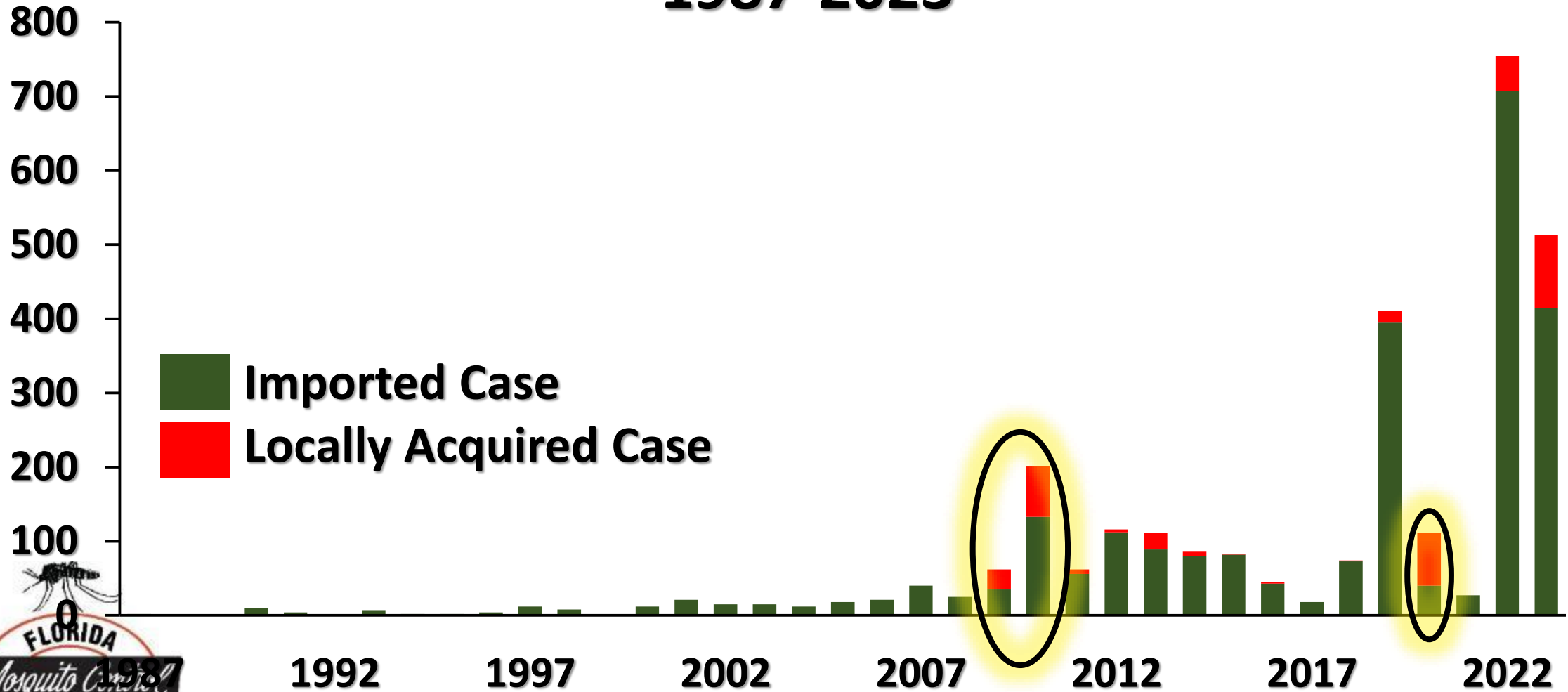
Recent Mosquito-Borne Diseases in South Florida



*Updated through 10/28/2023



Dengue Cases in Florida 1987-2023*



*Updated through 10/28/2023



— Sweep #1
— Sweep #2



— Sweep #1
— Sweep #2



— Sweep #1
— Sweep #2



— Sweep #1
— Sweep #2



— Sweep #1
— Sweep #2





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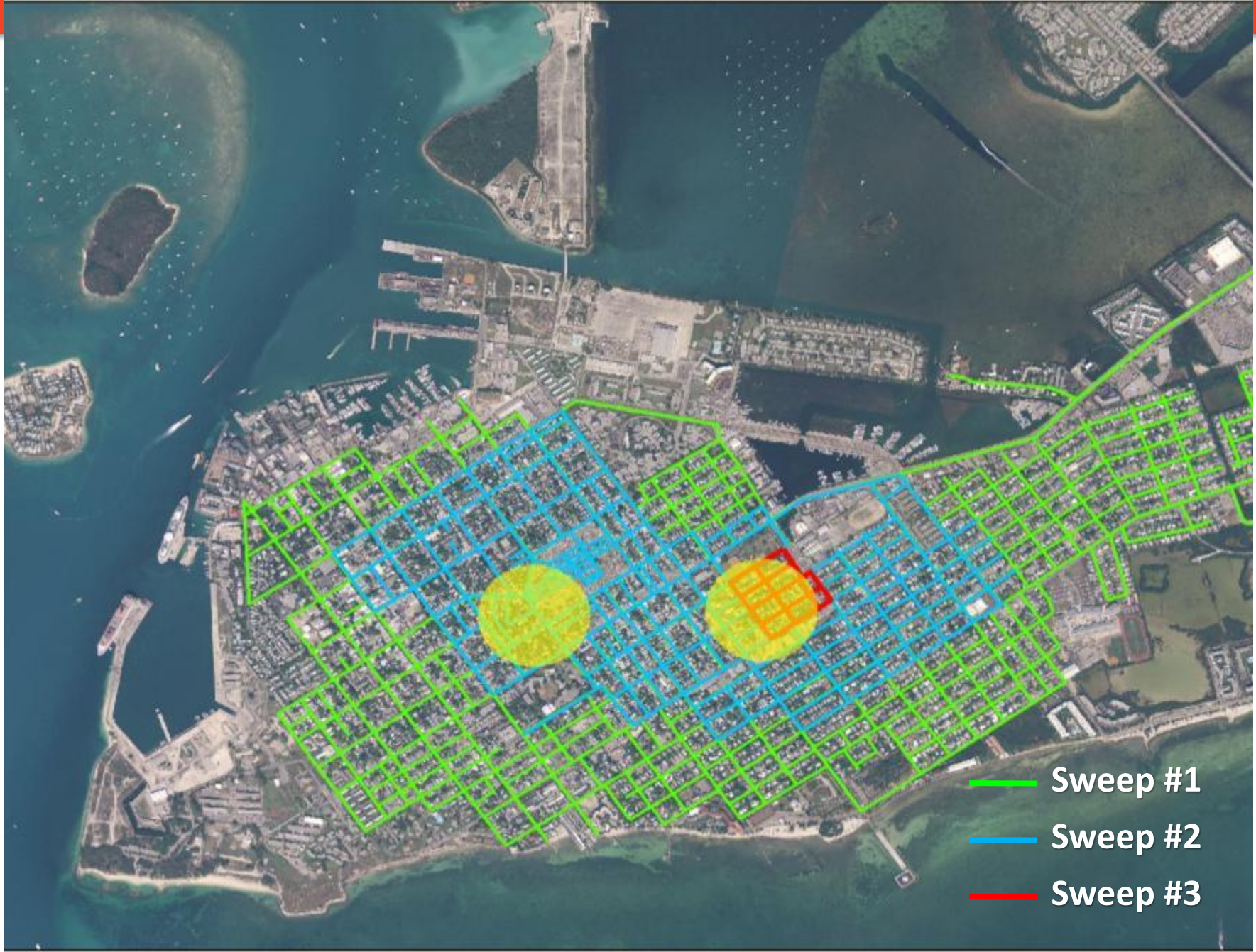


