Responding to Locally Acquired Malaria in Sarasota County, Florida.

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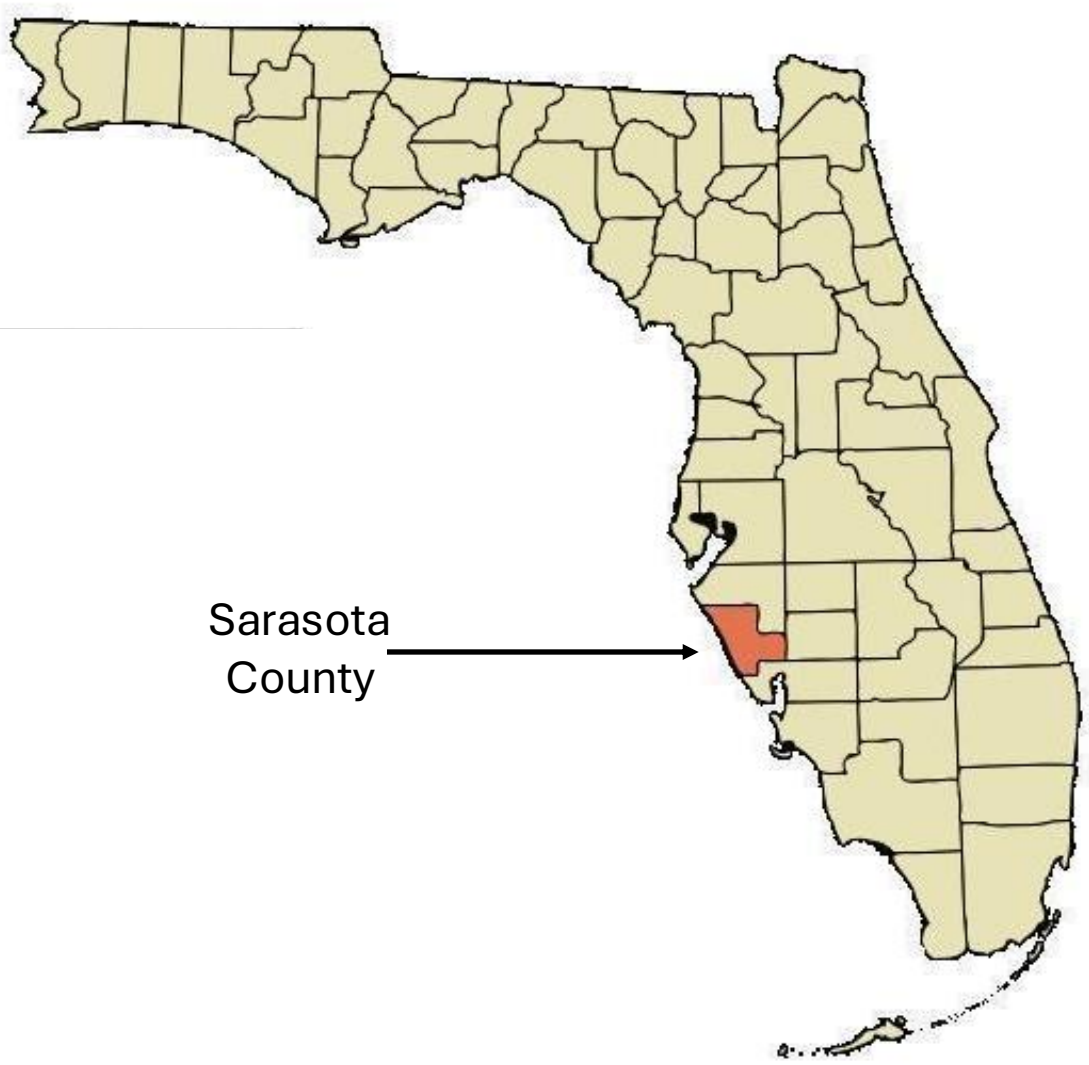
SARASOTA COUNTY MOSQUITO MANAGEMENT

UF UNIVERSITY of FLORIDA

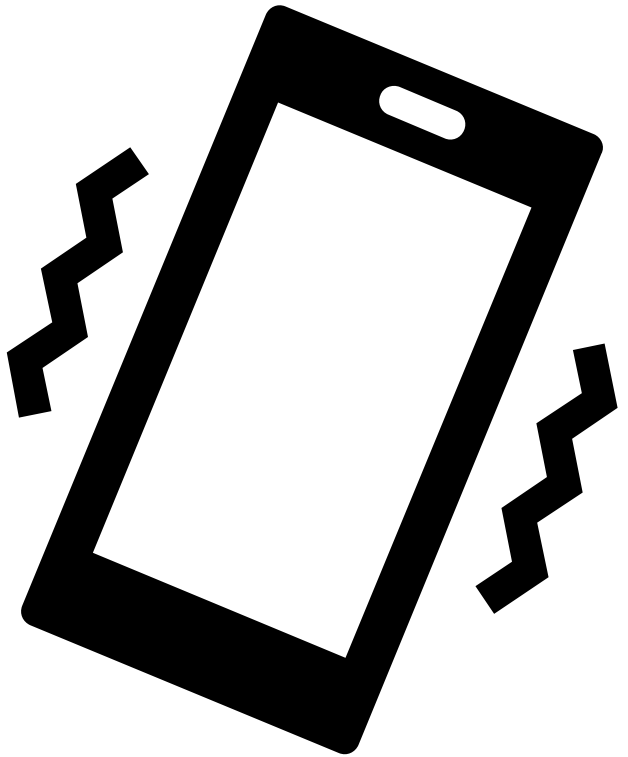
Malaria Occurrences in Sarasota Prior to 2023

