



OXITEC



FKMCD - Oxitec Public Educational Webinar

14 July 2020



Welcome!

FKMCD-Oxitec Public Educational Webinar

14 July 2020

Documentation, references, resources and other information available at oxitec.com/florida

Purpose:

Provide an opportunity for members of the public to ask questions about the proposed Florida Keys Mosquito Control District (FKMCD) evaluation of Oxitec's *Aedes aegypti* male mosquitoes.

Agenda:

- Meeting Introduction
- Presentation (~20 mins)
- Panel Introduction (~20 mins)
- Q&A (~2 hrs 20 mins)
- Close at 8pm local time

- Registered attendees may listen/view and also submit questions using the Q&A feature
- Moderators will sort and pass questions to the panel who will provide answers
- Related or similar questions may be grouped to process as many as possible live during the webinar
- Priority will be given to questions from Florida Keys residents
- The webinar will continue until the event closes (8pm ET) or until no further questions are asked

FKMCD and Oxitec Panelists



OXITEC



Andrea Leal
Executive Director
FKMCD



Dr Lawrence Hribar
Director of Research
FKMCD



Grey Frandsen
CEO
Oxitec



Dr Kevin Gorman
Head of Field Operations
Oxitec



Dr Nathan Rose
Head of Regulatory Affairs
Oxitec



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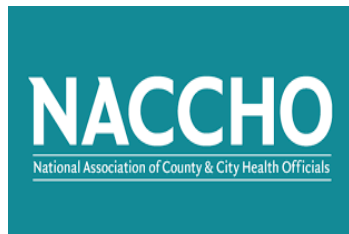
Independent Panelists



Dr Oscar Alleyne

Chief of Programs and Services

National Association of County and City Health Officials (NACCHO)



Bob Eadie

Administrator and Health Officer
Monroe County Department of Health

Member, Project Independent Advisory Board



Dr Douglas Mader

Veterinary Specialist

Marathon Veterinary Hospital
Fellow, Royal Society of Medicine

Member, Project Independent Advisory Board



Dr Jorge Rey

Director and Professor
University of Florida – IFAS
Florida Medical Entomology Laboratory

Member, Project Independent Advisory Board



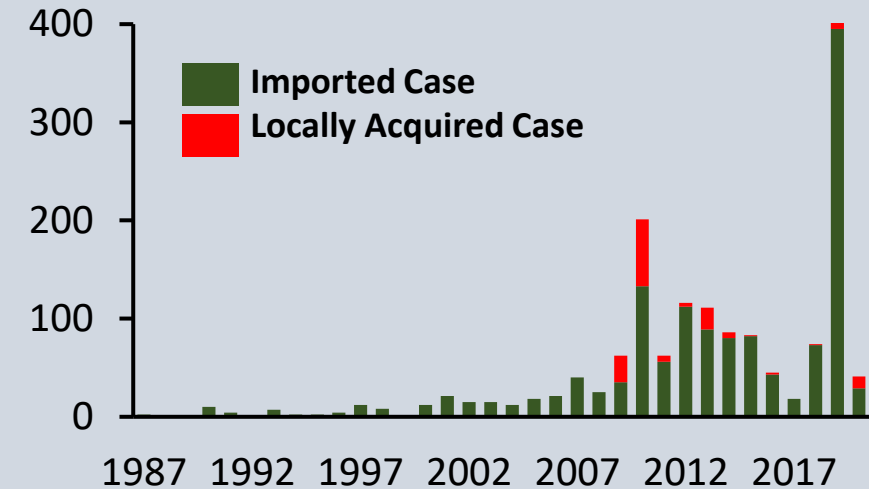
Brief Project Overview

Why Now? Health, Economy, and Environment



- Zika significantly damaged local economy 2015-2017
- Dengue is an ongoing issue with 11 recently confirmed cases including locally acquired ones
- The threat of other diseases such as crippling chikungunya remains

Dengue cases in Florida since 1987



- Environmental impact is a major consideration
- Using species-specific tools minimizes environmental impact
- Nine national and state agencies concluded Oxitec male mosquitoes pose no risk to environmental health



Photo: Jaret Daniels

Endangered Schaus' swallowtail butterfly lives where the current dengue outbreak is.

FKMCD-Oxitec Proposed Pilot Project



Purpose

1. Broaden the toolbox to protect communities against invasive species and diseases
2. Preserve both the quality of life for residents and the delicate Florida Keys ecosystem
3. Evaluate this safe, innovative tool for fighting *Aedes aegypti*

Project: Evaluate Oxitec's *Aedes Aegypti* Mini-Capsule Technology



Just add water: Safe, non-biting males are hatched in small boxes using small mini-capsules.

Project Components

1. Community Engagement
2. Mark-Release-Recapture
3. Project A: Single-point Releases
4. Project B: Area-wide Releases

**Safe &
Non-Toxic**

**~130
Boxes
Placed**

**~28
Weeks
Total**

**0
Females
Released**

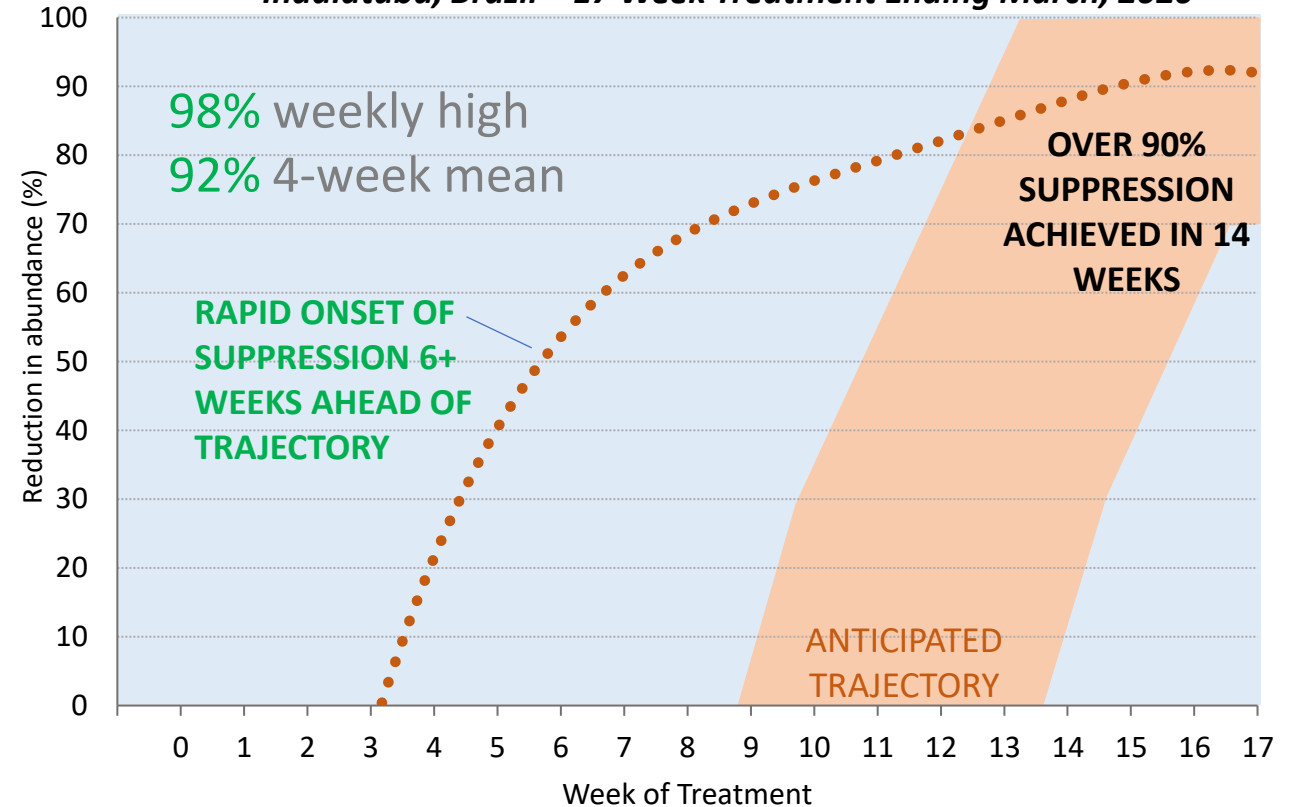
Demonstrated Effectiveness & Safety



Results:

- ✓ Safe – no unintended impacts
- ✓ Males only – no female release
- ✓ Fully self-limiting – no persistence
- ✓ Significant suppression (see graph)
- ✓ 90% reduction in operations
- ✓ 94%+ public acceptance

Pilot Project #1 for Mini-Capsule Product – 1,000 Person Area
Indaiatuba, Brazil – 17 Week Treatment Ending March, 2020



6
Weeks

Faster to Suppression
than OX513A

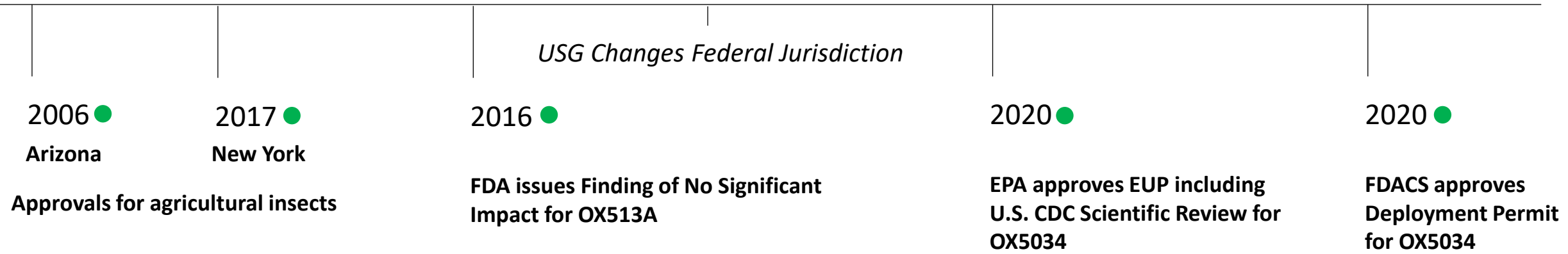
90%

More Efficient
Production &
Deployment

US Agency Approvals of Oxitec Technology



Exhaustive review by five U.S. government agencies over 14 years



Approval of Oxitec's EUP



“...after extensive evaluation of the best available science and public input, the U.S. Environmental Protection Agency (EPA) has granted an experimental use permit (EUP) to Oxitec Ltd.”
([OPP Update](#))



“EPA anticipates that this could be an effective tool to combat the spread of certain mosquito-borne diseases like the Zika virus in light of growing resistance to current insecticides.”