— Sweep #1
— Sweep #2

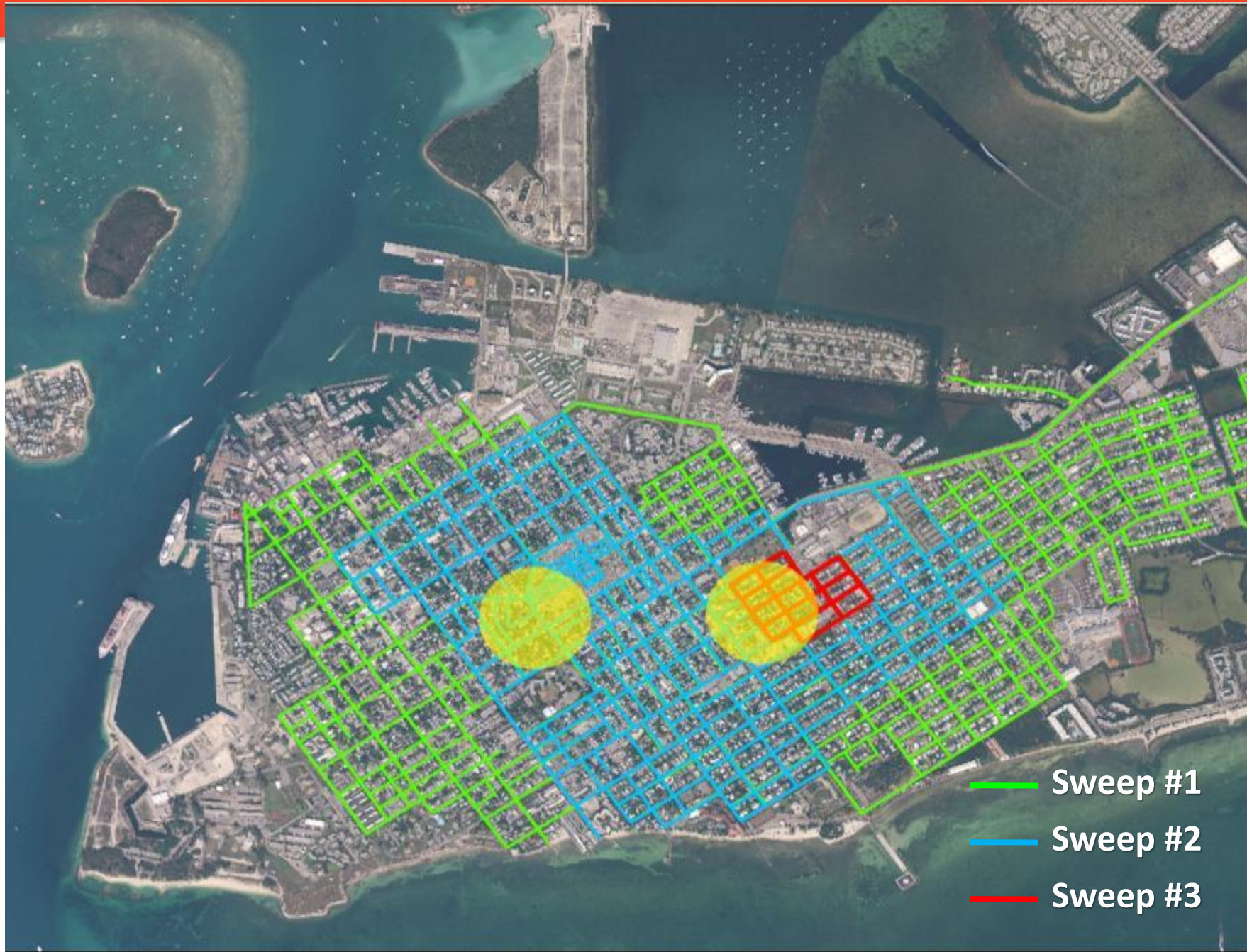


- Sweep #1
- Sweep #2
- Sweep #3

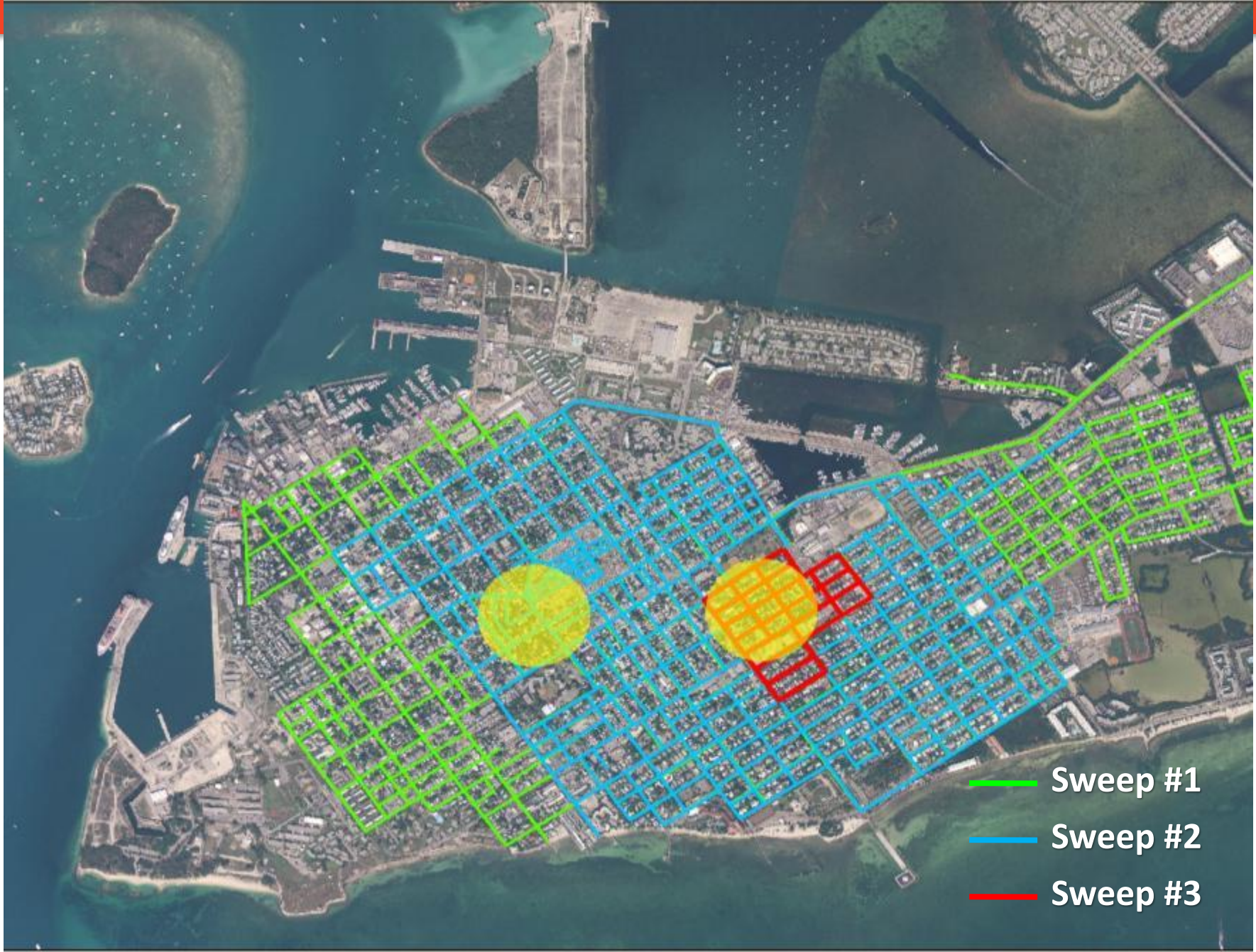




