

# **Zika Mozzie Seeker:** Citizen scientists and Metro South Health partner to innovate a regional invasive mosquito surveillance program

Australian Citizen Science Conference 21 Nov 2023

Brian L Montgomery, Jason Christiansen, Jon Cianci, Corinne Collins, Sonja Hall-Mendelin, Jamie McMahon, Ian Mohamad, Phil Rocha, Matt Wessling

ICARE<sup>2</sup> values



# Invasive *Aedes* mozzies can carry human diseases

An escalating public health problem in many global cities

APR 16, 2023 8:45 AM  
Lisa Schlein

## WHO Warns Climate Change Causing Surge in Mosquito-Borne Diseases

Share



FILE - This 2006 file photo provided by the Centers for Disease Control and Prevention shows a female *Aedes aegypti* mosquito in the process of acquiring a blood meal from a human host.

www.nnews.cn  
新华网  
NEWS  
www.xinhuanews.com

## Asia&Pacific

Sunday, August 15, 2021

### Indian gov't rushes team to Maharashtra to aid Zika virus monitoring

Source: Xinhua | 2021-08-02 23:57:37 | Editor: huaxia



NEW DELHI, Aug. 2 (Xinhua) -- India's federal government Monday rushed a high-level multidisciplinary team to the western state of Maharashtra to monitor the Zika virus situation there and aid the local government in controlling the cases, an official statement said.

## 'A first in Paris': city fumigates for tiger mosquitoes as tropical pests spread, bringing disease

Parisian health authorities treat French capital for the first time as Zika and dengue-carrying tiger mosquitoes advance through northeastern Europe



A Tiger Mosquito (*Aedes Albopictus*) bites through clothes in Paris, France on 20 August 2023. This invasive mosquito brings tropical diseases such as dengue, Zika or chikungunya. Photograph: Geyres Christophe/ABACA/Shutterstock

**Dengue:**

*100-400 M cases p.a. 100 countries endemic, 129 countries at risk*

**Chikungunya:**

*135,000 cases in South America in 2023, 115 countries*

**Zika:**

*Millions in 2015-16 (3,500 babies born with microcephaly): Now 30-40,000 cases p.a., 89 countries*

# A warning to SE Queensland and Australia – they will invade!

International and domestic pathways for freight and transport. Mozzies will be difficult to find once past biosecurity...

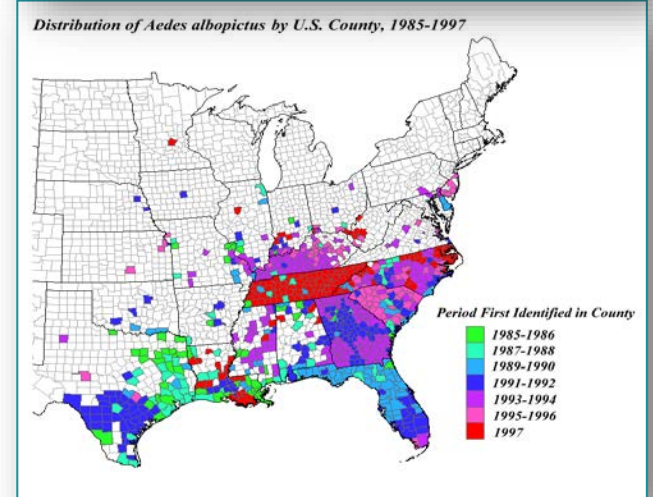
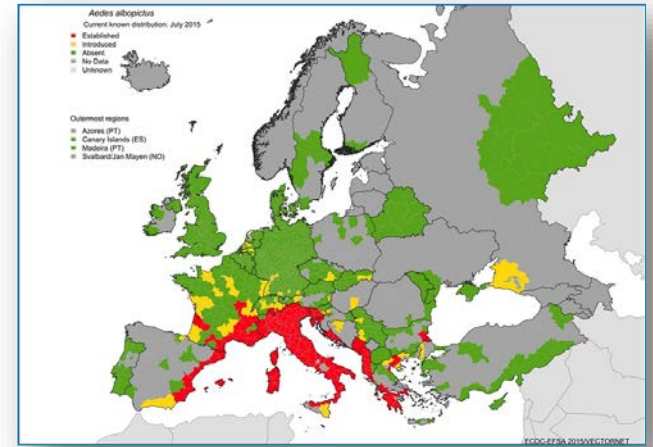
**SCIENTIFIC REPORTS**