“...only male mosquitoes will be released into the environment and as they do not bite people, they will not pose a risk to people.”

“It is also anticipated that there would be no adverse effects to animals, such as bats and fish, in the environment.”

State of Florida Project Approvals



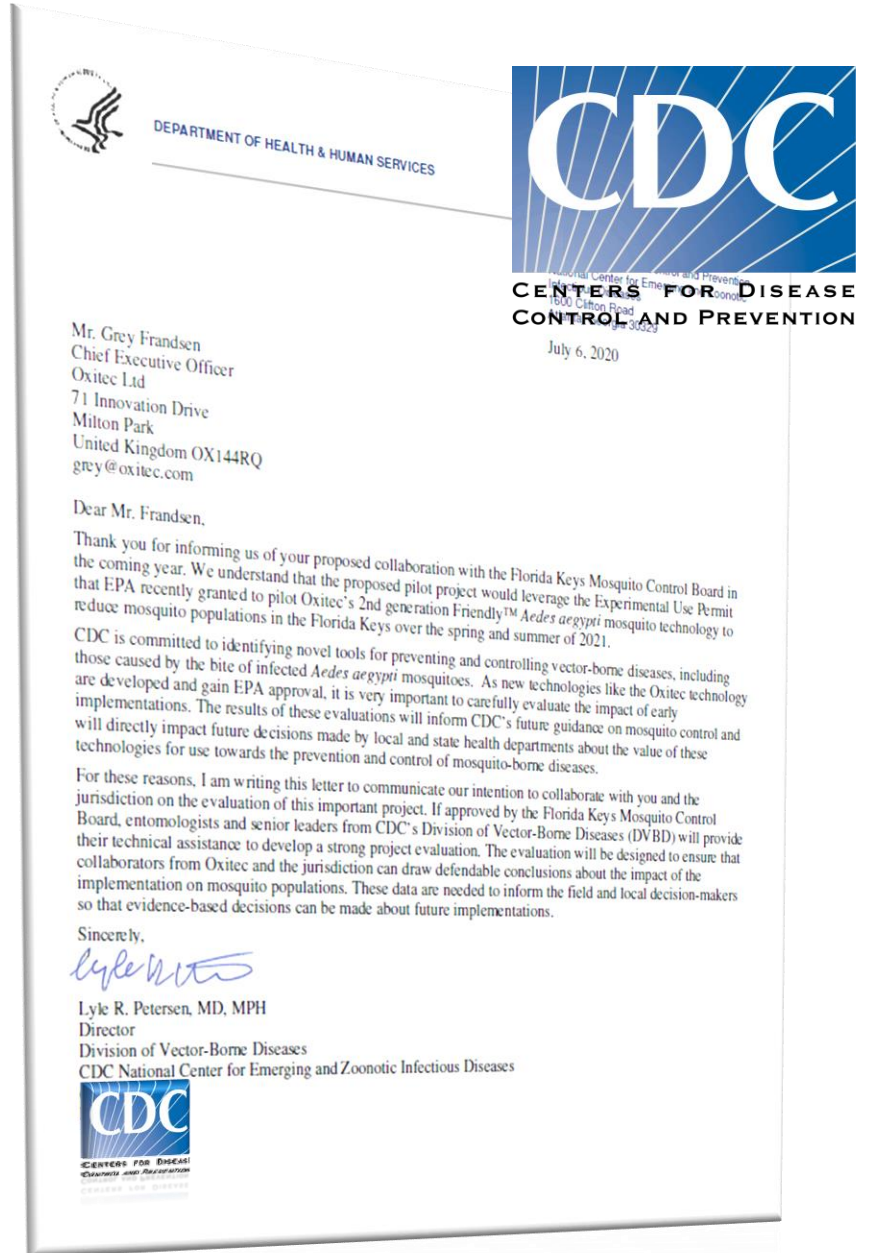
EUP Approved By:

- ✓ Florida Department of Agriculture and Consumer Services
- ✓ Florida Department of Environmental Protection (FDEP)
- ✓ Florida Fish and Wildlife Conservation Commission (FWC)
- ✓ Bureau of Inspection and Incident Response (BIIR)
- ✓ Florida Department of Health (DOH)
- ✓ Bureau of Agricultural Environmental Laboratories (BAEL)
- ✓ Bureau of Chemical Residue Laboratories (BCRL)
- ✓ Bureau of Scientific Evaluation and Technical Assistance, Scientific Evaluation Section (SES)

Project's Comprehensive Independent Review



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CDC confirms participation:

"...I am writing this letter to communicate our intention to collaborate with you and the jurisdiction on the evaluation of this important project.

...entomologists and senior leaders from CDC's Division of Vector-Borne Diseases (DVBD) will provide their technical assistance to develop a strong project evaluation."

Lyle Petersen, MD, MPH
Director of Division of Vector-Borne Diseases
Centers for Disease Control and Prevention

Advisory Board Members



Where We Are Today



OXITEC



April 2020 ●

June 2020 ●

21 July 2020

2021

2022

EPA approves EUP including U.S. CDC Scientific Review for OX5034

FDACS approves Deployment Permit for OX5034

FKMCD Commissioners vote on project approval

Anticipated Project Window

Pilot Project Design



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 TBD following monitoring
5. Timing: 2020-2022

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 wild population treated



Simple devices with capsules of mosquito eggs inside release only male mosquitoes

Trial Locations and Mosquito Releases



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PROJECT A

SINGLE POINT RELEASE



1 box placed per week in up to 9 small areas

~12 weeks

LOCATIONS

TO BE SELECTED W/
FKMCD FOLLOWING PEST
MONITORING AND INITIAL
COMMUNITY ENGAGEMENT

TRAP TO COLLECT MOSQUITO EGGS



TRAP TO COLLECT MOSQUITO ADULTS



PROJECT B

MULTIPLE RELEASE POINTS



Small number of devices placed per week in up to 6 areas

~16 weeks

10 Years of Florida Keys Engagement



Working together, FKMCD and Oxitec will continue engaging, listening and sharing with communities in the Florida Keys.



Community Approach:

- Full coordination between FKMCD and Oxitec
- Transparency and robust information sharing
- Listening and learning from communities and stakeholders
- Inclusive engagement programs specific to community members and groups
- Broad view of stakeholders – citizens, communities, businesses, experts
- Multiple avenues for anyone to contact and engage

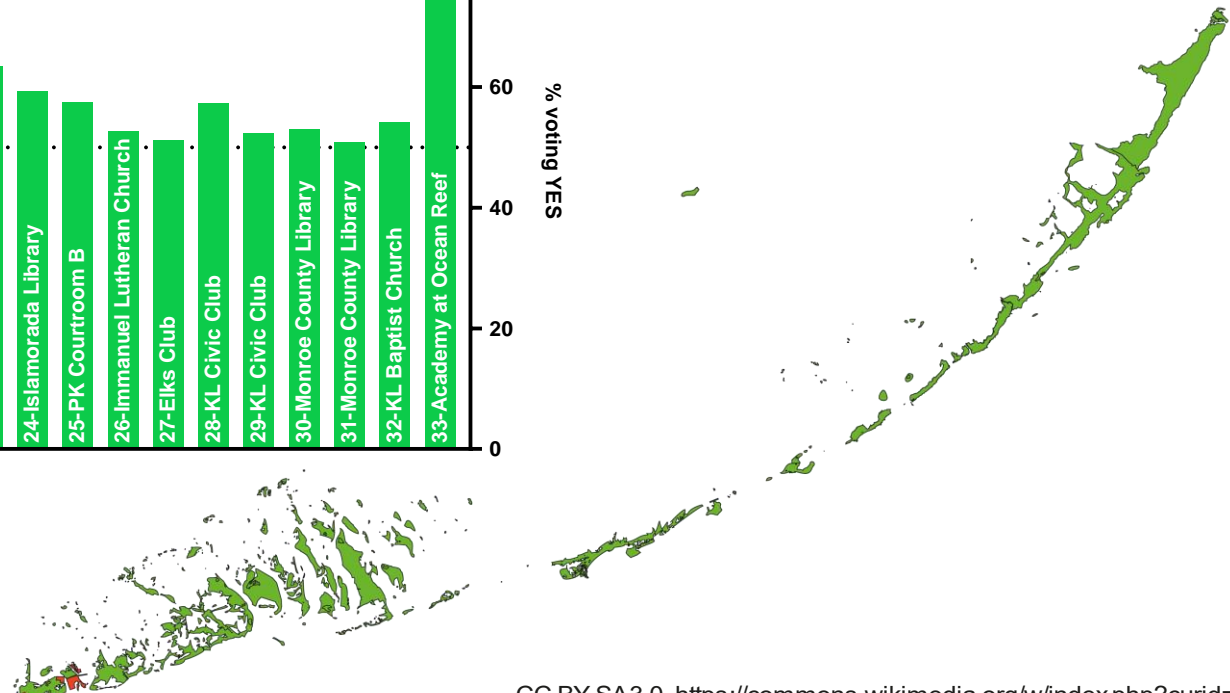
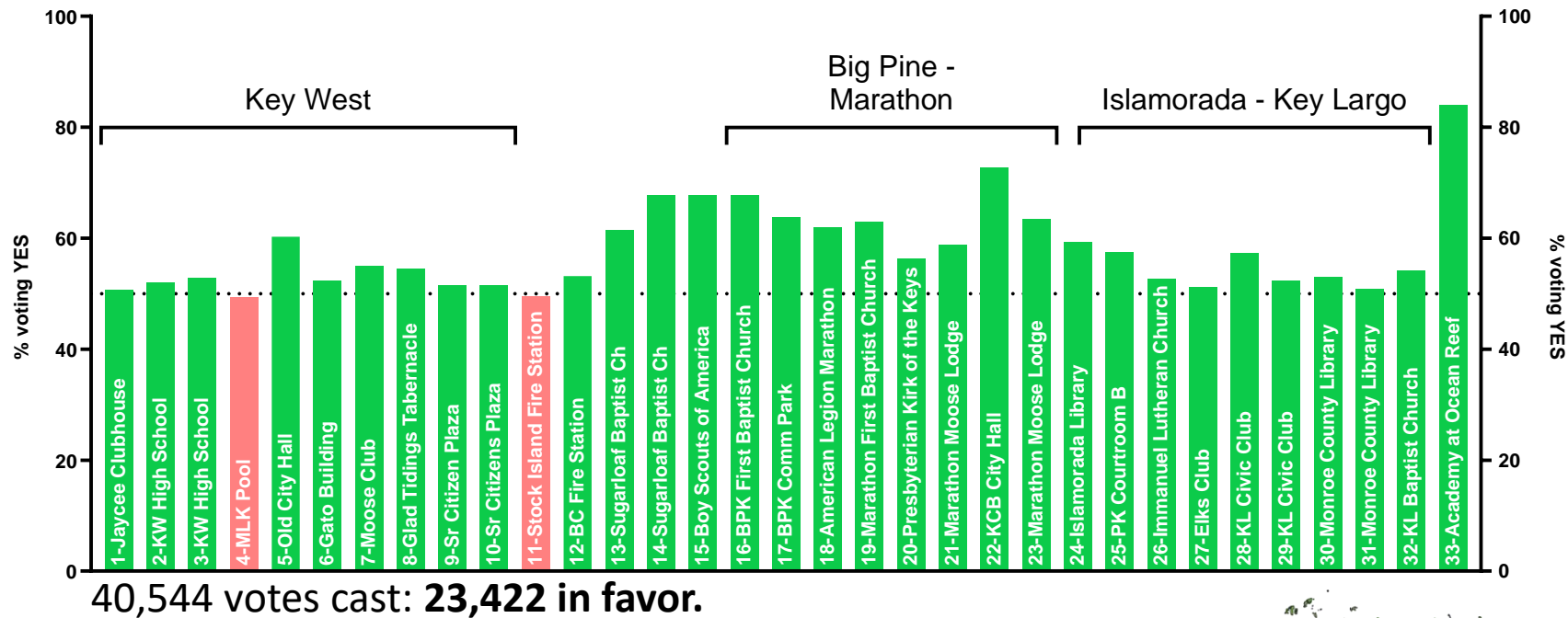