< 1 imported case of malaria per year on average



18th May 2023
Notified by Department of Health (DOH)

- Unsheltered person found unresponsive.
- Transported to Sarasota Memorial Hospital
- Hospital lab identified malaria on thick/thin smear. SUSPECTED MALARIA CASE and reported to DOH.
- Low suspicion of locally acquired.
- Mosquito Management notified on same day of suspect case.



Initial Response

- Communication with Manatee Mosquito Control District
- ↑ Adult Mosquito Surveillance:
  - Collected low *Anopheles* populations.
  - Pooling commenced
- Larval Inspections & Treatments
  - No larvae present in 6 surrounding areas
- Adult treatments of woodlots/swamps
- 2 Truck missions > 3,500 acres

Investigation

Patient Interview.

No recent travel outside of USA.

DOH Lab diagnostic testing.

24th May: *Plasmodium vivax* confirmation.

CDC Lab testing.

2nd June: *Plasmodium vivax* confirmation.

Case is determined to be locally acquired.

Active Surveillance

On 26th May:

- Local hospitals and physician groups notified.

- Request for malaria screening for:
  - any person with reported fever and/or chills with low platelet count or anemia.
  - any person experiencing homelessness with fever and/or chills.

- DOH Staff review all Emergency Dept visits meeting the above criteria:
- **DOH Issues Mosquito Borne Illness advisory for Malaria**