**OPEN** **Direct Evidence of Adult Aedes albopictus Dispersal by Car**

Roger Eritja<sup>1,2</sup>, John R. B. Palmer<sup>1,3,4</sup>, David Roitz<sup>5</sup>, Isis Sanpera-Calbet<sup>2</sup> & Frederic Bartumeus<sup>1,3,4</sup>

Received: 12 January 2017  
Accepted: 18 September 2017  
Published online: 24 October 2017

Whereas the Asian tiger mosquito (*Aedes albopictus*) has low active dispersal capabilities, its worldwide colonization has been rapid. Indirect evidence and informal reports have long implicated passive transportation in cars, but this has not previously been studied systematically given the difficulties of real-time roadside surveys. Here we report the first sampling study confirming that adult tiger mosquitoes travel with humans in cars and enabling us to estimate the frequency of these events. We



SEQ airports and seaports: All life stages can arrive in cargo

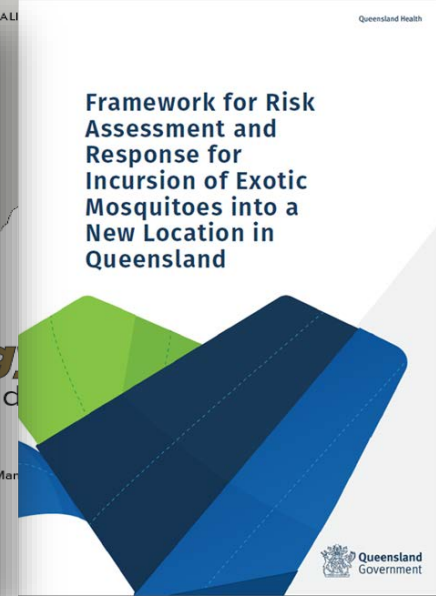
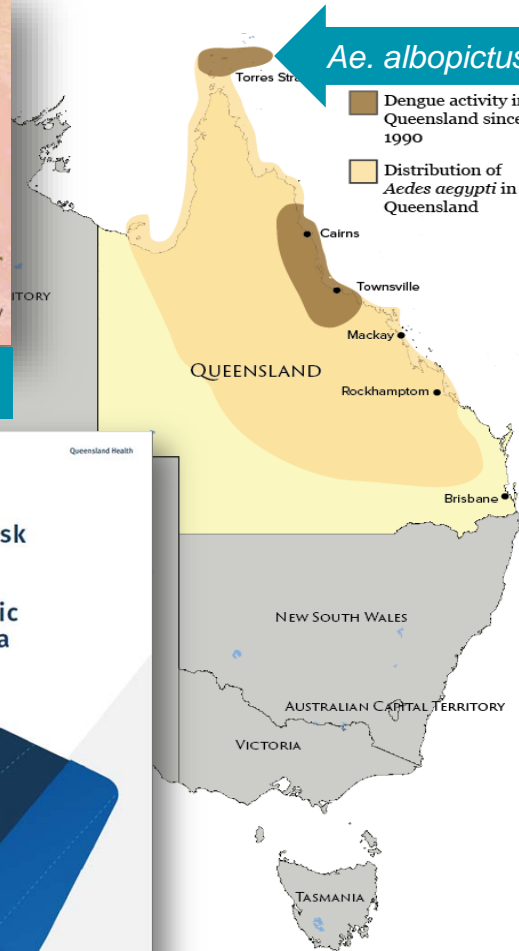
# Zika mozzies invading SEQ is a public health risk