Successful 2016 Monroe County Referendum



"Are you in favor of the Florida Keys Mosquito Control District conducting an effectiveness trial in Monroe County, Florida, using genetically modified mosquitoes to suppress an invasive mosquito that carries mosquito-borne diseases?"

Oxitec GM Mosquito Referendum Results Nov 2016



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Q&A

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Oxitec's Male-Only Mosquitoes



OXITEC RELEASES ONLY MALE MOSQUITOES

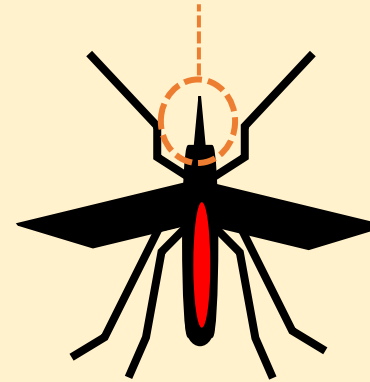


A member of the public with their hand in a cage of non-biting Oxitec male mosquitoes

MALE MOSQUITOES CANNOT BITE

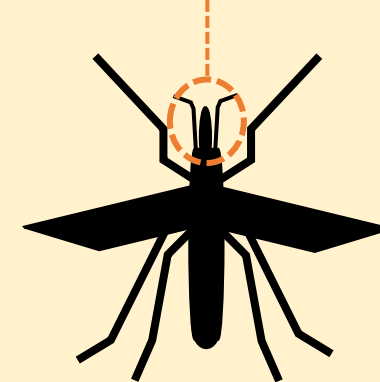
FEMALE:

Biting mouthparts



MALE:

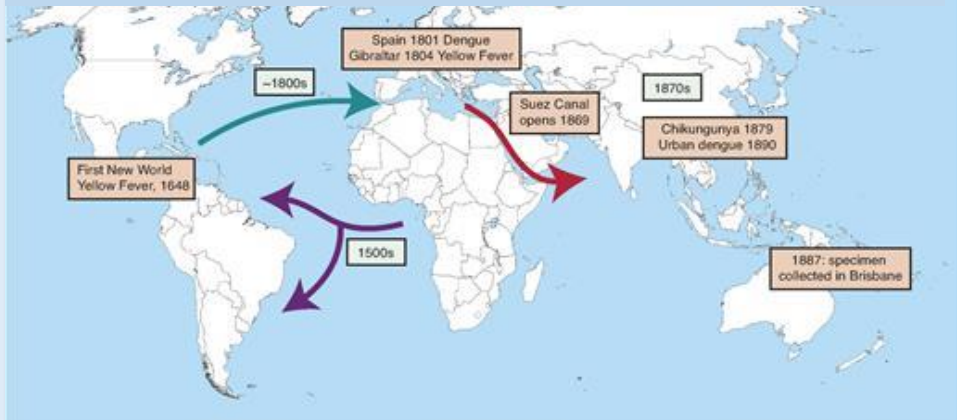
Non-biting mouthparts



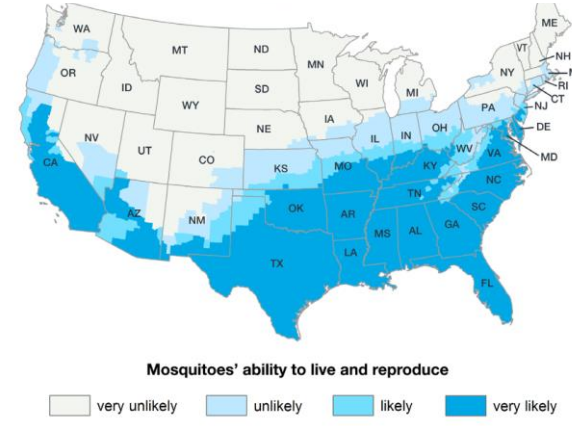
The mouthparts of males mean they are physically unable to bite humans

AEDES AEGYPTI IS AN INVASIVE SPECIES, AND IS NOW WIDELY DISTRIBUTED

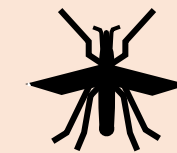
Ae. aegypti originates from Africa and invaded USA via trade routes



Ae. aegypti distribution in USA in 2017



CANNOT MATE WITH OTHER SPECIES



Oxitec mosquito



Different mosquito species

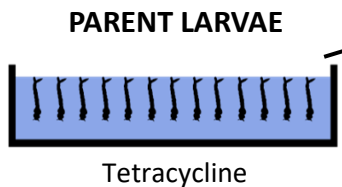


No viable offspring

How Are OX5034 Mosquitoes Made?

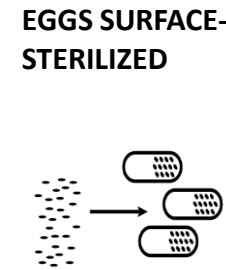
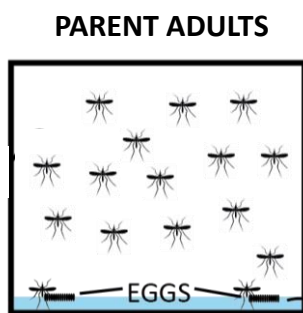
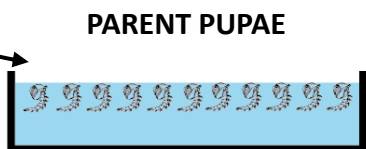


1



TETRACYCLINE
To produce all of the eggs required for this project, Oxitec will use less tetracycline than sugar in a 5g packet.

No tetracycline used beyond this point



2



- ✓ EPA compliant quality control at every step
- ✓ Egg surfaces sterilized with sanitizer 4x stronger than hospital-grade disinfectant



3

BOXES ARE PLACED BY TRAINED OPERATORS



4

- ✓ No female release
- ✓ Only male adults in the box
- ✓ No tetracycline in the box
- ✓ No tetracycline in Florida
- ✓ Boxes will be placed in out-of-the-way areas



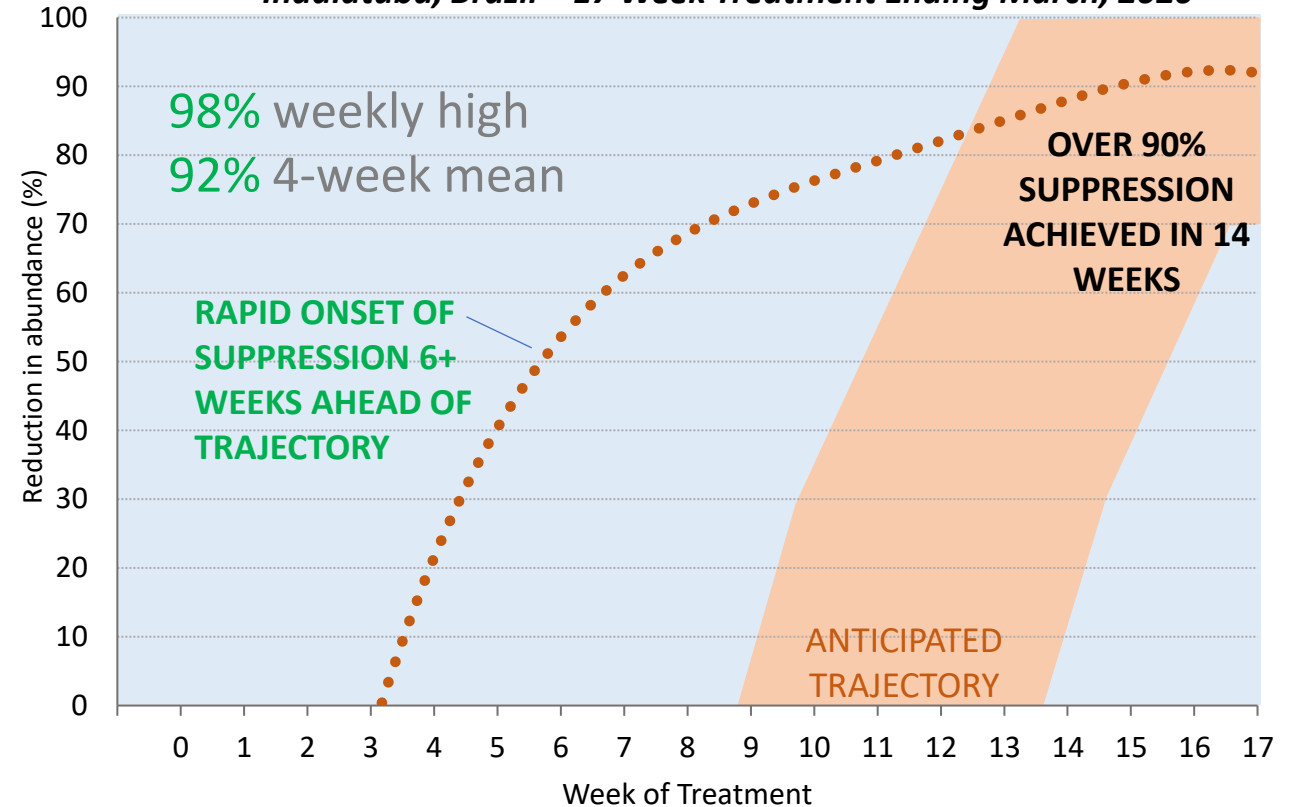
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Production &
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Overview of EPA's Review & Approval