Case Summary

7 cases identified
- 43% unsheltered
- 86% hospitalized
- 100% recovered

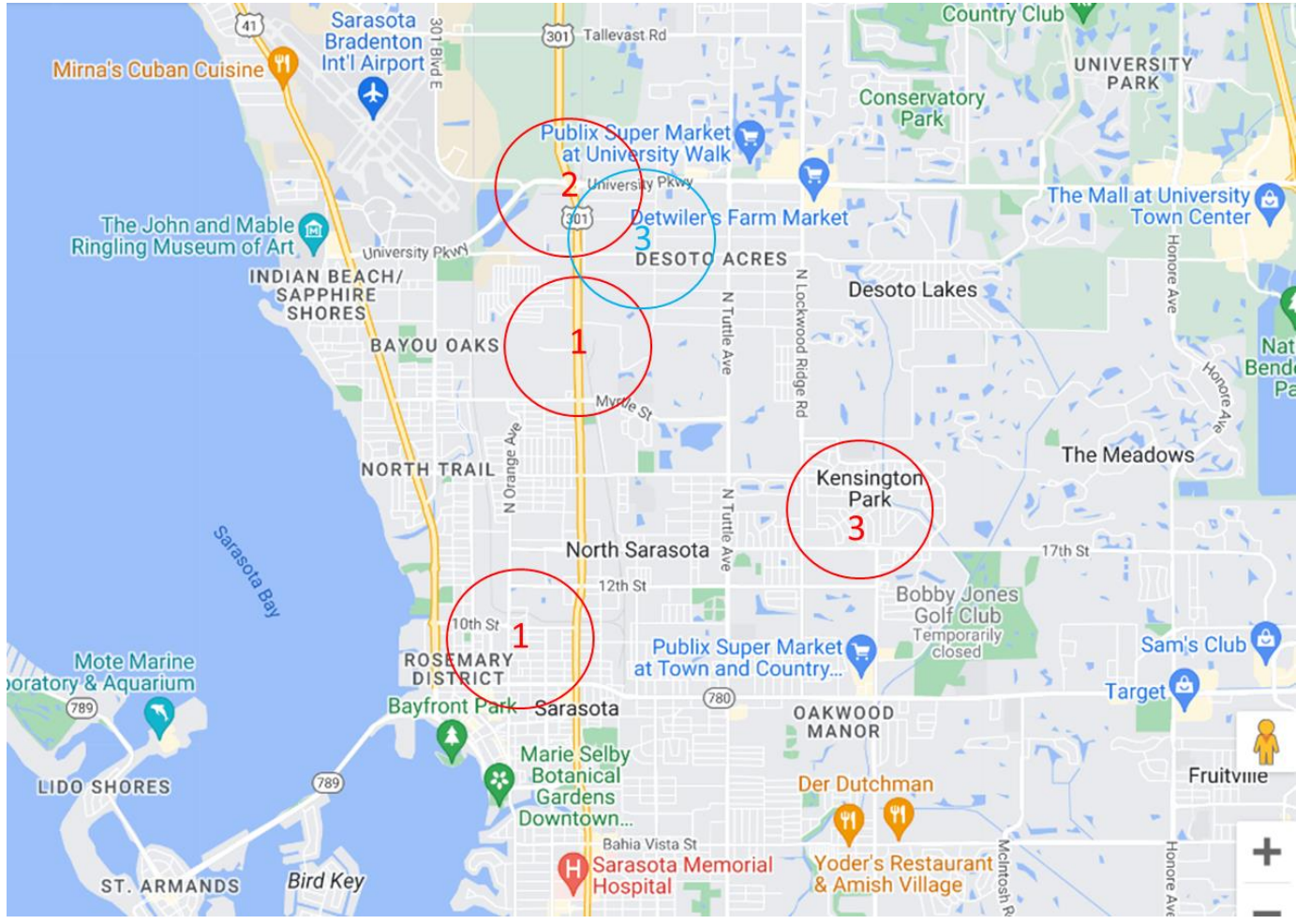
- All cases from NW Sarasota

On the 19th June, DOH Issued Mosquito Borne Illness alert for Malaria

Cases	Identified	Confirmed	Unsheltered Y/N	Hospitalized Y/N	Treated & Recovered
1.	5/18	5/24	Y	Y	Y
2.	6/15	6/17	N	Y	Y
3.	6/15	6/30	N	N	Y
4.	6/17	6/22	N	Y	Y
5.	6/19	6/22	Y	Y	Y
6.	6/28	6/30	N	Y	Y
7.	7/13	7/17	Y	Y	Y

Locations of Cases

- Case locations were limited to the NW Sarasota County area
- Patients came from a variety of backgrounds & socioeconomic statuses
  - 3/7 were unsheltered

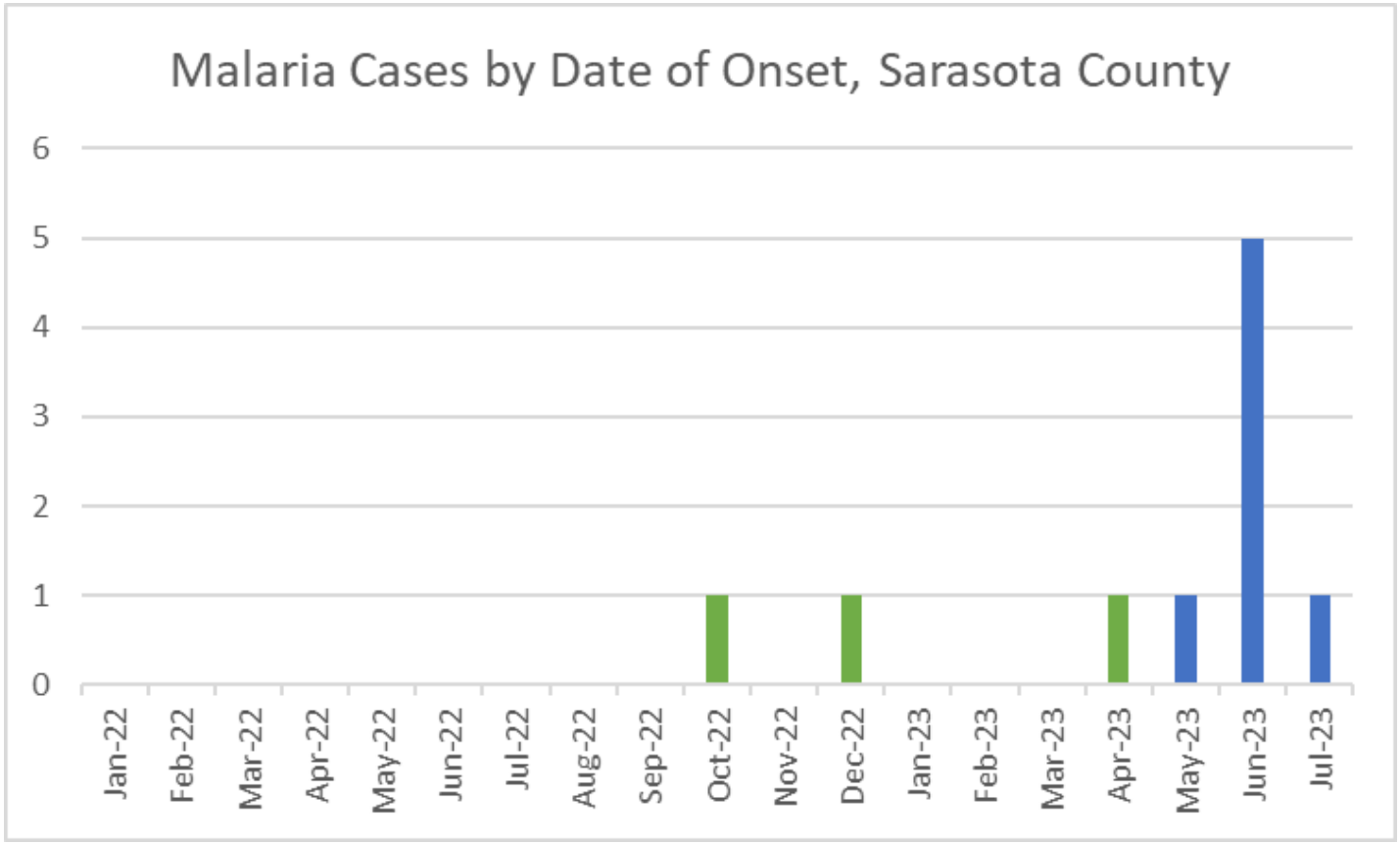


# of Human

# of Mosq

Travel Associated & Endemic Cases 2022-2023

- Green = Travel associated
- Blue = locally acquired



Communication

Weekly updates:

DOH Central Office

County Commissioners

- Case numbers
- Outreach strategies
- Mosquito Control activities

The Malaria Mosquito: *Anopheles* spp.