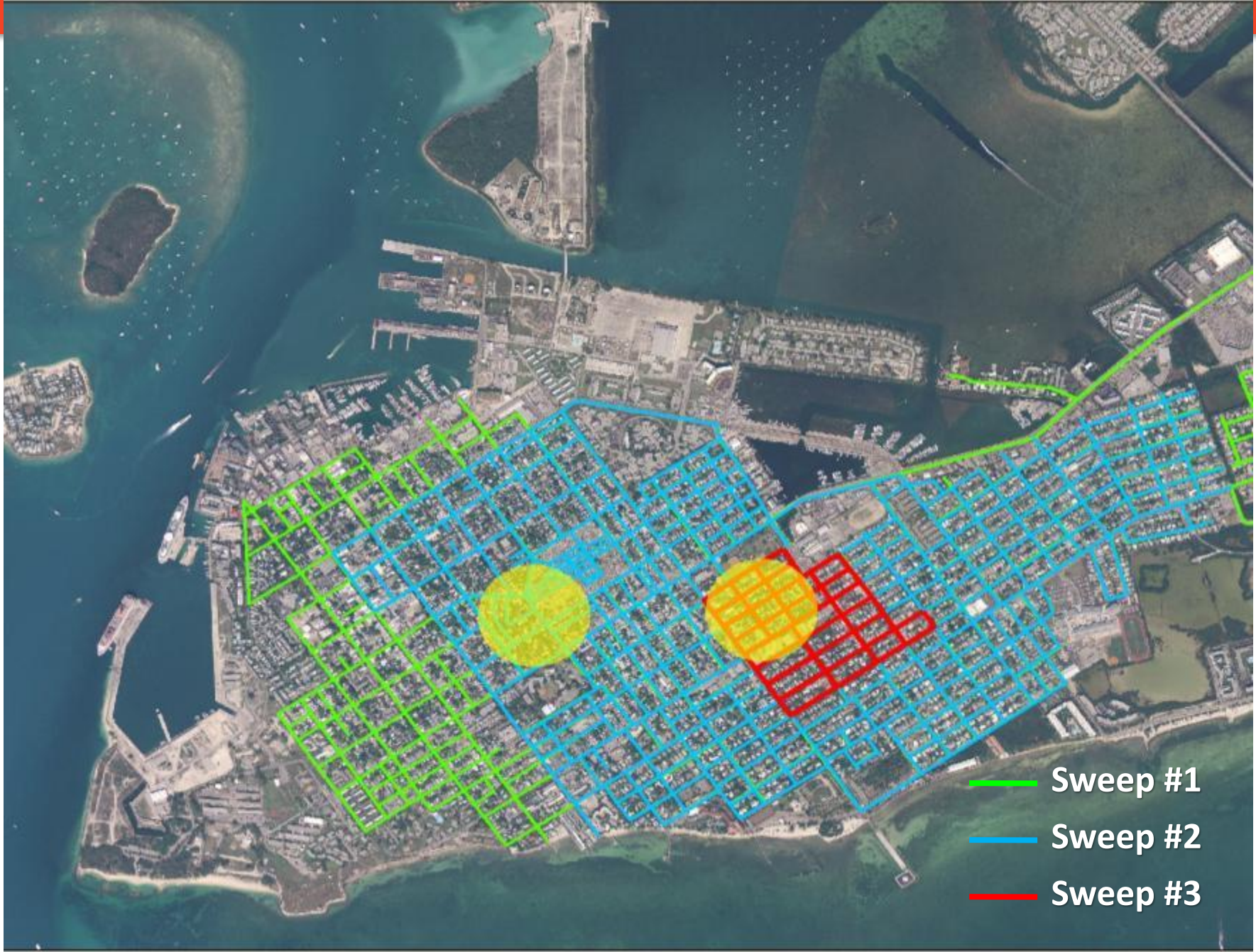
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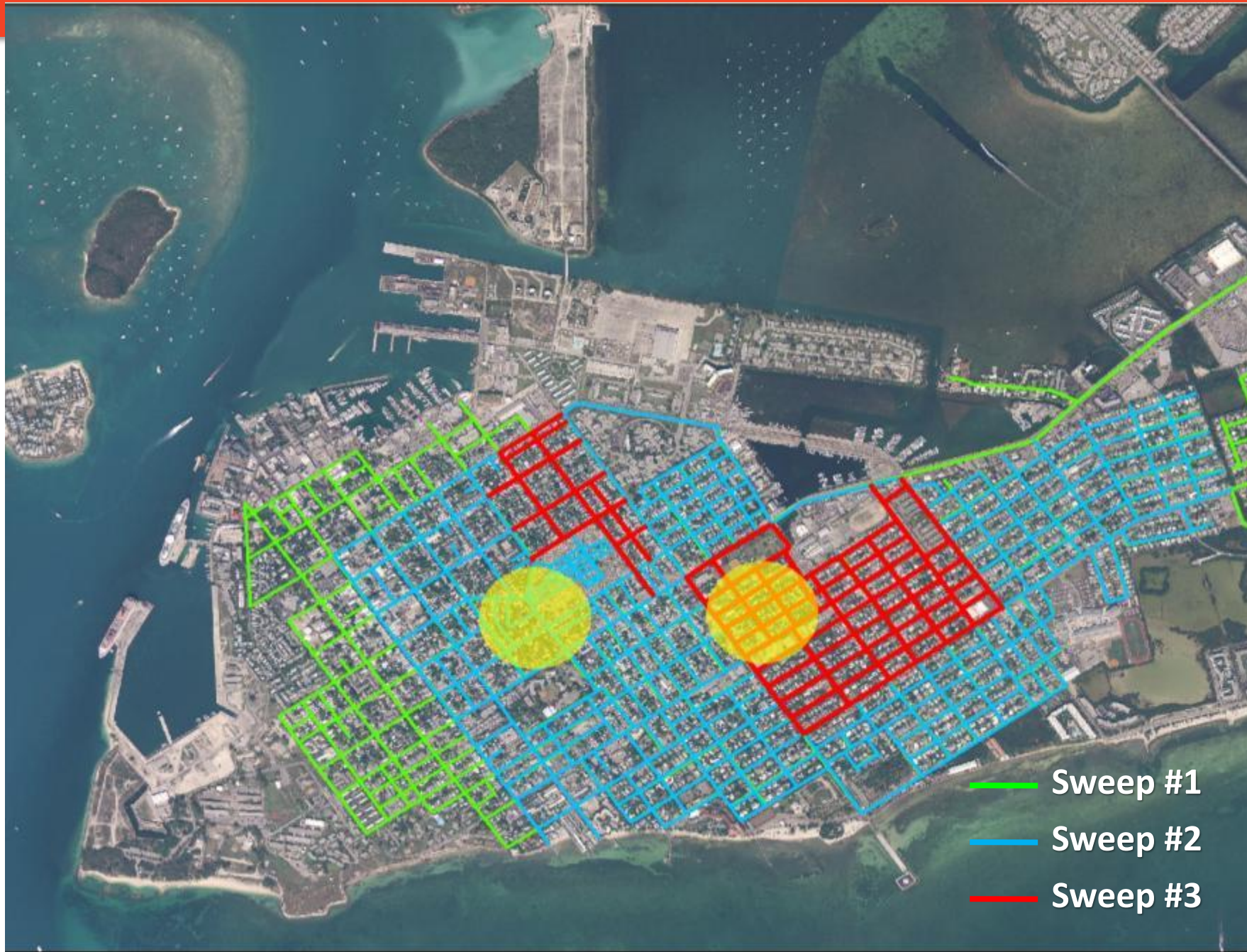