Key Elements:

- 14-month in-depth process
- Exhaustive scientific review
- Risk assessment
- Multi-agency support
- Public comment responses

By the Numbers:

- 70+ documents submitted
- 25 commissioned studies
- 4,500+ pages, including 2,500+ pages of scientific peer-reviewed literature



Data Requirements Fulfilled by Oxitec (partial list)

Environmental Assessments:

- Fish
- Birds
- Mammals
- Plants
- Aquatic Invertebrates
- Insects
- Endangered Species

Health Assessments:

- Trait Penetrance
- Oral Toxicity
- Inhalation Toxicity
- Ocular Toxicity
- Dermal Toxicity
- Allergenicity
- Vector Competence

Mosquito Characterization and Performance:

- Insecticide Susceptibility
- Trait Penetrance
- Tetracycline Response
- Stability of Genetic Traits
- Trait Persistence
- Field Data (Brazil)
- Protein Stability
- Arbovirus Screening
- Introgression Analysis
- Complete SOPs
- Analytical Methodologies

EPA Responds to Keys Residents' Questions



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Topic

EPA's Response

Tetracycline

✓ *“negligible risk that testing of OX5034 mosquitoes would spread antibiotic resistant bacteria in the US environment”*

(p75-76, Response to Comments)

Off-target Impacts

✓ *“no adverse effects are anticipated for nontarget organisms as a result of the experimental permit to release OX5034 mosquitoes”*

(p 49, EPA Human Health and Environmental Risk Assessment)

Endangered Species

✓ *“a 'No Effect' determination is also made for direct and indirect effects to federally listed endangered and threatened species, and for their designated critical habitats”*

(p 49, EPA Human Health and Environmental Risk Assessment)

GM mosquito survival in the environment


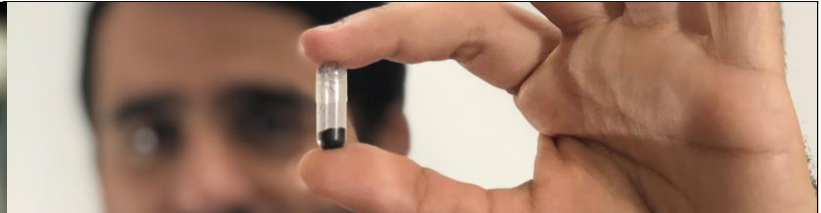
✓ *“introgression of OX5034 strain genetics into the local wild Ae. aegypti mosquito population is likely to occur during releases of OX5034; however, the risk resulting from such introgression is negligible”*

(p134, Response to Comments)

Oxitec's *Aedes aegypti* Strains



OXITEC

| |  |  |
|---|--|---|
| STRAIN | '1ST GENERATION' / OX513A | '2ND GENERATION' / OX5034 |
| ACTION | >95% male and female offspring die | All female offspring die |
| FEMALES RELEASED? | <1% | None |
| METHOD OF DEPLOYMENT | Adults only | Eggs in a box, pupae or adults |
| FIELD RELEASED | 2009 - 2019 | 2018 - present |
| COUNTRIES RELEASED | Brazil, Cayman, Panama, Malaysia | Brazil |
| NUMBER RELEASED TO DATE | ~1 billion adults | >20 million adults |
| EFFECTIVE CONTROL WITH NO ENVIRONMENTAL PERSISTENCE | ✓ | ✓ |
| NO DIRECT EFFECT ON NON-TARGET SPECIES | ✓ | ✓ |
| NON-TOXIC, NON-ALLERGENIC | ✓ | ✓ |
| NO LONG-TERM EFFECTS ON THE ENVIRONMENT; NO CHEMICAL RESIDUES | ✓ | ✓ |

OX5034: Zero Females Released



No OX5034 females have been released

No OX5034 female offspring survive to adulthood



***BRAZIL: 2018-2020**



BRAZIL: 2019-2020

| | | |
|---------------------------------|--------------|------------|
| OXITEC MALE MOSQUITOES RELEASED | ~ 20 million | ~1 million |
| OXITEC MALE MOSQUITOES CHECKED | ~370,000 | ~120,000 |
| OVITRAPS COLLECTED | ~20,000 | ~7000 |
| OXITEC FEMALES | 0 | 0 |

**Data reviewed by EPA*

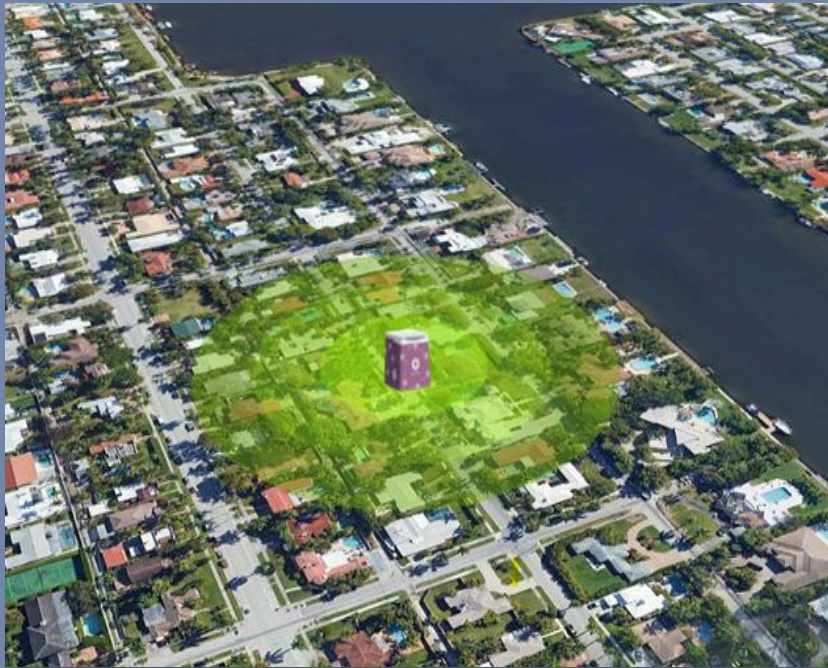
Trial Locations and Mosquito Releases



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PROJECT A

SINGLE POINT RELEASE



1 box placed per week in up to 9 small areas

~12 weeks

LOCATIONS

TO BE SELECTED W/
FKMCD FOLLOWING PEST
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TRAP TO COLLECT MOSQUITO EGGS