The main species of concern:

- *An. quadrimaculatus*
- *An. crucians*

Main habitats:

- Freshwater swamps
- Permanent water bodies aquatic plants

Difficult to sample and treat:

- Habitats hide them well
- They lay parallel to surface
- Aquatic plants may block treatments

Mosquito Population Surveillance

- By July >**200** CDC Light Traps set in area of concern
- 407 *Anopheles* spp. mosquitos were collected
- Throughout outbreak ↓ 98% *Anopheles* spp.

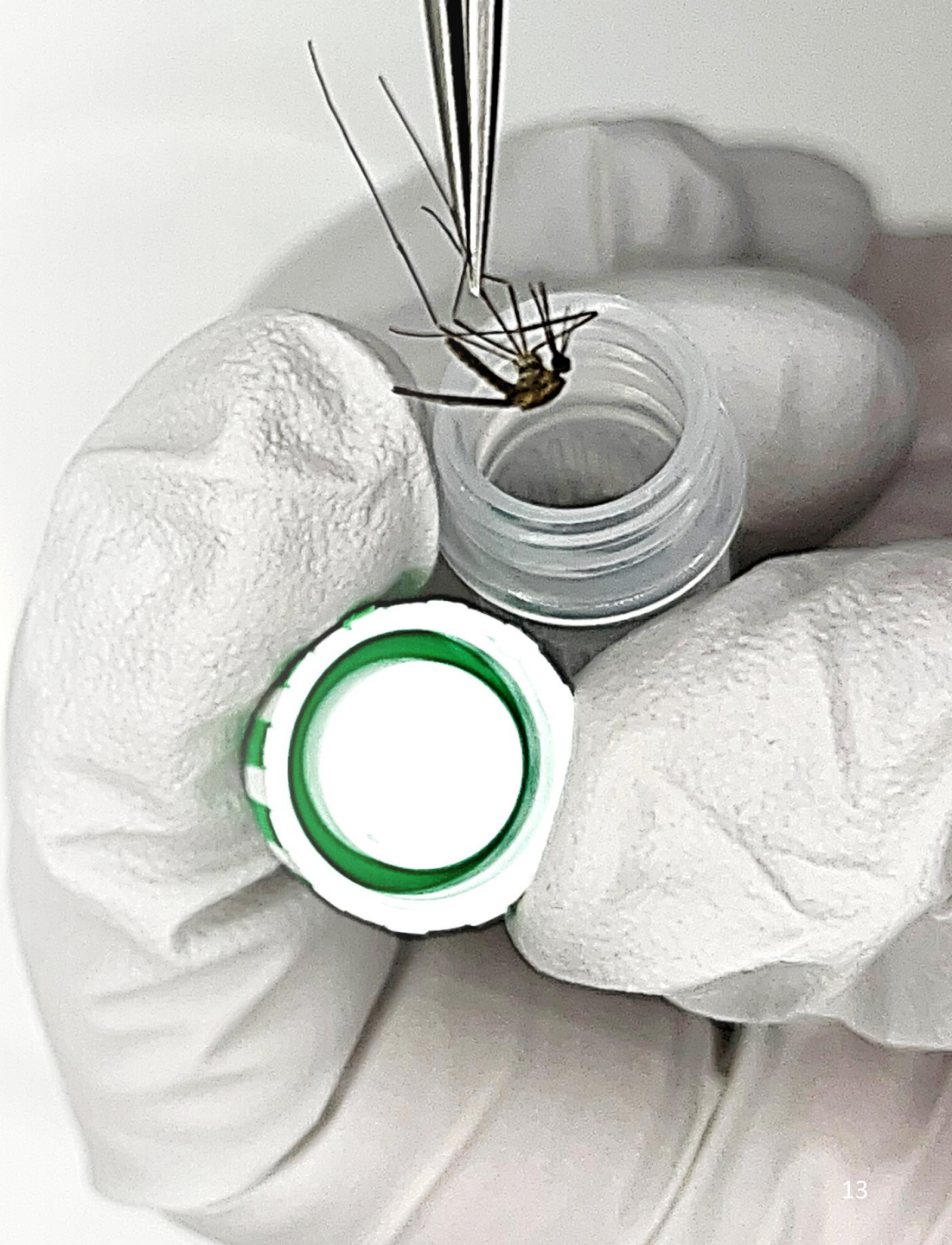
Disease Surveillance

172 *Anopheles crucians* sent to CDC

- Mosquitoes tested individually
- Mosquitoes separated into thorax and abdomen
- **3 x *An. crucians* abdomens were positive for *Plasmodium vivax***

