



**16th FKMCD-Oxitec Public Educational Webinar:
Takeaways from 2021, Planning for 2022**

Tuesday, April 5th 2022

Introductions – Panelists With You Today



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FKMCD-Oxitec Public Educational Webinar Series

Introduction to our Webinar Series

FKMCD and Oxitec are hosting a series of public educational webinars to share information with residents of the Florida Keys and provide forums to answer questions.

- Webinars are open to everyone.
- Webinars are recorded and made available for everyone after the event.
- All questions relating to the webinar topic(s) will be answered (some in batches if questions are similar).
- If time runs out, we will accept questions in writing via florida@oxitec.com.
- Questions and answers will be published in writing after the event with external or related online resources/references.

FKMCD & Oxitec Public Educational Webinars

Welcome to Webinar #16!

Today's Agenda:

- Takeaways from the 2021 Project – What Did We Achieve?
- Plans for 2022.
- Your Questions, Answered.

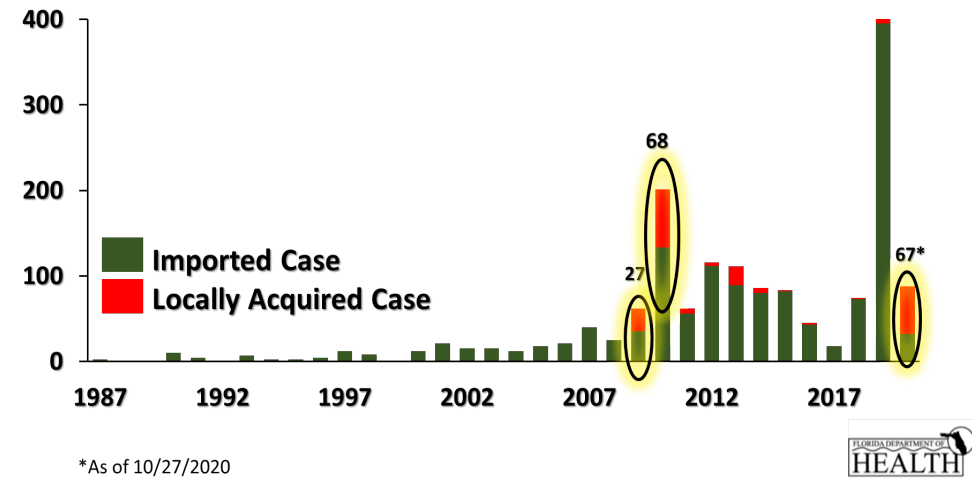
Documentation, resources, references, and other information are available at keysmosquitoproject.com

Why Now, Why the Florida Keys?

Virus transmission, pyrethroid resistance, and challenges unique to *Aedes aegypti*

- **Dengue is an ongoing challenge** with 72 confirmed, locally-acquired cases in Monroe County in 2020.
- Potential risk of **Zika, chikungunya, yellow fever, heartworm and other diseases.**
- **Pyrethroid resistance in *Ae. aegypti*** in Florida is ubiquitous.
- **Inherent challenges to *Ae. aegypti* control.** Cryptic harborages, oviposition & larval sites, diurnal behavior.
- **Need more tools** in our toolbox.
- **Environmental impact** a key consideration in the Keys.
- Nine national & state agencies concluded **Oxitec male *Ae. aegypti* pose no risk to human or environmental health.**

Dengue Cases in Florida Since 1987



Quantification of permethrin resistance and *kdr* alleles in Florida strains of *Aedes aegypti* (L.) and *Aedes albopictus* (Skuse)

Alden S. Estep^{1*}, Neil D. Sanscrainte², Christy M. Waits¹, Sarah J. Bernard¹, Aaron M. Lloyd³, Keira J. Lucas⁴, Eva A. Buckner^{5a}, Rajeev Vaidyanathan⁶, Rachel Morreale⁷, Lisa A. Conti⁸, James J. Becnel²

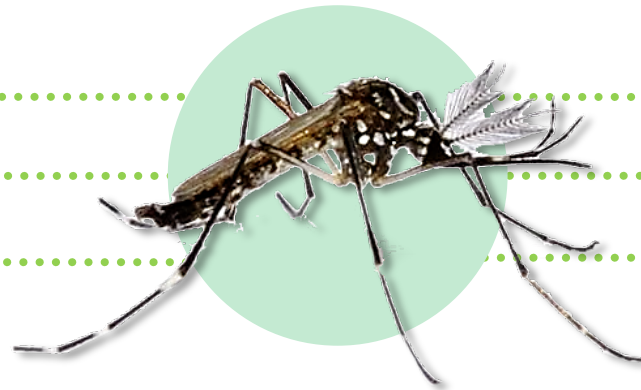
Oxitec's *Aedes aegypti* Male Mosquitoes

Oxitec male mosquitoes mate with invasive female pests, and only the male offspring of these encounters survive

✓ TARGETED SUPPRESSION

✓ SAFE, NON-TOXIC, NON-ALLERGENIC

✓ PROVEN EFFECTIVE



MALE-ONLY RELEASES
(male mosquitoes do not bite!)