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PROJECT B

MULTIPLE RELEASE POINTS



Small number of devices placed per week in up to 6 areas

~16 weeks

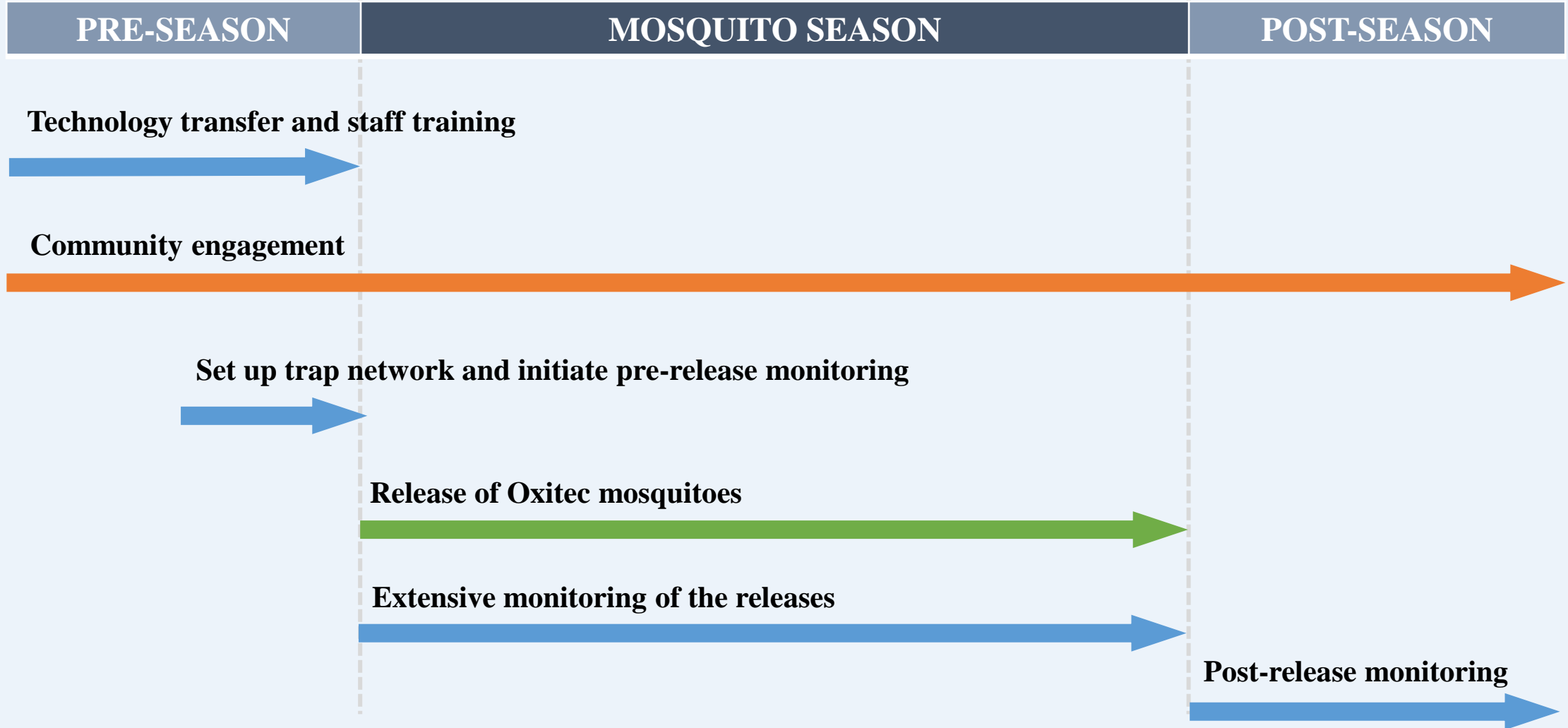
Florida Keys Pilot Project Timeline



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21 July 2020

30 June 2020

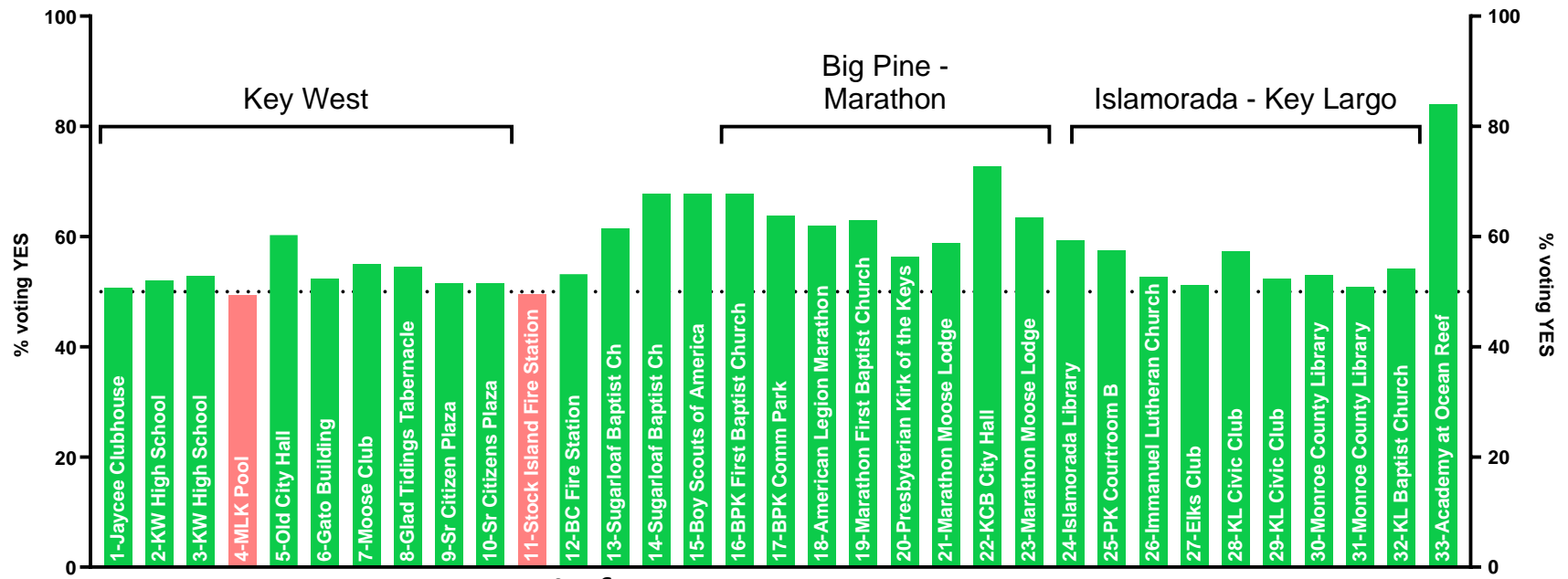


2016 Monroe County Referendum

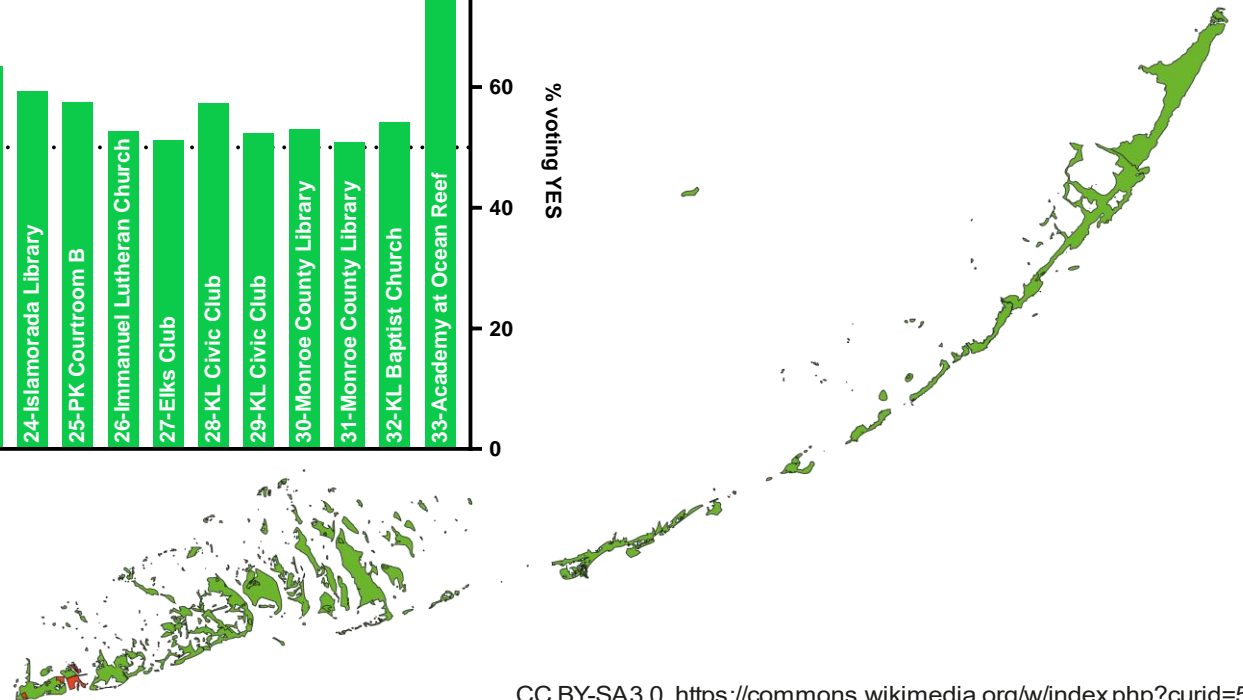


"Are you in favor of the Florida Keys Mosquito Control District conducting an effectiveness trial in Monroe County, Florida, using genetically modified mosquitoes to suppress an invasive mosquito that carries mosquito-borne diseases?"

Oxitec GM Mosquito Referendum Results Nov 2016



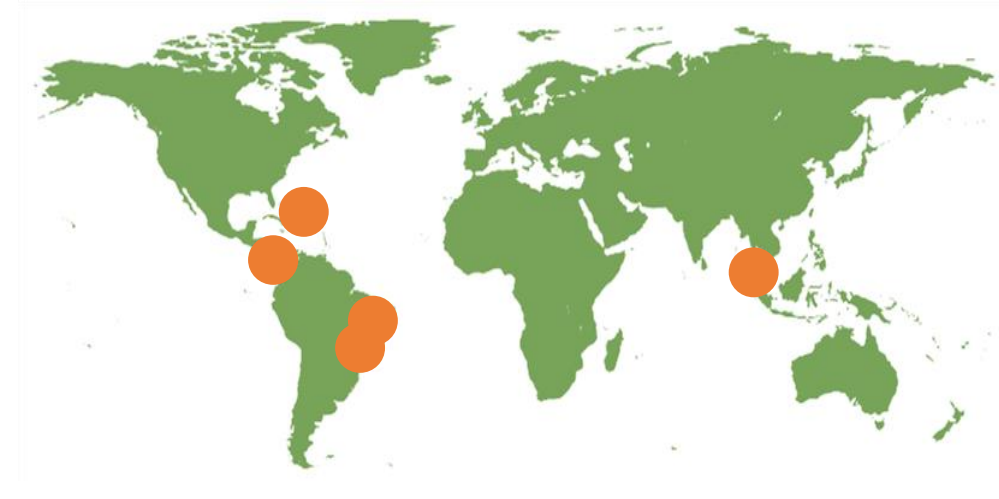
40,544 votes cast: **23,422 in favor.**



Independent Scientific/Peer Review



- 7 OX513A independent peer-reviewed studies
- Over 100 scientific reports & studies published
- Most published with Open Access



| STRAIN | COUNTRY | LOCATION | YEAR | INDEPENDENT SCIENTIFIC REVIEW |
|-------------------------|--------------|----------------------------|-----------|---|
| 1st Gen (OX513A) | Grand Cayman | East End | 2009 | Harris et al (2011) <i>Nature Biotech.</i> , 29:1034-1037 |
| | Grand Cayman | East End | 2010 | Harris et al (2012) <i>Nature Biotech.</i> 30:828-830 |
| | Malaysia | Pahang | 2011 | Lacroix et al (2012) <i>PLoS One</i> , 7(8): e42771 |
| | Brazil | Itaberaba | 2012 | Carvalho et al (2015) <i>PLoS Negl Trop Dis</i> 9(7): e0003864. |
| | | Mandacaru | 2012-2013 | Garziera et al (2017) <i>Entomol. Experiment. Appl.</i> 164, 327–339 (2017). |
| | | Pedra Branca | 2013-2015 | |
| | Panama | Nuevo Chorrillo | 2014 | Gorman et al (2016) <i>Pest Man. Sci.</i> 72(3):618-28. doi: 10.1002/ps.4151. |
| 2nd Gen (OX5034) | Brazil | Indaiatuba – adult release | 2018-2019 | Publication expected later in 2020 |
| | | Indaiatuba – egg release | 2019-2020 | Study ongoing (post-release monitoring) |

Genuine Partnerships with Communities



Let's Keep India Ahead

Gangabhai Bhikaji Investment and Trading Limited (GBIT) and Oxitec are working in partnership to bring 'Friendly' *Aedes aegypti* to India, to help fight the mosquito that transmits dengue, chikungunya and Zika.

WHY IS THIS PROJECT IMPORTANT?
India invests significant resources in fighting the *Aedes aegypti* mosquito - that transmits dengue, chikungunya and Zika. However, current tools are insufficient to control this mosquito and stop diseases from spreading. Many in our country suffer from dengue and chikungunya every year. The 'Friendly' *Aedes aegypti* is an additional tool that can help control the spread of disease-causing mosquitoes.

HOW DOES FRIENDLY™ AEGES AEGYPTI WORK?
Genetically engineered self-limiting male *Aedes aegypti* mosquitoes, which cannot bite or transmit disease, are released to mate with local (female) *Aedes aegypti*. Their offspring, before being able to reproduce, will have a reduced ability to reproduce. With repeated releases, the mosquito population is reduced. This is an environmentally friendly and safe solution.

WHAT HAVE WE DONE SO FAR?
We have been conducting contained studies evaluating the 'Friendly' *Aedes aegypti* at our research centre in Dordrecht since 2011. These were approved by the Ministry of Science and Technology of the Government of India.

WHERE HAVE FRIENDLY™ AEGES AEGYPTI BEEN USED?
The 'Friendly' *Aedes aegypti* mosquitoes have already been used successfully in field trials in Brazil, Panama and the Cayman Islands. In each of these projects, releases of 'Friendly' *Aedes aegypti* reduced the wild populations by more than 90 percent.

WHAT IS THE NEXT STEP?
We are evaluating 'Friendly' *Aedes aegypti* in outdoor cages. Open field trials will only occur following regulatory permission from the Government of India. Before field trials begin, we will inform the local communities through engagement activities.