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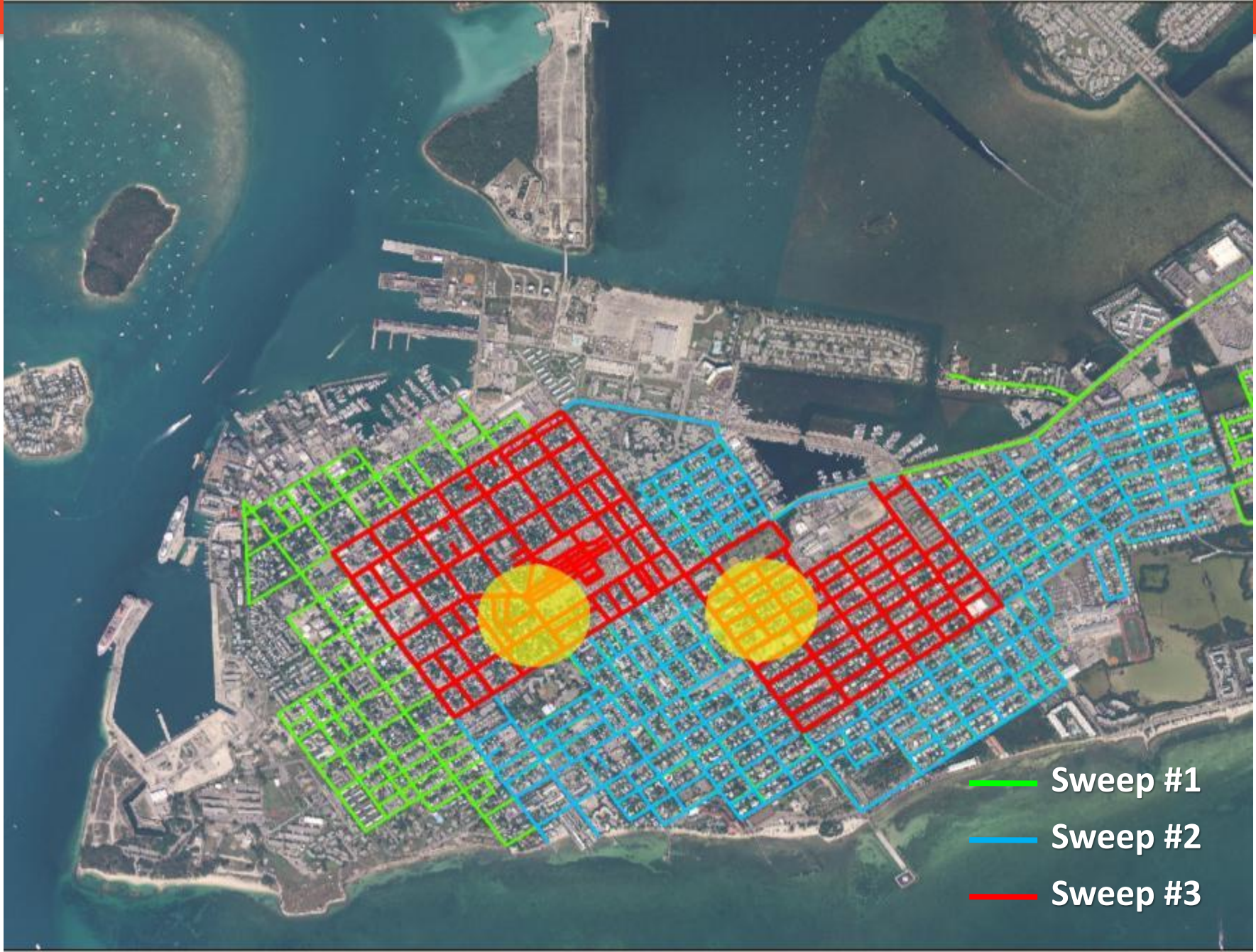
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