Detecting Zika mozzies early may pre-empt cryptic outbreaks of exotic diseases



*Aedes aegypti*

*Ae. albopictus*



PLOS NEGLECTED TROPICAL DISEASES

RESEARCH ARTICLE

### Past and future epidemic potential of chikungunya virus in Australia

Timothy White<sup>1,2</sup>, Gina Mincham<sup>3</sup>, Brian L. Montgomery<sup>4</sup>, Cassie C. Jansen<sup>5</sup>, Xiaodong Huang<sup>1</sup>, Craig R. Williams<sup>6</sup>, Robert L. P. Flower<sup>1,2</sup>, Helen M. Faddy<sup>1,2,7</sup>, Francesca D. Frentiu<sup>1,2</sup>, Elvina Viennet<sup>1,2</sup>

1 Centre for Immunology and Infection Control, School of Biomedical Sciences, Queensland University of Technology, Kelvin Grove, Queensland, Australia, 2 Research and Development, Australian Red Cross Lifeblood, Kelvin Grove, Queensland, Australia, 3 Research and Innovation Services, University of South Australia, Adelaide, South Australia, Australia, 4 Metro South Public Health Unit, Metro South Hospital and Health Service, Brisbane, Queensland, Australia, 5 Communicable Diseases Branch, Queensland Department of Health, Herston, Queensland, Australia, 6 UniSA Clinical & Health Sciences, University of South Australia, Adelaide, South Australia, Australia, 7 School of Health and Behavioural Sciences, University of the Sunshine Coast, Petrie, Queensland, Australia

### Epidemic potential for local transmission of Zika virus in 2015-2016, in Queensland, Australia

Elvina Viennet, Gina Mincham, Francesca D. Frentiu, Cassie C. Jansen, Brian Montgomery, David Harley, Robert L.P. Flower, Craig R. Williams, Helen M. Faddy

12th Mosquito Control Association of Australia & Arbovirus in Australia Symposium  
Session 2: 07 September 2016, Surfers Paradise

Australian Red Cross BLOOD SERVICE

### DONOR INFECTIOUS DISEASE TESTING

#### Epidemic potential of Zika virus in Australia: implications for blood transfusion safety

Peter Watson-Brown,<sup>1,2</sup> Elvina Viennet<sup>1</sup>, Gina Mincham,<sup>3</sup> Craig R. Williams,<sup>3</sup> Cassie C. Jansen,<sup>4</sup> Brian L. Montgomery,<sup>5</sup> Robert L.P. Flower,<sup>1</sup> and Helen M. Faddy<sup>1,2</sup>

# Big questions for SE Queensland

- Are they already here
- Where will they invade
- When will they invade
- How long will be the delay before detection
- Will a detection precede a disease outbreak



# Are there Zika mozzies at my place?

Community education is key to social mobilisation!

1. Urban mosquitoes: What are they, where are they, and what diseases do they carry?
2. Backyard breeding sites: Associate with personal behaviours to reduce sites and disease risks
3. Empower action: Enable participation in surveillance at home

## PREVENT MOSQUITO BREEDING

Urban mosquitoes, including exotic and invasive species such as *Ae. aegypti* and *Ae. albopictus* breed in water-filled containers that you may find in your own backyard. By simply tipping out water from containers and objects at least once a week, correctly storing items that are not in use and throwing away unused and unwanted items, you can help prevent mosquito breeding.

**Invert buckets and containers**  
**Clean out gutters to avoid stagnant water**  
**Treeholes should be filled with sand**  
**Ensure your water tank is screened against mosquitoes**  
**Consider drilling holes in tyres to allow for drainage**  
**Ensure wheelbarrows are stored undercover**  
**Make sure there is no standing water in the base of pot plants**  
**Tarps should be tied taut to prevent water pooling**  
**Water in bird baths and fountains should be replaced weekly**

Graphics by Sophie Magee

## DEALING WITH DENGUE

Dengue Fever is a mosquito-borne disease which occurs globally, with occasional outbreaks in Queensland, mainly Cairns. These mosquitoes thrive during summer with high rainfall and temperatures. As Queenslanders, we can protect ourselves from outbreaks by checking and emptying containers around our homes that allow water to pool for over a week.