LEARN MORE ABOUT ECO-FRIENDLY MOSQUITO CONTROL IN INDIA
GBIT: gbitindia.com | info@gbitindia.com | +91 902 262677 | www.friendlyindia.com
Oxitec: oxitec.com | info@oxitec.com | +44 (0) 1246 531933 | www.oxitec.com | Oxitec, Mill Park, Abingdon, OX14 4EJ, UK

Funding from Biotech UK and Global Innovation & Technology Mission (GITM)



★ VIDA E + MORTE DO Aedes do Bem!

O mosquito geneticamente modificado desenvolvido pela Oxitec, o chamado *Aedes do Bem*, nasce e cresce em uma fábrica. Após ser liberado no ambiente, ele cruza com fêmeas selvagens do *Aedes aegypti*. Os descendentes desse cruzamento morrem antes de chegar à fase adulta. E assim, em poucos meses, a população de *Aedes aegypti* selvagem da região é reduzida em até 99%. Confira o passo a passo da breve, porém hercúlea, vida do *Aedes do Bem*!

NA FÁBRICA
O *Aedes do Bem* é geneticamente alterado no laboratório Oxitec. Ele não transmite doenças e não pode se reproduzir naturalmente. Ele é criado em uma fábrica de plástico.

OS OVOS
Para ser um mosquito, o *Aedes do Bem* precisa passar por 18 dias de desenvolvimento. Os ovos do *Aedes do Bem* são colocados em um recipiente com água e comida.

NA VAN
Os ovos do *Aedes do Bem* são colocados em uma van. A van transporta os ovos para o local de liberação.

NO CAMPO
A partir da análise dos dados de campo, os pesquisadores podem garantir o sucesso do projeto.

4 MILHÕES
A produção da fábrica de Oxitec em Campinas (SP) produz cerca de 4 milhões de ovos por semana.

400 MIL OVOS
Em uma semana, a fábrica produz cerca de 400 mil ovos de *Aedes do Bem*.

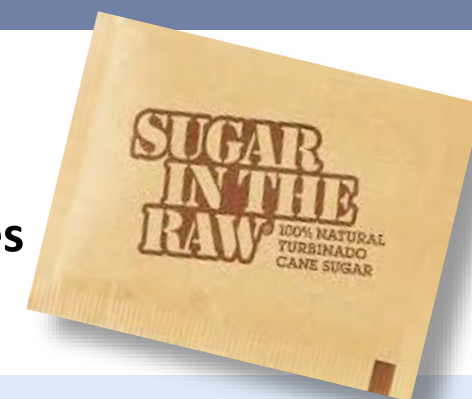
Resultados
A população de *Aedes aegypti* selvagem na região de estudo foi reduzida em até 99%.



Use of Tetracycline: EPA Confirms Oxitec Mosquitoes Pose No Risk

Our technology introduces no hazards associated with tetracycline.

- + **Eggs shipped to Florida have never been in contact with tetracycline**
- + To produce all the eggs required for this project in the UK, **Oxitec will use less tetracycline than sugar in a packet, equivalent to two human therapeutic courses**
- + **Florida farmers use up to 88 million times more tetracycline to treat trees**



EPA has concluded that ***“there is negligible risk that testing of OX5034 mosquitoes would spread antibiotic resistant bacteria in the US environment”***

In the USA, every year:

- Doctors’ offices and emergency departments prescribe about 47 million antibiotic courses for infections that don’t need antibiotics ([CDC](#))
- Nearly 4,000 tons supplied to livestock and pets ([FDA](#))

In Florida:

- Up to 388,000 lbs of oxytetracycline approved for spraying each year on 300,000+ acres citrus farms since 2015 ([EPA](#))
- Use of tetracyclines on farms and in human medicine is linked to resistant bacteria in waterways and coastal waters¹, and marine wildlife²

¹<https://www.mdpi.com/2079-6382/9/3/118/htm>

²Schaefer et al, 2009 *Ecohealth* 6: 33–41.

Tetracycline-Resistant Bacteria: EPA Confirms Oxitec Mosquitoes Pose No Risk



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Tetracyclines and other antibiotics are produced naturally by soil bacteria^{1,2}, which is why tetracycline resistance occurs naturally in the environment in soil bacteria.³⁻⁵

Tetracycline-resistant bacteria have been found in 30,000-year-old Alaskan permafrost, in caves isolated for 4-7 million years, and from pristine Antarctic soils.⁶⁻⁸



¹Nelson & Levy 2011 *Ann N Y Acad Sci* 1241:17-32.
²Martin & Liras 1989 *Ann Rev Microbiol* 43:173-206.
³Riesenfeld et al. 2004 *Environ Microbiol* 6:981-989.
⁴Donato et al. 2010 *Appl Environ Microbiol* 76:4396-4401.
⁵Lang et al. 2010 *Appl Environ Microbiol* 76:5321-5326.
⁶D'Costa et al. 2011 *Nature* 477: 457-461.
⁷Bhullar et al. 2012 *PLoS ONE* 7: e34953.
⁸Van Goethem et al. 2018 *Microbiome* 6:40.

These naturally occurring bacteria only pose a threat to human health if exposed to intensive antibiotics use, which makes the resistant bacteria more abundant.

The Oxitec mosquitoes released into the field will not be exposed to tetracycline over their entire lifetime.

Scientific Reports Article: *Editorial Expression of Concern*



OXITEC

Addendum | [Open Access](#) | Published: 24 March 2020

Editorial Expression of Concern:

Transgenic *Aedes aegypti* Mosquitoes Transfer Genes into a Natural Population

Benjamin R. Evans, Panayiota Kotsakiozi, Andre Luis Costa-da-Silva, Rafaella Sayuri Ioshino, Luiza Garziera, Michele C. Pedrosa, Aldo Malavasi, Jair F. Virginio, Margareth L. Capurro & Jeffrey R. Powell

Scientific Reports **10**, Article number: 5524 (2020) | [Cite this article](#)

831 Accesses | 11 Altmetric | [Metrics](#)

The original article was published on 10 September 2019

- The **manuscript showed or described data to support:**
 - ✓ No persistence of the GM
 - ✓ No increase in insecticide resistance
 - ✓ No increase in ability to transmit disease
 - ✓ High levels of performance and effectiveness
- Peer-review '**scientific validity is in question and must be addressed**'
- Journal '**the authors have failed to address those concerns**'
- Six of ten **authors formally agreed with the concerns**
- Yale University **removed the paper and press release from their own website**

Cayman Islands Projects



OXITEC

Pioneering, long-standing collaboration achieving several important research 'firsts'
 Provided invaluable learning opportunities across operations, data analysis, and public engagement
 All Cayman Islands projects were 1st Gen OX513A

| # | Strain | Year | Context | Outcome | Independent Scientific Review |
|----|----------------------------|------|---|---|---|
| 1. | 1 st Gen OX513A | 2009 | First ever GM mosquito release worldwide | Feasibility study, strong dispersal and mating, CE review | Harris et al (2011) <i>Nature Biotech.</i> , 29:1034-1037 |
| 2. | 1 st Gen OX513A | 2010 | First ever GM mosquito performance trial | Proof of Concept, 80% - 96% dependant on metric | Harris et al (2012) <i>Nature Biotech.</i> 30:828-830 |
| 3. | 1 st Gen OX513A | 2016 | Small area-wide pilot deployment from novel mobile rearing unit | 62% eggs per trap (comparing 2016-2017) | Unpublished |
| 4. | 1 st Gen OX513A | 2018 | First ever integration between GM mosquitoes and chemical insecticides | New info on combining tools, operations, <i>Aedes</i> spp. surveillance | To be confirmed |

- Biology and behaviour as expected
- Application rate estimates achieved
- Pioneering study

- Biology and behaviour as expected
- Application rate estimates achieved
- Pioneering study

- 62%, which was lower than other pilots
- Higher than often achieved with chemicals
- Evaluated novel mobile lab concept

- Full regulatory compliance
- Strong operational performance
- Predetermined analysis/communications

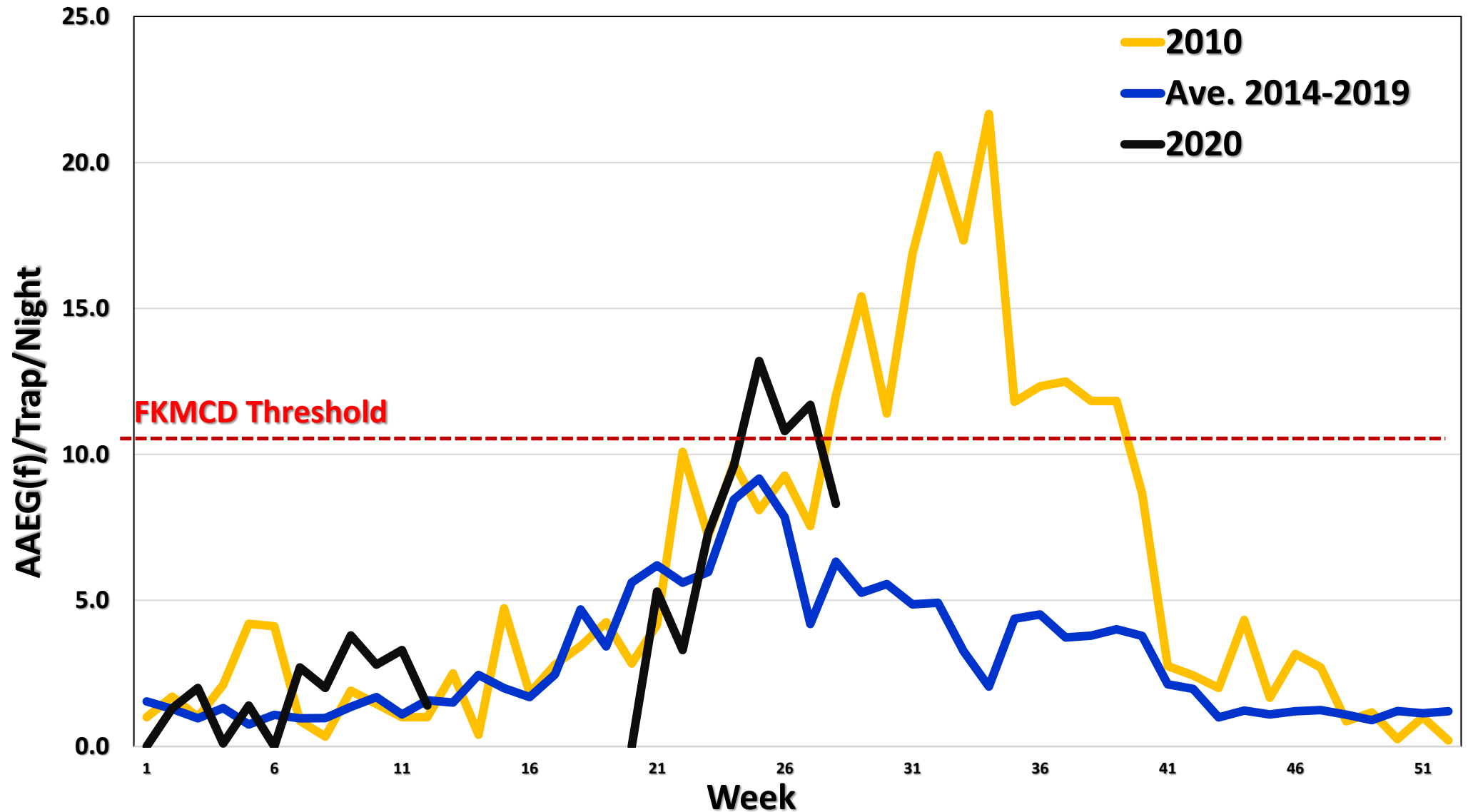
Cayman Islands Projects – Latest from MRCU



MRCU Director Jim McNelly (July 2020)

"The 2018 collaborative project between the Mosquito Research and Control Unit-Grand Cayman and Oxitec was a professional scientific endeavor. MRCU's relationship with Oxitec senior scientists and management was positive and supportive of the integration of different approaches. This was a successful collaboration that fully adhered to the mutually agreed upon contract and Operational Plan that was steered, as the project progressed, through an active Stewardship Committee."