TRACEABLE IN THE FIELD

SELF-LIMITING IN THE ENVIRONMENT





FKMCD-Oxitec Mosquito Project 2021 Takeaways

Field Project Designs and Data Collection



1

Regulatory Pilots

Small | high statistical power | protocol approved by regulators | biology/efficacy measured

2

Demonstration Pilots

Larger pilot to demonstrate area-wide suppression | designed w/ regulator | compared with control

3

Operational Deployment

Deployed as vector control tool to suppress vector population over an area

2021/22 Pilot Project Design and Aims

Project Design Elements

1. Single-point release, trapping males and offspring
2. Multi-point release, trapping offspring
3. Replicated and compared to untreated areas
4. Specific locations determined following community engagement
5. Timing: 2021-2022 (including baseline monitoring)

Evaluation Elements

1. Male flight range and longevity
2. Duration of effect (residual activity)
3. Evaluation of natural breeding sites
4. % kill of female mosquitoes
5. % of the invasive population treated



How We Collected Data

1 Egg Collection Ovitrap



Small plastic cups

Monitors the numbers of eggs laid by *Ae. aegypti* females

2 Adult Mosquito Collection



Captures adults

Monitors ratios and numbers of *Ae. aegypti* adults

3 Lab-based Monitoring/QC



Stereo microscopes

Used to track performance and confirm quality

Where and When Did Releases Occur?

Releases occurred in select locations in the Middle and Lower Keys

Locations:

- Vaca Key
- Ramrod Key
- Cudjoe Key
- Little Torch Key
- Big Coppitt Key

Untreated control sites were in **Key Colony Beach, Little Torch Key** and **Summerland Key**.

Releases began in late April 2021 and concluded in late November 2021.

The project experienced two interruptions, from **Tropical Storms Elsa and Fred** in July and August.

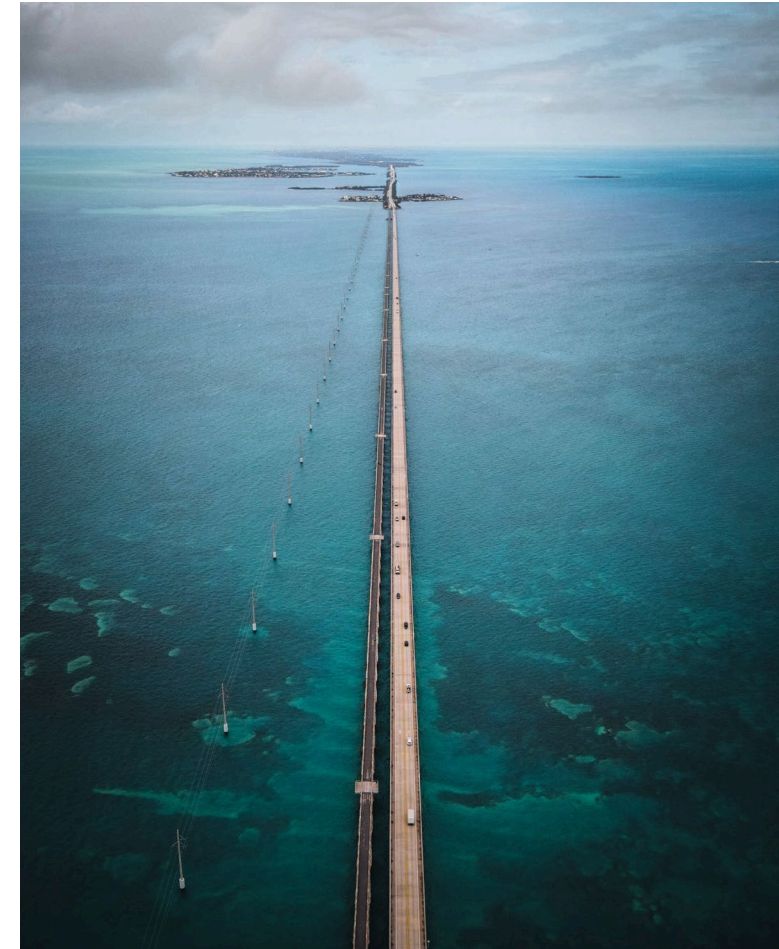


Photo by [Chase Baker](#) on [Unsplash](#)

Success: Florida Keys 2021 Hits the Mark!