**Number of Humans Killed by Each Year**

780,000 Mosquitoes	546,000 Humans	75,000 Snakes
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Without water or when effective measures are in place, female mosquitoes are unable to reproduce, preventing local outbreaks. With water and without effective measures, female mosquitoes have the opportunity to reproduce and transmit disease.

**STOP THE BITE...**  
...and you can stop the disease:

- **Spray your home**  
Apply long acting surface spray twice every month, in dark hiding places behind and under furniture, in and around your home.
- **Use insect repellent**  
containing DEET or Picaridin.
- **Cover up**  
wear long sleeves, pants and cover your feet.
- **Screen your home**  
Install screens on windows and doors.

**STOP MOZZIES**

- Tip it
- Store it
- Throw it
- Spray it

**PROTECT YOURSELF FROM DENGUE & ZIKA MOZZIES**

email: [dengue@health.qld.gov.au](mailto:dengue@health.qld.gov.au)  
[zika@health.qld.gov.au](mailto:zika@health.qld.gov.au)  
web: [www.health.qld.gov.au/dengue](http://www.health.qld.gov.au/dengue)  
[www.health.qld.gov.au/zika](http://www.health.qld.gov.au/zika)  
phone: 1800 536 483

QR code:

Queensland Government | DON'T INVITE THE BITE

## Rainwater tanks

### A Guide to keeping your tank safe

Illustration of a mosquito on a rainwater tank and a person cleaning the tank.

# Citizen scientists can help protect 'public health'

'Promote health, prevent disease, and manage risk': QPHR Final Report Mar 2023

TO ACHIEVE THE OBJECTIVES, WHO AND PARTNERS HAVE DEVISED THE FOLLOWING STRATEGIES.

## DETECTION

Develop, strengthen and implement integrated surveillance systems at all levels for Zika disease, its complications, other arboviral diseases and their vectors, in order to provide up-to-date and accurate epidemiological and entomological information, to guide the response.

- strengthening surveillance of the *Aedes* mosquitoes by engaging communities in activities such as mapping *Aedes* breeding sites and undertaking actual surveillance themselves.

Recent research has demonstrated that community-based, integrated control of *Aedes aegypti* to prevent dengue, when thoroughly implemented, is able to reduce mosquito density and also the transmission of the virus.<sup>12,13,14</sup> Civil society organizations can play an important role in:

- strengthening communities' capacity to participate actively in community surveillance;
- creating demand for Zika virus diagnosis from the at-risk populations and dispelling rumors and fears;
- strengthening the number and capacities of laboratories; and
- setting criteria for diagnostic tests.

## PREVENTION

Prevent adverse health outcomes associated with Zika virus infection through integrated vector management, risk communication and community engagement.

In view of the continued spread of the disease and the mosquitoes increasing resistance to insecticides, there is a need to generate robust evidence on the effectiveness of mosquito control strategies as they are rolled out.

<sup>12</sup> Toledo, Maria E. et al. "Evidence On Impact Of Community-Based Environmental Management On Dengue Transmission In Santiago De Cuba". *Tropical Medicine & International Health* 16.6 (2011): 744-747.

<sup>13</sup> Kittayapong, P., et al., Suppression of dengue transmission by application of integrated vector control strategies at sero-positive GIS-based foci. *American Journal of Tropical Medicine and Hygiene* (2008): 78: 70-76.

<sup>14</sup> Anderson, Neil et al. "Evidence Based Community Mobilization For Dengue Prevention In Nicaragua And Mexico (Camino Verde, The Green Way): Cluster Randomized Controlled Trial". *BMJ* (2015): h3267.