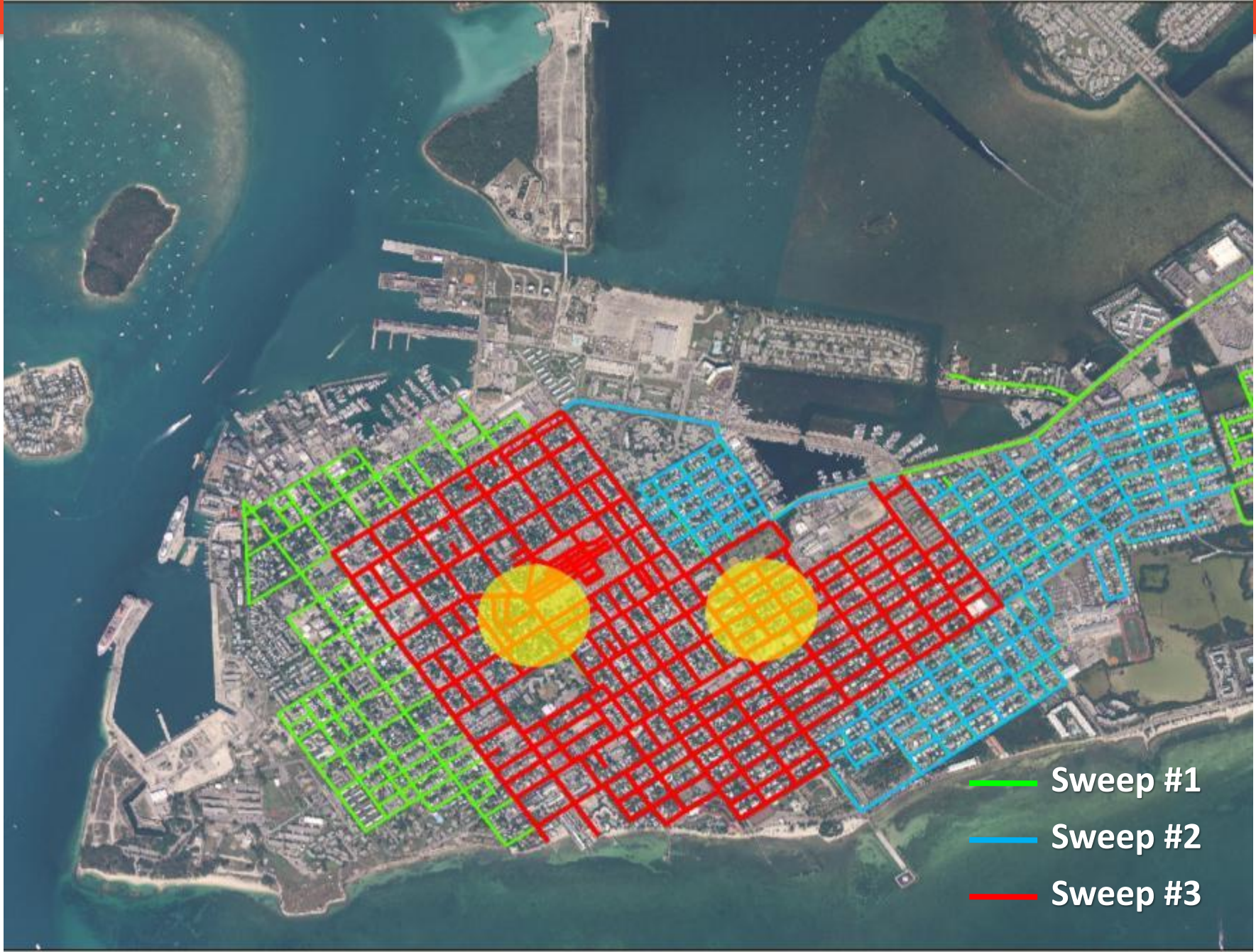
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- Sweep #1
- Sweep #2
- Sweep #3