No salivary glands positive

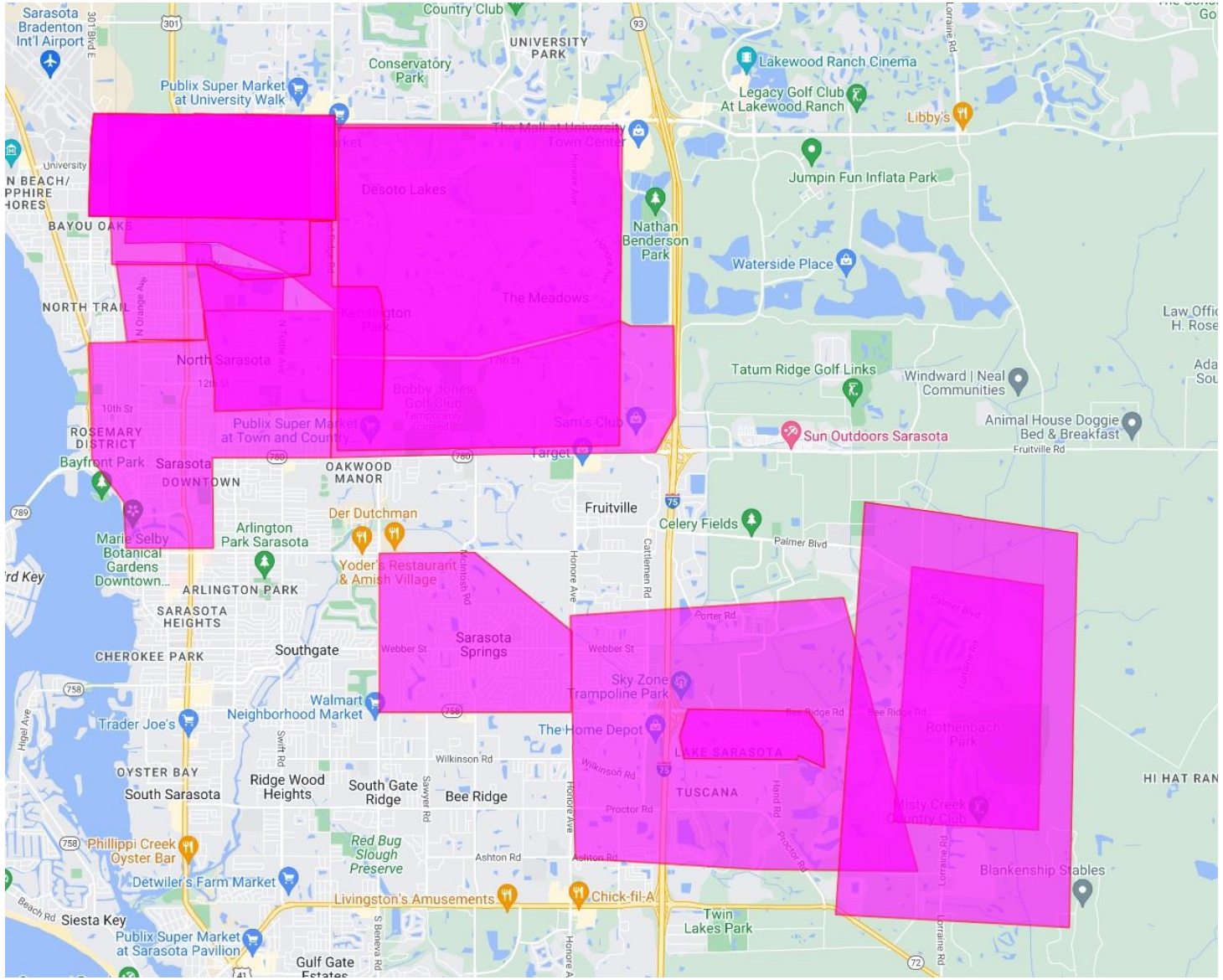
No specimens tested positive since early June, 2023.