Key West *Ae. aegypti* Surveillance Collections

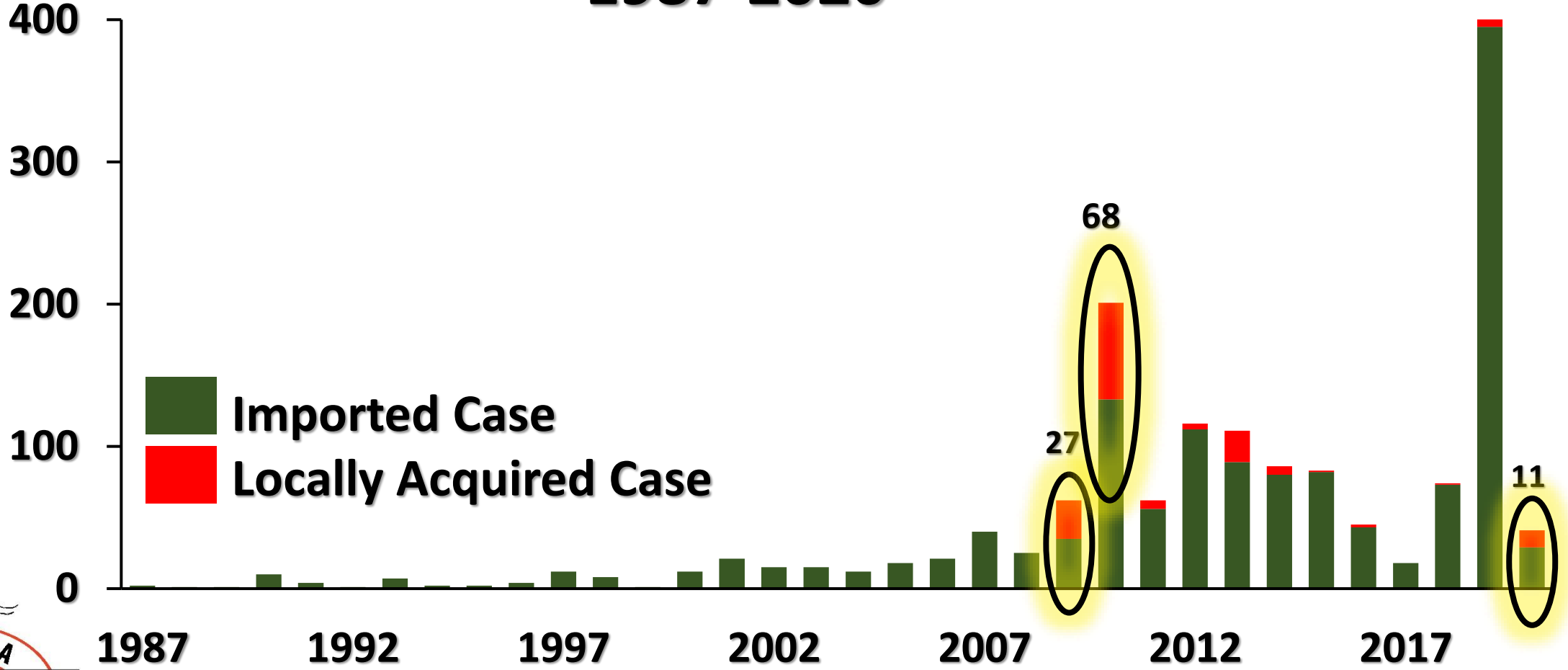


Resistance Status of *Aedes aegypti*

| | | Key West | Marathon | Key Largo |
|---|------------|-------------|-------------|-------------|
|  | PERMETHRIN | Resistant | Resistant | Resistant |
|  | SUMETHRIN | Resistant | Resistant | Resistant |
|  | MALATHION | Susceptible | Susceptible | Resistant |
|  | NALED | Susceptible | Susceptible | Susceptible |






Dengue Cases in Florida 1987-2020



SPECIAL ISSUE – STERILE INSECT TECHNIQUE

Effect of interruption of over-flooding releases of transgenic mosquitoes over wild population of *Aedes aegypti*: two case studies in Brazil

Luiza Garziera¹ , Michelle Cristine Pedrosa^{1,2}, Fabrício Almeida de Souza¹, Maylen Gómez¹, Márcia Bento Moreira³, Jair Fernandes Virginio¹ , Margareth Lara Capurro² & Danilo Oliveira Carvalho^{2*} 

¹Biofábrica Moscamed Brasil, Industrial District – Juazeiro, Juazeiro, BA, Brazil, ²Department of Parasitology, Instituto de Ciências Biomédicas, Universidade de São Paulo, São Paulo, SP, Brazil, and ³Department of Agrarian Sciences, Universidade do Vale do São Francisco, Petrolina, PE, Brazil

© 2017 The Netherlands Entomological Society *Entomologia Experimentalis et Applicata* **164**: 327–339, 2017



Figure 2 (A) Fluctuation in the number of eggs per trap in the municipality of Juazeiro (Mandacaru, Bahia, Brazil) before, during, and after release of *Aedes aegypti* GM males and the numbers of adult males released per week (grey columns). (B) Ovitrap index (OI, solid line) before, during, and after the release of transgenic males of Juazeiro. (C) Monthly mean relation of Release of Insects carrying a Dominant Lethal (RIDL) and wild larvae detected during and after releases in Juazeiro. The dotted boxes are highlighting periods with high rates of wild larvae during releases of transgenic males.

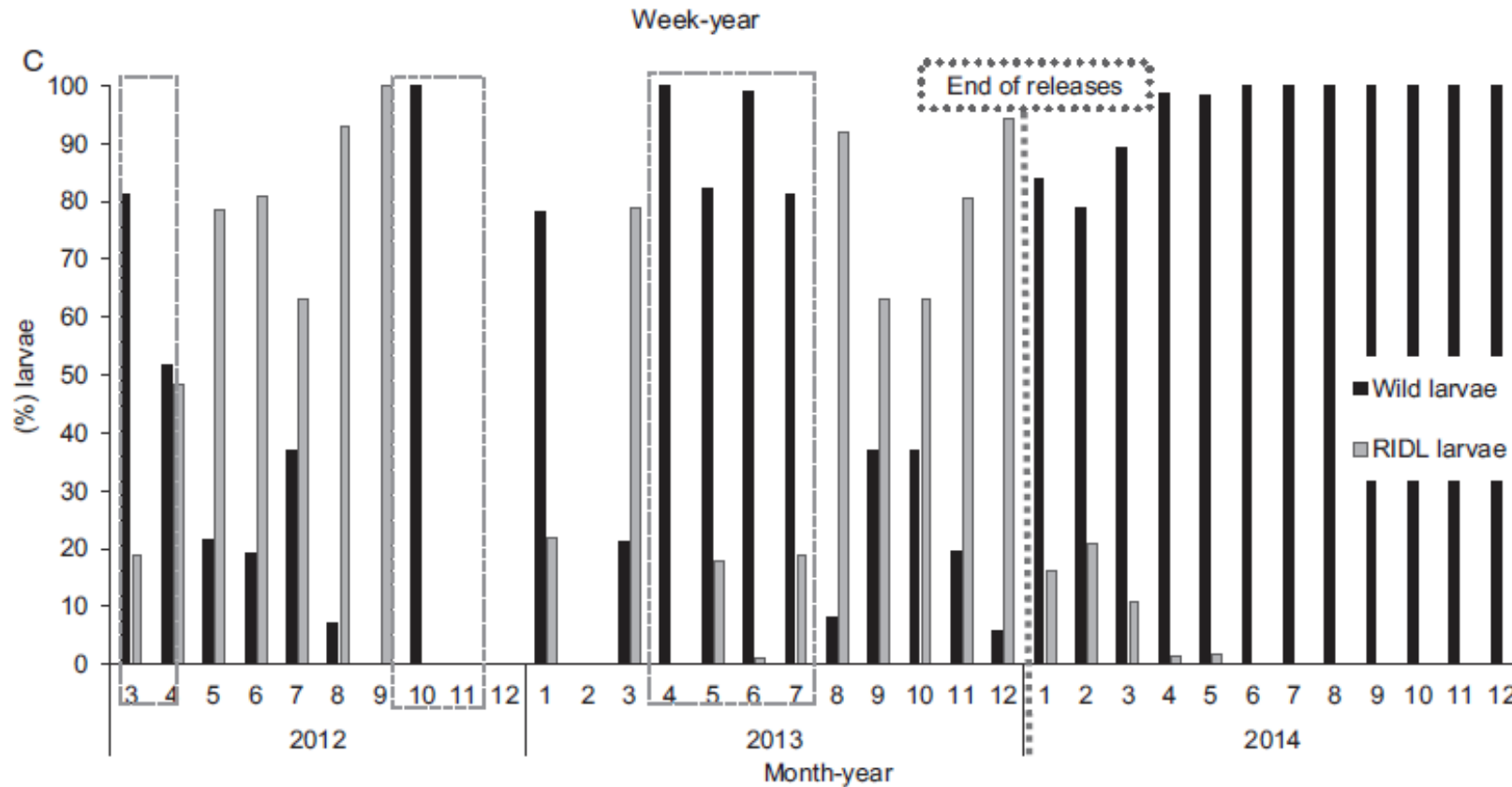
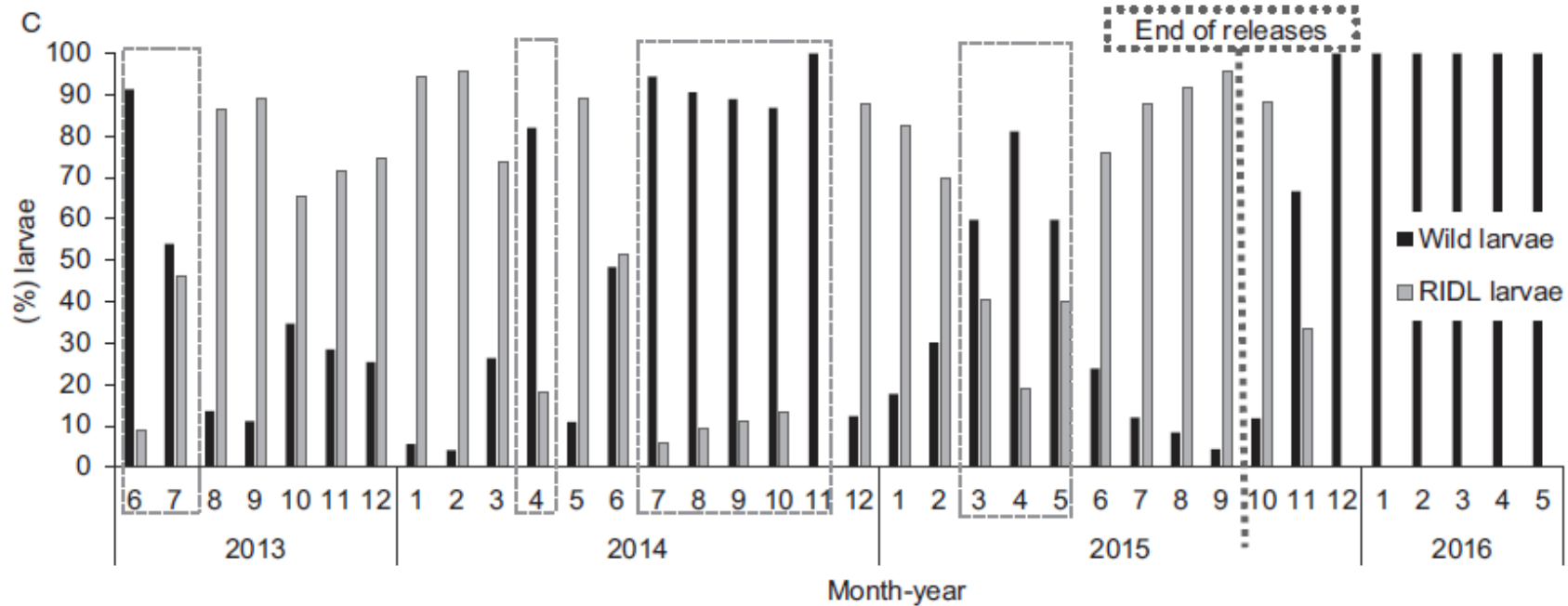