- Sweep #1
- Sweep #2
- Sweep #3



- Sweep #1
- Sweep #2
- Sweep #3

Dengue Outbreak Control Techniques

- Control
 - Control of **Larvae**
 - Repeated sweeps of high interest areas
 - ✓ Eliminate larvae
 - ✗ Residents did not like weekly visits
 - Control of adults
 - ✓ Handheld fogging
 - ✗ Aerial/truck adulticiding



Current *Aedes aegypti* Control Measures

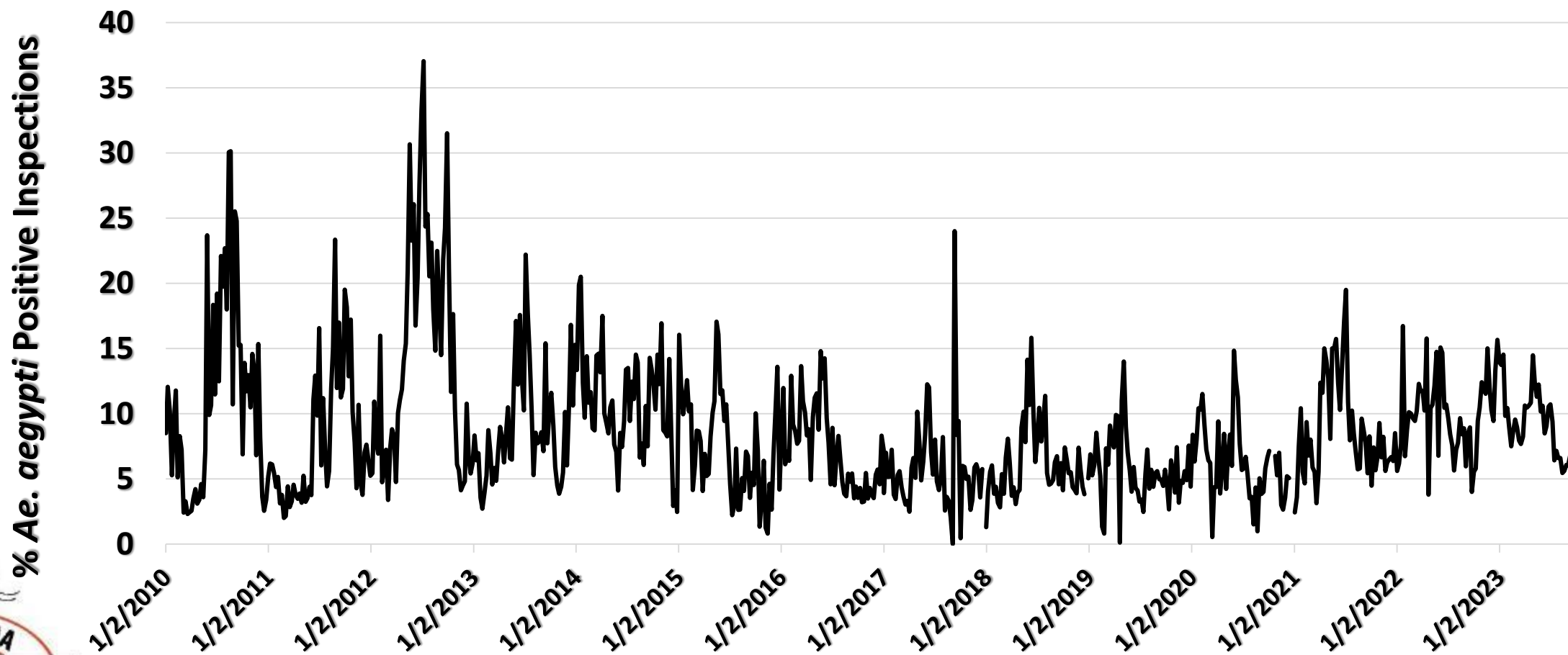
- **Door-to-Door Work**
 - Added more inspectors
 - Source reduction, Annual Sweep
 - Direct application of larvicides
 - Handheld ULV applications of adulticide
 - Education of home and business owners
- **Aerial Work**
 - Combination of larviciding and adulticiding