Mosquito Control Efforts: Adulticide

- Aerial treatments
  > 36,000 acres

- Truck treatments
  > 600 miles

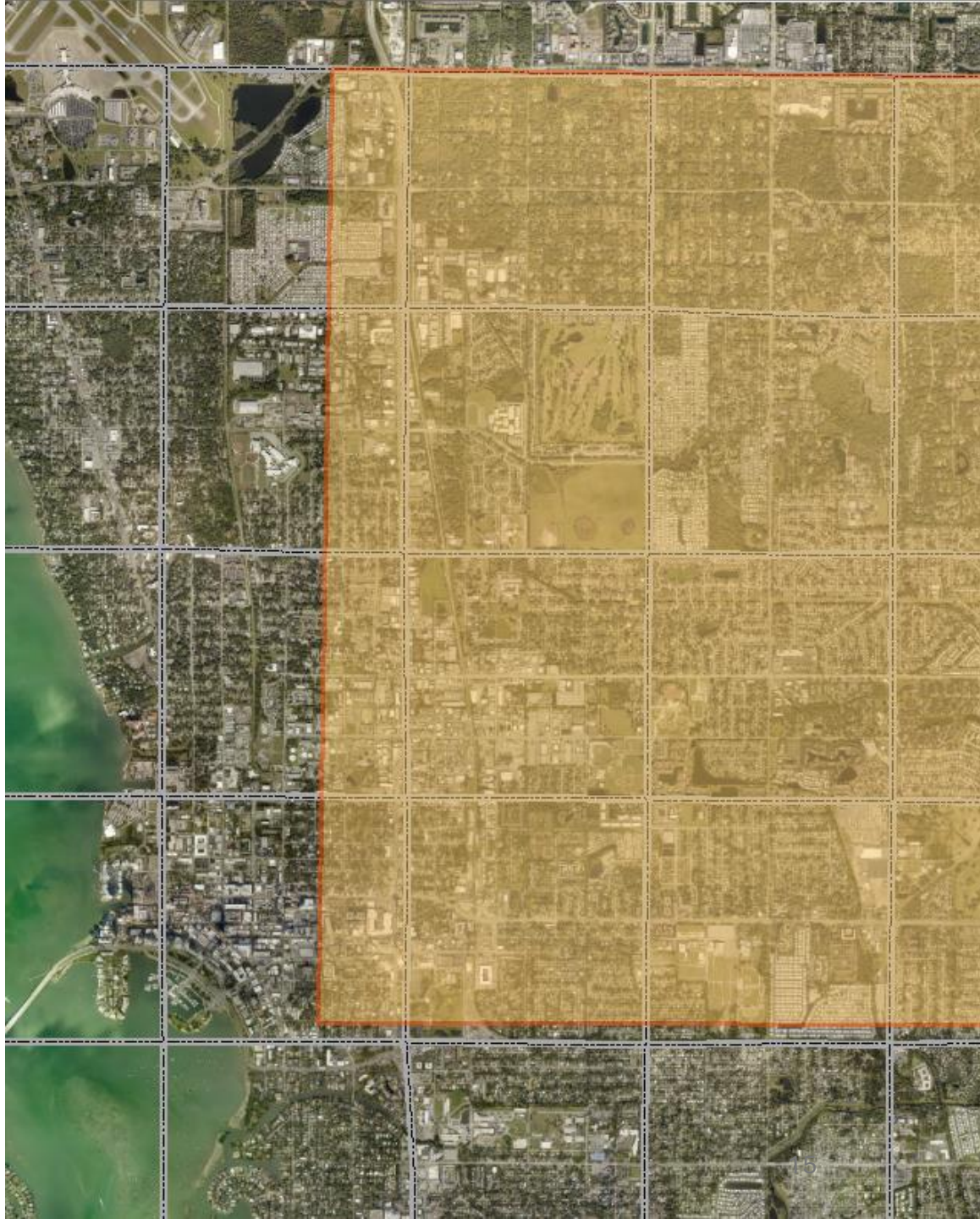


ALERT Sarasota County

Official notification system of Sarasota County

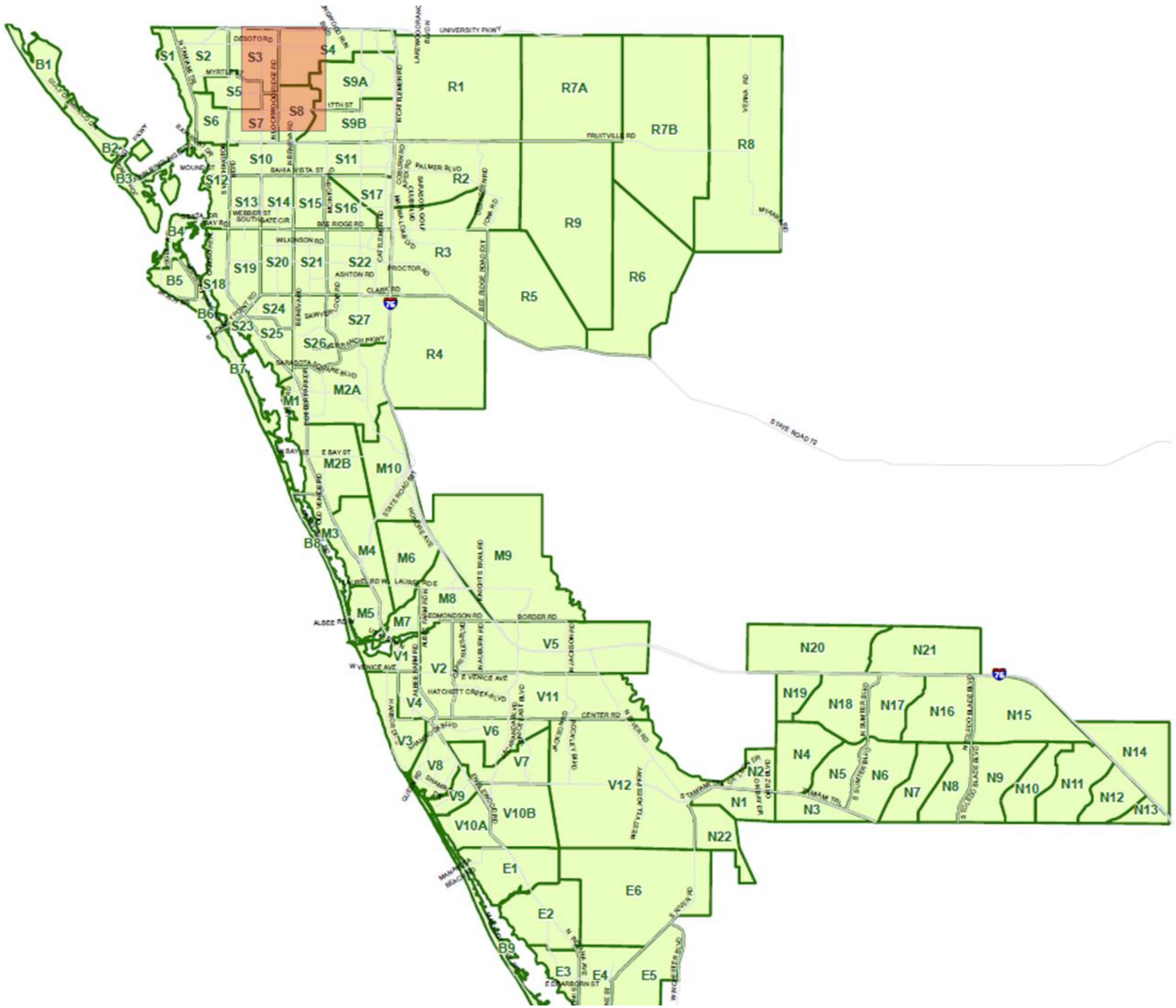
- Consistent messaging
- Realtime determination of area
- Multiple modes of communication
  - Phone
  - Email
  - Text
- Informed > 60,000 residents within minutes
  - Plus anyone with app that drives into area