Key Performance Outcomes

- ✓ Oxitec's self-limiting gene maintains effectiveness in the field
- ✓ Dose rates are suitable for use
- ✓ Oxitec males performed excellently
- ✓ Box dosing established effective overflooding against invasive species
- ✓ Oxitec males mated successfully
- ✓ Oxitec progeny accessed cryptic breeding sites (this is good)
- ✓ No females released



Success: Oxitec Male Mosquito Flight Radius Confirmed

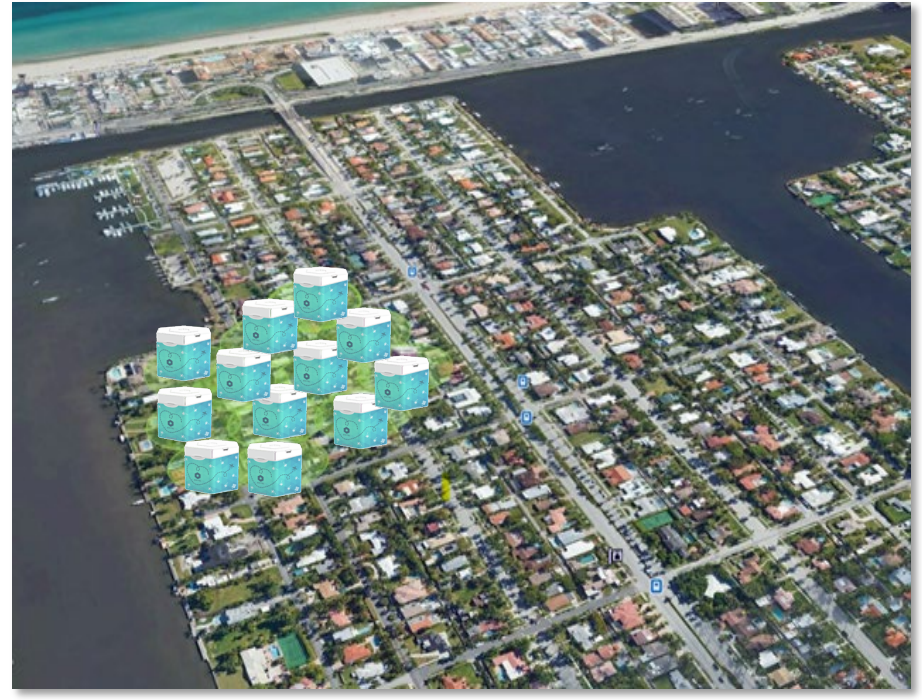
The majority of Oxitec's male mosquitoes were found within ~50m of release locations

Mosquito coverage in Project A was concentrated within a 1 Ha circle (equating to 50m from release points) around release locations, as expected.



CONFIRMED
The flight range of Oxitec's male mosquitoes is the same as wild *Aedes aegypti* males.

Mosquito releases in Project B achieved effective mosquito coverage throughout release neighborhoods using multiple release locations.

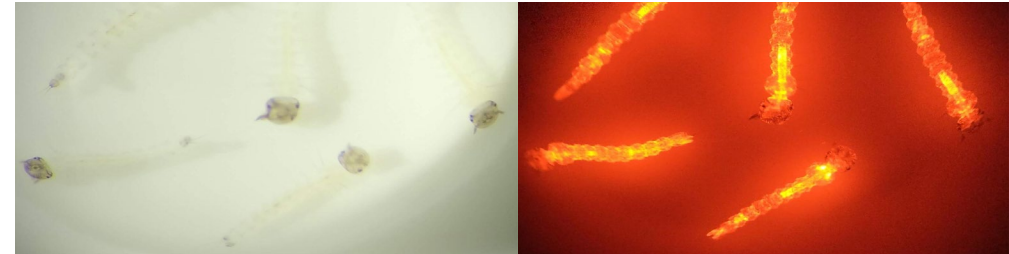


No **released** Oxitec male mosquitoes were detected in traps at 400 m from the release locations in Project A, reinforcing previous data that *Aedes aegypti* mosquito movement is limited to within 400 m generally.