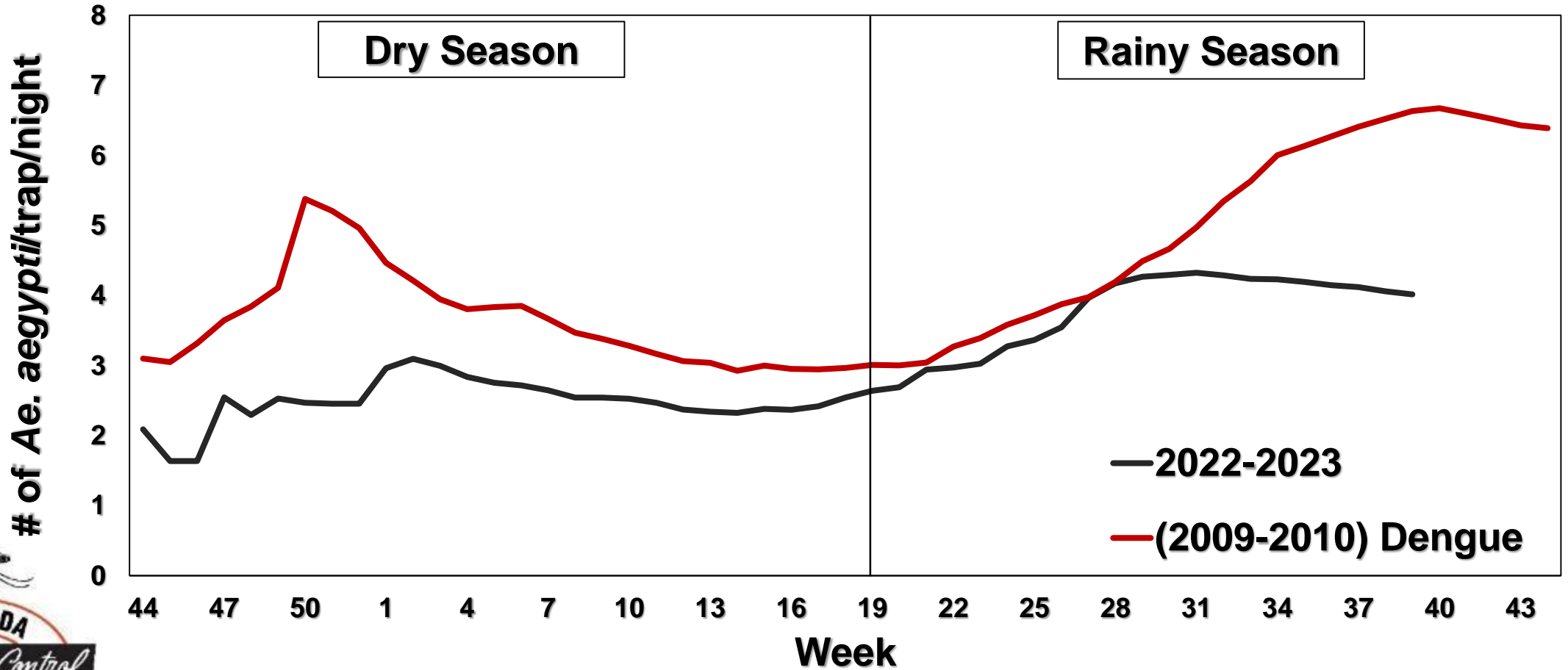
**Need new tools to
better fight
*Aedes aegypti***