<u>Make sure to inform call center</u>



Beyond Adulticides

- Release of **21,500** eastern mosquitofish *Gambusia holbrooki*
- **1,286** sources treated by larvicides


UNIVERSITY PKWY
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STATE ROAD 72
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S1
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V10A
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B9
E3
E4
E5


Was malaria in MY area?

General Public Outreach

Pitches to Journalists	213
Media Availability Events	3
Media Contacts/Responses	36
On-Camera/Phone Interviews	23
Social Media Posts	39
Articles Published	3
Door-To-Door Events	3
Events Attended	8
Joint FMCA expert panel event	1

Outreach to the Unsheltered Community

DOH Sarasota Health in Motion

- Partnered with 7 organizations
- Law Enforcement Homeless Outreach Teams (HOT)
- Provided bite prevention supplies
  - > 1,000 cans of insect repellent
  - > 60 bed nets
  - Education on bite prevention

Provided additional testing

- Symptom screening
- Blood draws

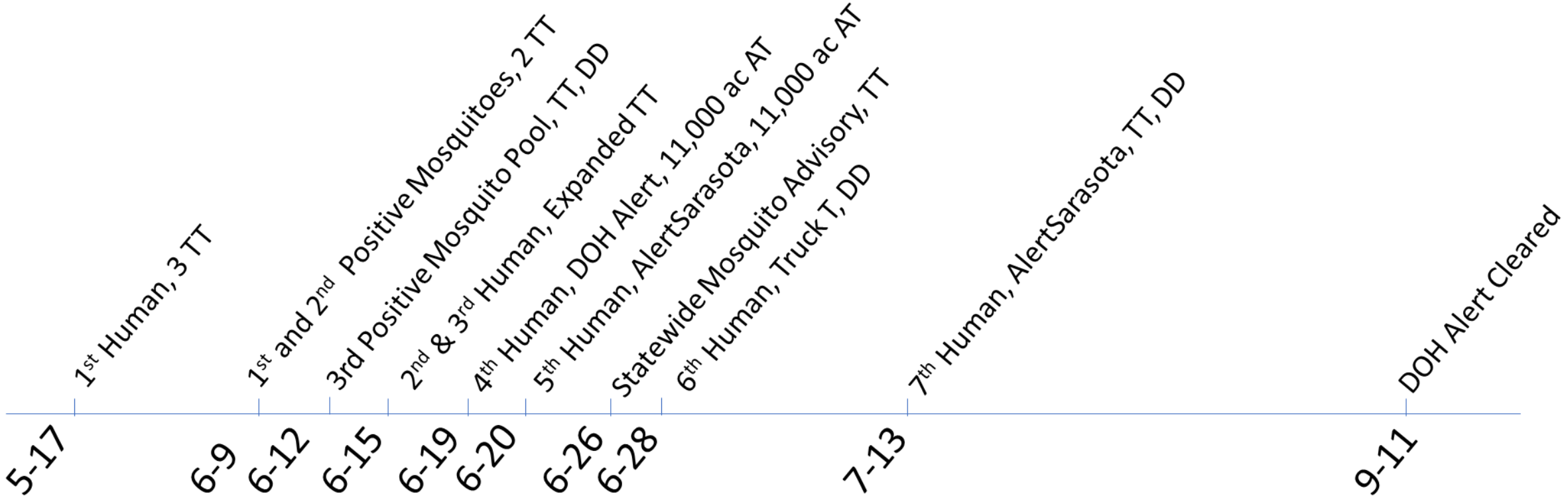
The Finish Line

- The last reported case came on July 13th, 2023.