Figure 3 (A) Fluctuation in the number of eggs per trap in the municipality of Jacobina (Pedra Branca, Bahia, Brazil) before, during, and after release of *Aedes aegypti* GM males and the numbers of adult males released per week (grey columns). (B) Ovitrap index (OI, solid line) before, during, and after the releases of transgenic males of Jacobina. (C) Monthly mean relation of Release of Insects carrying a Dominant Lethal (RIDL) and wild larvae from eggs collected during and after the releases in Jacobina. The dotted boxes are highlighting periods with high rates of wild larvae during releases of transgenic males.



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Capurro agree with the Editorial
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Editorial Expression of Concern: Transgenic *Aedes aegypti* Mosquitoes Transfer Genes into a Natural Population

<https://www.nature.com/articles/s41598-020-62398-w.pdf>



Editorial Expression of Concern: Transgenic *Aedes aegypti* Mosquitoes Transfer Genes into a Natural Population

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The Editors are issuing an Editorial Expression of Concern for this Article. Shortly after publication of this Article in September 2019, the Editors were alerted to concerns regarding the interpretation of the data and some of the conclusions. Specific concerns include:



The title does not make it clear that the authors only examined genomes of specimens that lacked the transgenes and sampled during the release period;



The Abstract and Introduction use language which is not justified given the evidence present in the peer reviewed literature and the data presented in this Article. No sampling for this study was conducted more than a few weeks after the release program, and as such there is no evidence in the Article to establish whether the non-transgenic, introgressed sequences from the released strain remained in the population over time. Furthermore, previous work from some of the authors (Reference 6 in the Article) showed that over time, the transgene is lost from the population, but the Article does not disclose this information;



In the Discussion, the authors claim that because of the distinct genetic backgrounds of different mosquito populations (two used to create OX513A mosquitoes, and one local population), the existing population in Jakobina is more robust than the original wild population due to hybrid vigour. There are no data in the Article to support this point; furthermore, data included in the Article indicate that a number of hybrid individuals rapidly declined post-release;



The conclusion of the Article highlighting “the importance of having in place a genetic monitoring program during such releases” could be misunderstood to mean that such program was not in place. The Mosquito release program in Jakobina is monitored by the Brazilian regulator, the National Technical Commission of Biosafety (CTNBio).



When contacted about these issues, **some of the authors** indicated that they **had not approved the final version** that was submitted for publication.



The Editors received a response to the concerns from the corresponding author, and **sought further advice from expert peer reviewers** regarding both the issues raised and the response received. The **reviewers confirmed that the scientific concerns are valid and should be addressed.** The Editors have offered the authors the opportunity to submit a Correction which will be peer reviewed. However, the authors have not notified the Journal that they have been able to reach agreement on the content of a Correction that would fully address the issues raised.



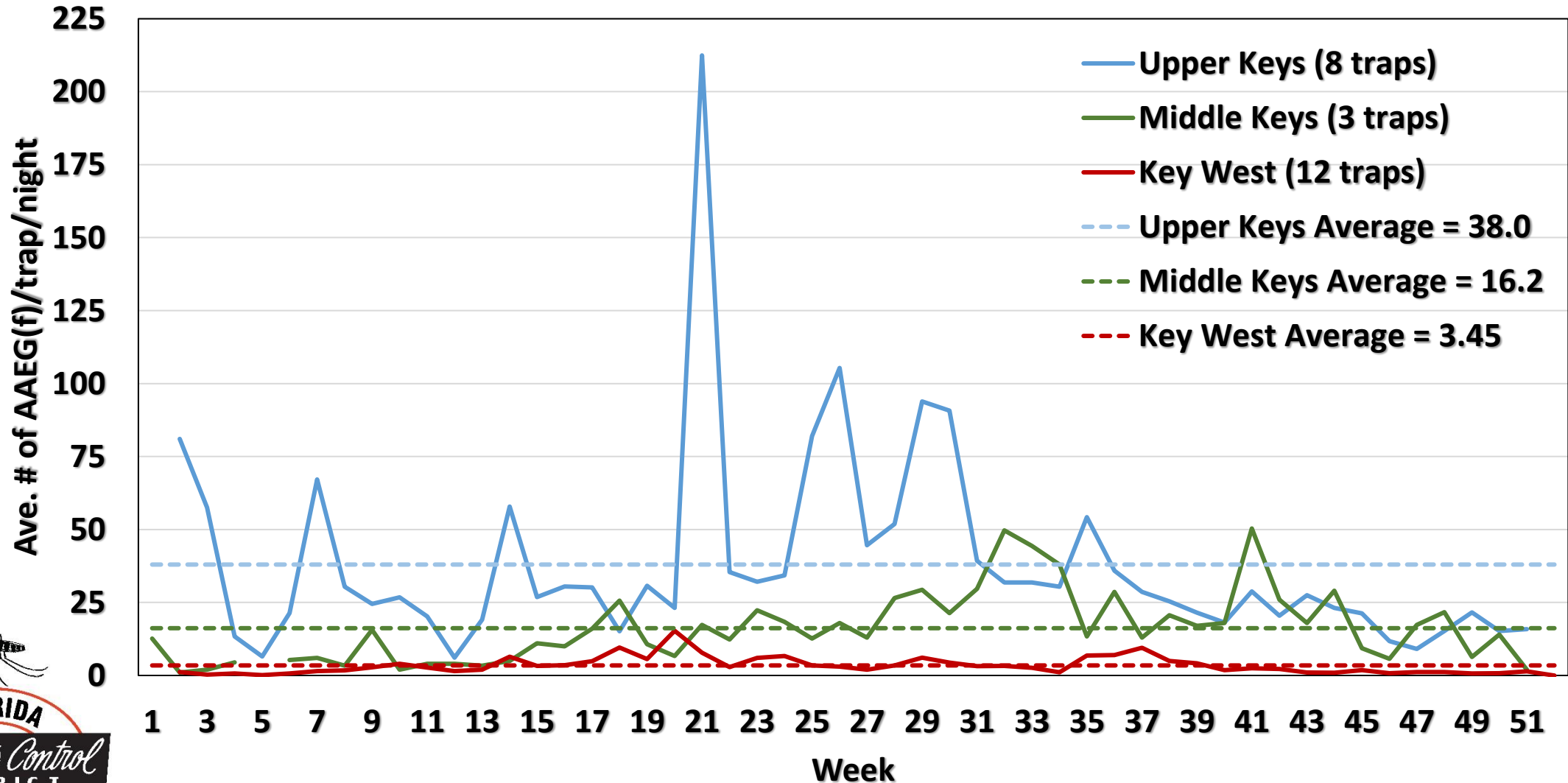
Andre Luis Costa-da-Silva, Rafaella Sayuri Ioshino, Luiza Garziera, Michele C. Pedrosa, Jair F. Virginio and Margareth L. Capurro agree with the Editorial Expression of Concern. Benjamin R. Evans, Panayiota Kotsakiozi, Aldo Malavasi and Jeffrey R. Powell disagree with the Editorial Expression of Concern.

Benjamin R. Evans, Panayiota Kotsakiozi, Andre Luis Costa-da-Silva, Rafaella Sayuri Ioshino, Luiza Garziera, Michele C. Pedrosa, Aldo Malavasi, Jair F. Virginio, Margareth L. Capurro, & Jeffrey R. Powell

6 of 10 (60%) of the paper's authors agree with the editorial expression of concern



Aedes aegypti Catch Rate: 2019



Aedes aegypti Catch Rate: 2020