Success: Effective Mating and 100% Larvicidal Efficacy

Larvicidal efficacy of Oxitec mosquitoes = 100% throughout the project.

- Throughout the entire field season, **larvicidal efficacy for Project A was 100%** in all sites where fluorescent larvae were detected.
- Over 22,000 *Aedes aegypti* larvae were screened for fluorescence.
- **Every fluorescent female larva died before reaching adulthood.**
- Three Project A sites did not detect Oxitec male mosquito progeny due to low *Aedes aegypti* mosquito abundance in these sites, and despite pre-release monitoring showing *Aedes aegypti* presence.
- Throughout the entire field season, **larvicidal efficacy for Project B was 100%** in all Project B sites, also demonstrating effective mating throughout.
- **Regular PCR-based confirmation of screening accuracy also confirmed that larval fluorescence screening was highly accurate, with zero samples mis-screened.**
- This reflects the complete penetrance of the conditional female-specific self-limiting gene which causes lethality in all female offspring inheriting the gene, and is consistent with previous laboratory data and field data from Oxitec pilots in Brazil.



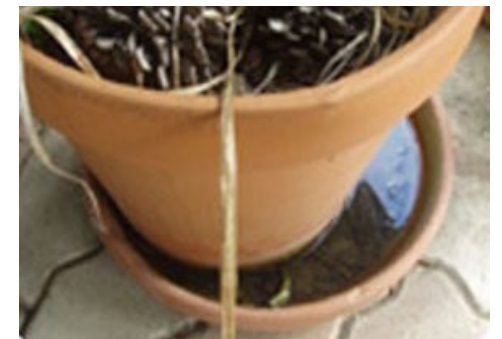
Site	Efficacy
A12 (low dose)	100%
A13 (low dose)	No data (abundance too low)
A21 (low dose)	No data (abundance too low)
A1 (high dose)	100%
A2 (high dose)	100%
A20 (high dose)	No data (abundance too low)
A15 (high dose)	100%
B2 (high dose)	100%
B22 (high dose)	100%
B25 (high dose)	100%
C8 (control)	N/A
C20 (control)	N/A
C24 (control)	N/A

Success: Oxitec Progeny Found in Cryptic Breeding Sites

Females Mated by Oxitec's Males Oviposited in a Wide Range of Cryptic Breeding Sites in Project B

Fluorescent progeny of Oxitec's male mosquitoes were detected in a wide range of cryptic *Aedes aegypti* breeding sites monitored during Project B, indicating that this is an effective tool to target *Aedes aegypti* larvae in hidden breeding sites that otherwise can be difficult to treat.

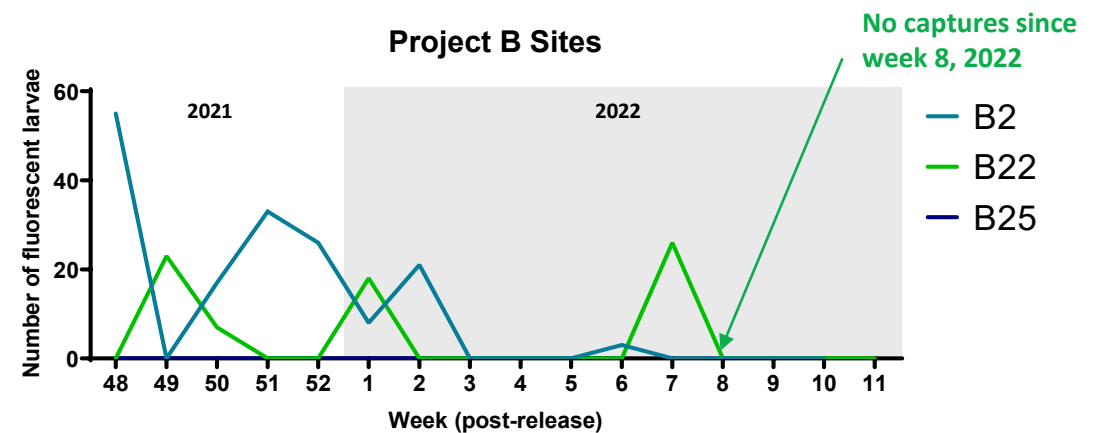
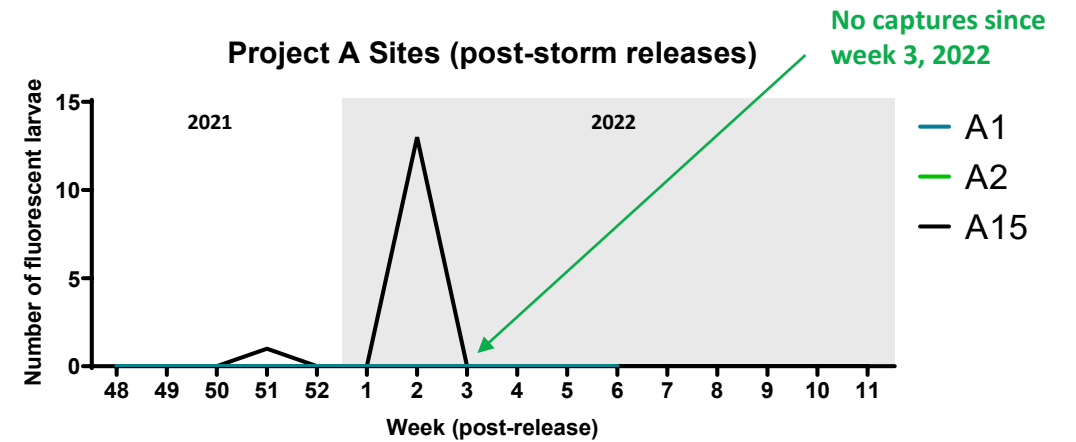
- Flowerpots and plant trivets
- Garbage can lids
- Buckets
- Tires
- Toilets
- Jet skis
- Aluminum soft drink cans