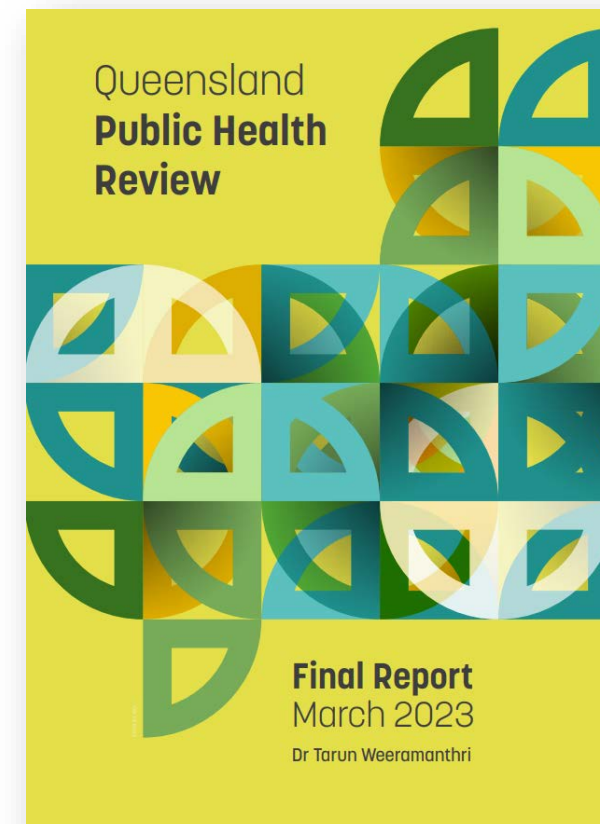
## Examples

- Zika Strategic Response Plan* alludes to citizen science as active community participation (p16)
- International suite of mobile phone apps - Adult mosquito imagery
- Mozzie Monitors (UniSA)* - Adult traps and apps
- Zika Mozzie Seeker (Metro South Health)* - DIY egg traps (ovitrap)

## Citizen Science – Zika Mozzie Seeker Project

Since early 2017, the Metro South PHU innovative Zika Mozzie Seeker project has recruited community members to trap mosquito eggs in their backyards to be tested for exotic diseases such as Zika, dengue or chikungunya. The screening technology was developed by Queensland Health and is a world first for mosquito monitoring.

The project is designed to enhance the ability to detect invasions of *Aedes aegypti* mosquitoes into South East Queensland. The success of the project depends on the high participation of community members to place traps in many locations as the mosquito does not fly more than 500 metres.



← QPHR excerpt p 34

# Zika Mozzie Seeker (ZMS): A good idea!

Citizen scientists monitor local urban mosquitoes for presence-absence of invasive *Aedes* species

## Recognition

### Queensland

- Metro South Health Innovation Awards 2017, 2019
- Queensland Health Innovation Award 2017
- Case study in *Qld Citizen Science Strategy* 2019
- Mention in *Qld Public Health Review* 2023

### Australia

- Australian Museum *Eureka Awards for Innovation in Citizen Science*: Finalist 2018, 2019
- Australia Post: Postage stamp 2020

### International

- Case study in OPSI *Embracing Innovation in Government: Global Trends* 2019
- *Wing Beats* AMCA industry magazine article 2020



Australia Post stamp designer Jonathan Chong  
Thanks to Michele Neil for brokering the opportunity!



# Challenge: Sorting local from invasive urban species

Early warning surveillance is difficult in large regions: Is there a needle in the haystack?