Measuring Success: Weekly House Index



Key West *Aedes aegypti* Cumulative Average



Key West Daily Landing Rate Count Stations



Ultra-Low-Volume Adulthood

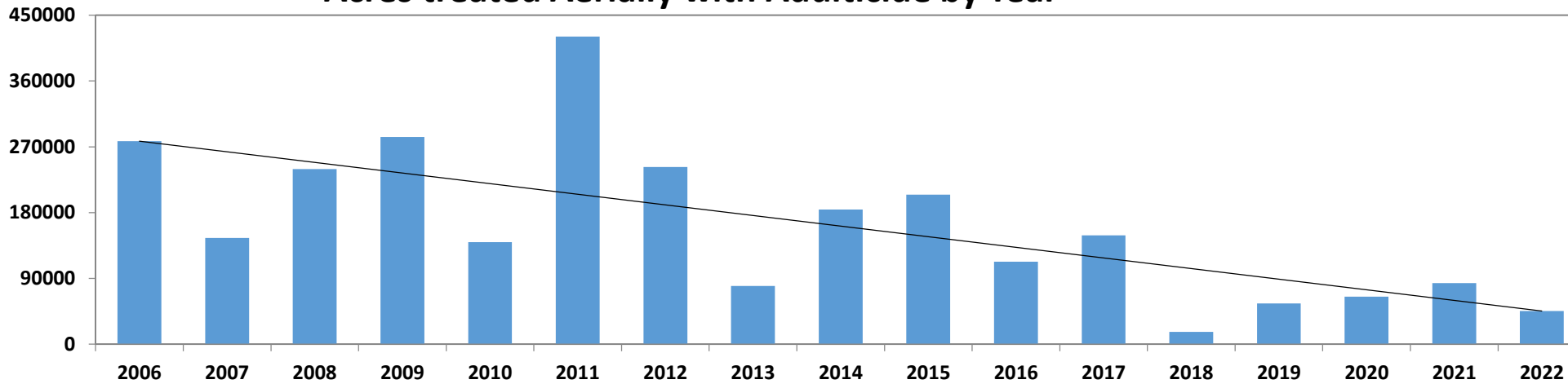


- Malathion
- Permethrin
- Naled

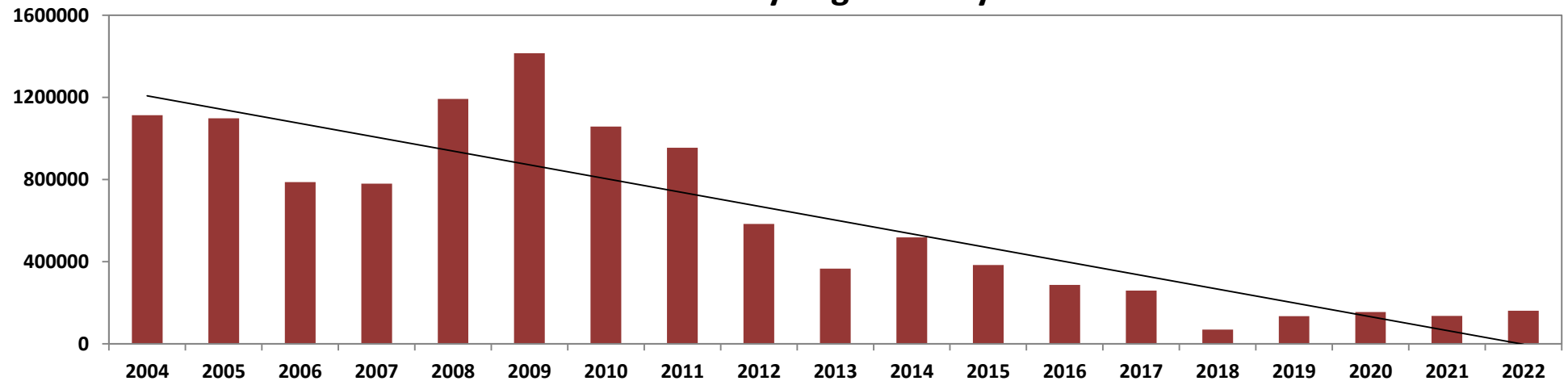


Emphasis on Increased *Bti* Larviciding and Reduced Adulticiding

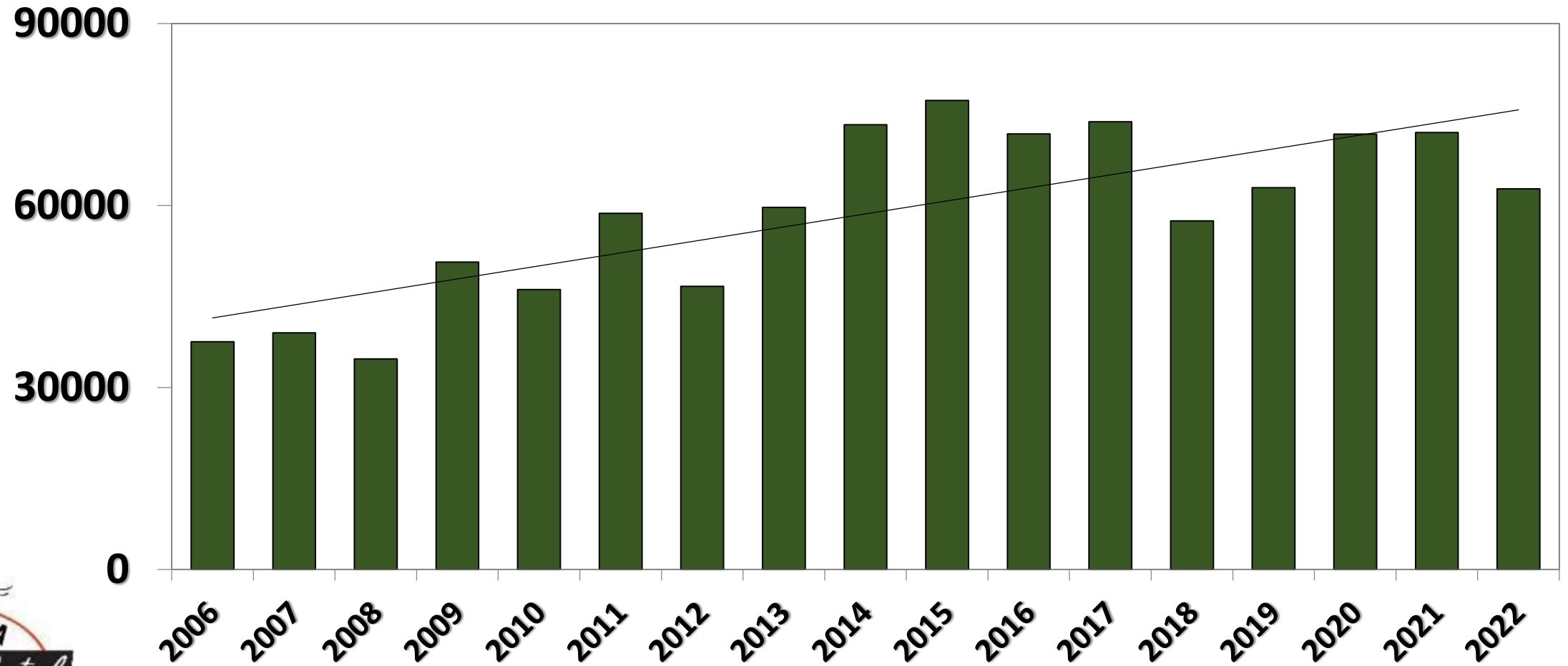
Acres treated Aerially with Adulticide by Year



Acres Treated by Fog Truck by Year



Acres Treated Aerially with *Bti* Larvicide by Year

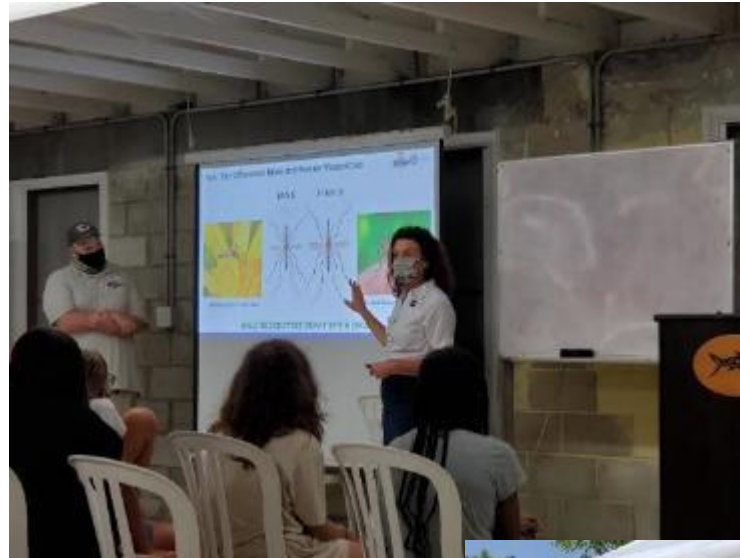


Public Education and Information



Getting Our Message to the Public

- Weekly Radio Spots
- Webinars
- Social Media
- Schools
- Community Events
- Homeowner's Associations
- Various Speaking Opportunities



Research Department



Current Projects Underway

- Resistance Testing
- New Product Testing
- Oxitec Mosquito Project
- Long-term product studies
- Automated Traps
- Drone Larviciding Applications
- Monitoring for invasive species



Questions



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