On Track: Post-Release Monitoring

Post-release monitoring is on track to conclude soon in all sites, documenting disappearance of Oxitec male mosquitoes from the area

- Following the end of releases, each site is monitored **until 10 weeks after no more fluorescent mosquitoes are detected.**
- Post-release monitoring has been concluded in all but 3 sites (A15, B2 and B22) as of 29 March 2022.



Success: Complete Project Compliance

The 2021-22 project was in full compliance with the EPA and FDACS permits granted to Oxitec

- **No adverse effects on human health or the environment** have been observed.
- **No adult female mosquitoes carrying the Oxitec transgenes detected.**
- Contained (caged) boxes further confirmed that **no female Oxitec mosquitoes were released.**
- Oxitec mosquito releases were **audited twice by FDACS' Bureau of Inspection and Incident Response**, in June and Sept 2021, with full compliance observed in each audit.
- **Post-release monitoring has been initiated** and will continue until at least 10 weeks with no fluorescent male mosquitoes detected in ovitrap collections is reached in each project site.
- No Oxitec mosquitoes were released within 500 m of sewage treatment facilities or commercial citrus groves, as required by the permit.
- Oxitec will inform EPA and FDACS once this post-release monitoring period is completed.



2022 Project Plans

Preparing for 2022 Releases

Follow-up Oxitec mosquito releases in the Florida Keys in 2022

AIMS OF THE PROGRAM

- Demonstrate excellent performance for Oxitec males.
- Supplement data on mosquito **dispersal**, **longevity** and **mating performance** especially over small areas/single homeowners.
- Collect relevant data to support the pathway to **commercial registration** to accelerate availability of Oxitec males for mosquito control more broadly in the USA.



Underway: Regulatory Approval Process

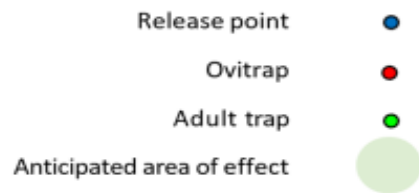
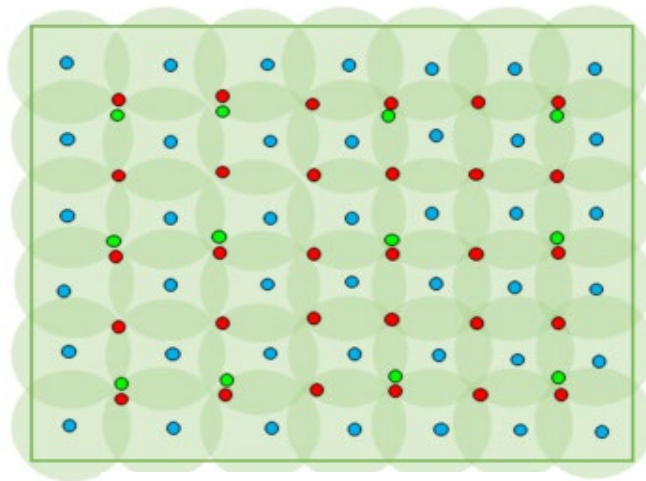
Pending regulatory approvals, the FKMCD-Oxitec Mosquito Project will continue in 2022