- Increased surveillance and submitting samples to CDC would continue for **8 more weeks.**

- By **September 11th**, the mosquito-borne illness alert for malaria was lifted.

2023 Malaria Timeline



TT= Truck Treatment
AT= Plane Treatment
DD= Door to Door Outreach

*Constant backpack Adulticiding & Larviciding treatments were conducted during this entire duration.

Meeting with CDC and FDACS

July 25th, 2023: Wade Brennan, Dr. Ellen Dobson, CPM Marah Clark, Michael Drennon, Max Dersch, Natalie Barber, and John Eaton (not pictured) met to discuss the collaborative response during the malaria outbreak.

Kudos from Dr. Dobson (CDC) for Sarasota County based on the excellence in response:

"If it had to happen anywhere, at least it happened here."

- We have the tools & equipment to battle these situations
- Advanced program and staff

The **only** suggestion from the meetings would be to incorporate drones for the application of pesticides

Potential Opportunities Identified

- Testing pools for malaria in-house
- Increased education for public
  - Improve accessibility to information

    (e.g. QR Codes and website)
- Bulletins for staff and/or public
- Weekly meetings
- Drone larviciding applications

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CDC U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION

USDA

SOUTHEASTERN CENTER OF EXCELLENCE IN VECTOR-BORNE DISEASES

The CDC-funded Centers of Excellence combine innovative, applied research programs with public health expertise to help prevent and control vector-borne disease threats.

Thanks to Dr. Rhoel Dinglasan and the Southeastern Center of Excellence in Vector-Borne Disease (SECVBD)

JAMA: Public Health Response to the First Locally Acquired Malaria Outbreaks in the US in 20 Years

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Public Health Response to the First Locally Acquired Malaria Outbreaks in the US in 20 Years

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Abstract

IMPORTANCE In 2023, the US reported 10 locally acquired mosquito-transmitted malaria cases of 4 genetic lineages in 4 states, the first such outbreaks detected in 20 years and the largest in 35 years.

OBJECTIVE To present the investigations, interventions, and challenges in the public health response to the malaria outbreaks and provide recommendations for future outbreaks.

DESIGN, SETTING, AND PARTICIPANTS This qualitative study was an interdisciplinary public health response to the locally acquired malaria outbreaks in May to December 2023 and included case investigations, enhanced case finding, polymerase chain reaction analysis of captured *Anopheles* spp mosquitoes for *Plasmodium* spp parasites, and novel targeted amplicon sequencing of *Plasmodium* spp in patient blood samples. Public health interventions included incident command activation, clinician outreach, community awareness, and vector control. Patient data were acquired through public health surveillance as part of National Notifiable Disease Surveillance.

EXPOSURE *Plasmodium vivax*–infected and *Plasmodium falciparum*–infected *Anopheles* spp mosquitoes.

MAIN OUTCOMES AND MEASURES Confirmed malaria infection via blood film microscopy and polymerase chain reaction, presence of *Plasmodium* spp in *Anopheles* spp mosquitoes, and genetic markers associated with an endemic region of origin and parasite strain relatedness via targeted amplicon sequencing.

RESULTS The study included 10 patients (mean [SD] age of 39.5 [15.0] years; 7 male [70%]) from Florida, Texas, Maryland, and Arkansas with locally acquired mosquito-transmitted malaria and 783 *Anopheles* spp mosquitoes across 4 states. No patient had a recent history of international travel or blood-borne exposures. Outbreak cases had epidemiologic links within but not across state lines. *P vivax* was detected in 3 *Anopheles crucians* in Florida. Sequencing data showed that all Florida *P vivax* cases shared the same *Plasmodium* strain. The Texas and Arkansas *P vivax* cases were genetically distinct from each other and from Florida's cases. All 9 *P vivax* strains had genetic signatures that were consistent with Central and South American origin. Maryland's *P falciparum* parasites were consistent with African origin. The outbreaks were contained.

CONCLUSIONS AND RELEVANCE In this qualitative study of locally transmitted malaria, outbreaks remained contained to individual counties, with Florida's *P vivax* cases linked to a single strain distinct from those in other states. Sustained *Plasmodium* spp transmission is unlikely in the US, though

(continued)

Key Points

Question Why were there 4 outbreaks of domestic malaria in 2023 after 20 years with no locally acquired cases?

Findings In this qualitative study, 10 locally acquired mosquito-transmitted malaria cases were reported in 4 states amid more than 2200 imported cases in 2023. Three infected mosquitoes were found in Florida, where all cases shared a Central or South American *Plasmodium vivax* strain; no genetic or epidemiologic links were found across states, and 1 *Plasmodium falciparum* case matched African parasites.

Meaning These findings suggest that sustained transmission of malaria in the US remains unlikely, though increased global travel, high temperatures and moisture, and competent vectors may raise the risk of local malaria outbreaks.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Thank you for listening!

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