- **EPA approved an extension of the Experimental Use Permit (EUP)** granted in 2020 for a pilot project in the Florida Keys, which was successfully carried out in 2021.
- Alongside its in-depth scientific evaluation process was a 30-day period for public comments. The **EPA reviewed and responded to each public comment** before issuing its approval.
- All of EPA's risk assessments, together with the approved field protocol, are available on www.regulations.gov.
- An application has been submitted to FDACS for an extension of the permit granted in 2020.
- Pending FDACS approval, releases are planned to begin in Spring 2022.

Three Field Trial Designs for Florida 2022

Trial B: Small Neighborhood Study

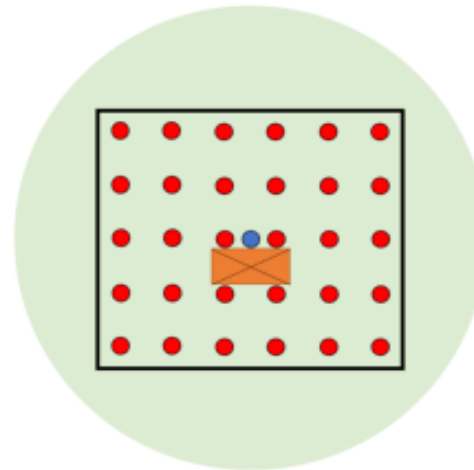
- Efficacy of the self-limiting gene.
- Adult sex ratios.
- Proportion of population treated.
- Duration and scale of residual activity.
- Presence in cryptic breeding sites.



Trial D: Household Study

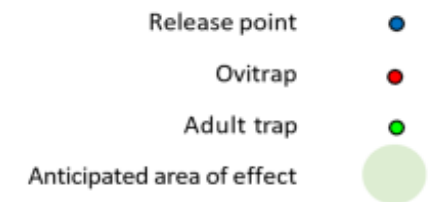
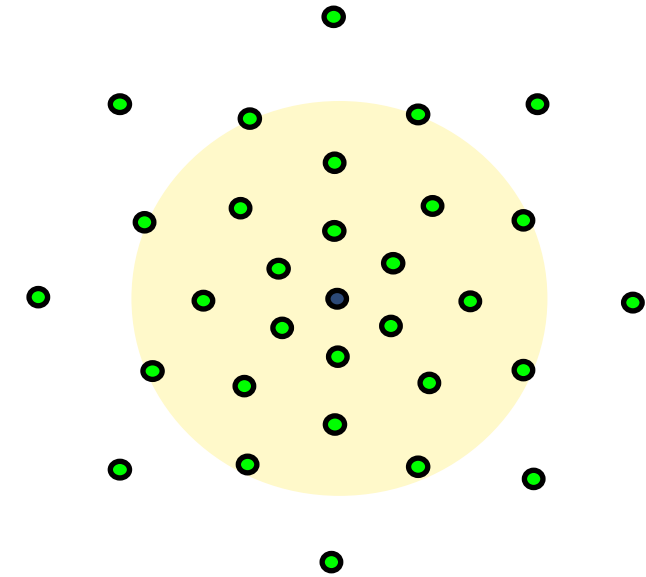
We will assess effects at household scale.

- Efficacy of the self-limiting gene.
- Adult overflooding ratio.
- Proportion of population treated.
- Duration and scale of residual activity.
- Presence in natural breeding sites.



Trial E: Mark Release Recapture

- Dispersal distance of released adult male OX5034 mosquitoes.
- Longevity of released adult male OX5034 mosquitoes.



2022 Next Steps

Pending regulatory approval from FDACS, this project will start in spring of 2022.

- Community engagement in potential project sites is ongoing.
- **Pre-release monitoring of *Aedes aegypti*** has been initiated in potential Project B sites and control sites.
- Project B will be the first part of this year's project to be initiated, with Projects D and E following **later in the mosquito season.**



Question and Answers

Any and all questions on this evening's topics are welcome!

(If we run out of time tonight, email florida@oxitec.com and we will attempt to answer your question if it isn't included in the growing FAQ or post-event summary we publish online at oxitec.com/florida and keysmosquitoproject.com)



THANK YOU!

A summary of this event, as well as more Q&As, resources, facts, and background materials will be made available at oxitec.com/florida and keysmosquitoproject.com