## *Aedes notoscriptus* LOCAL

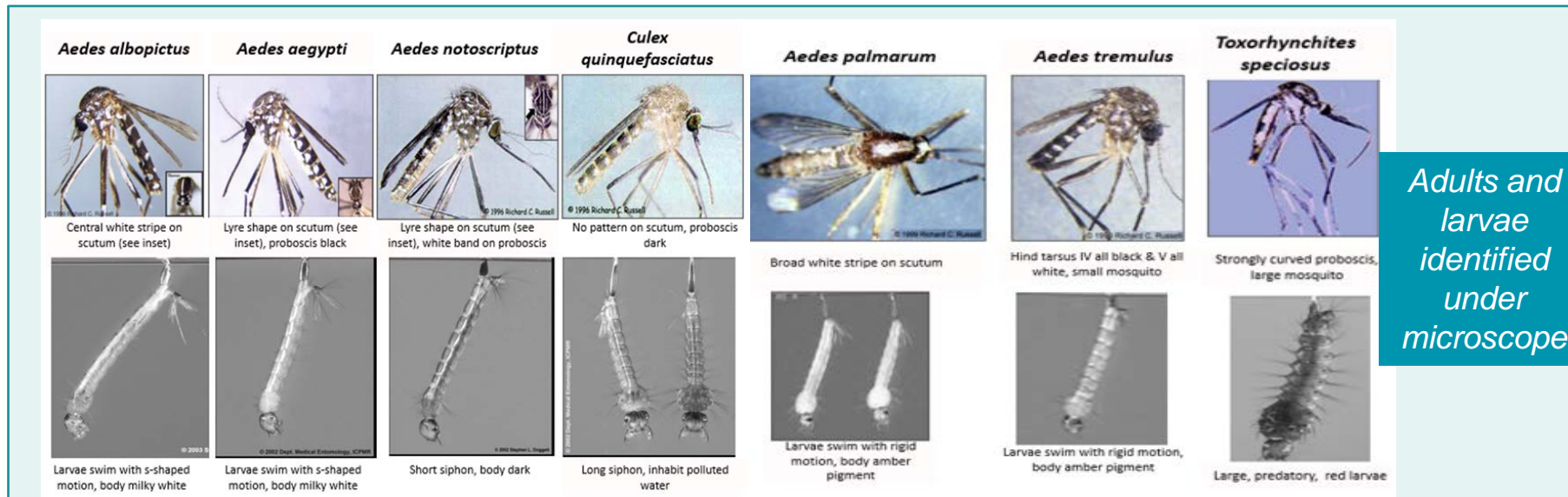
- Flight range 500 m?
- Dawn/dusk biter
- Outside the home
- 'Normal' biter
- Breed in containers (artificial & natural)
- Skip oviposition

## *Aedes aegypti* EXOTIC (SEQ)

- Flight range 200 m
- Daytime biter
- Enters the home
- Secretive biter
- Breed in containers (artificial)
- Skip oviposition

## *Aedes albopictus* EXOTIC (mainland QLD)

- Flight range 500 m
- Daytime biter
- Outside the home
- Painful biter
- Breed in containers (artificial & natural)
- Skip oviposition



Adults and larvae identified under microscope

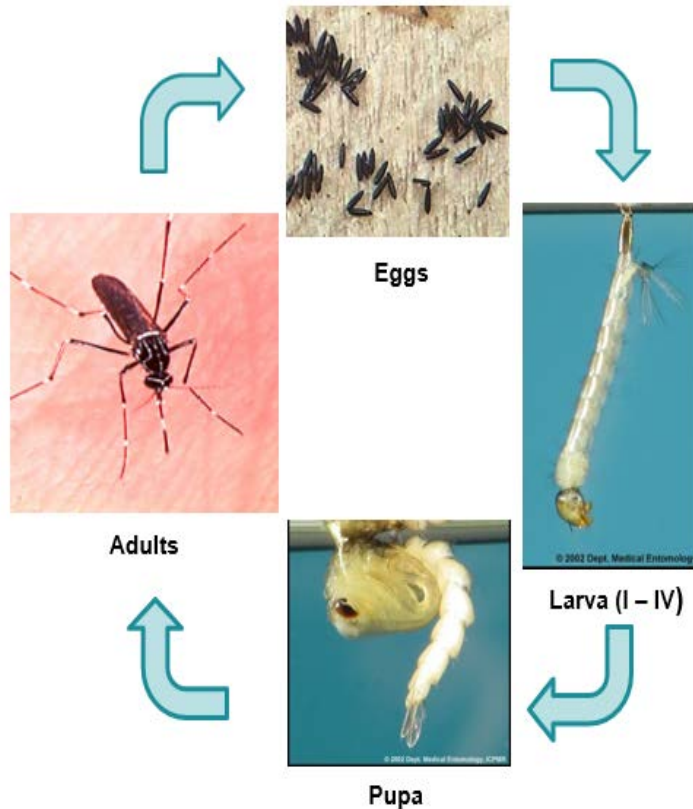


Eggs look the same!

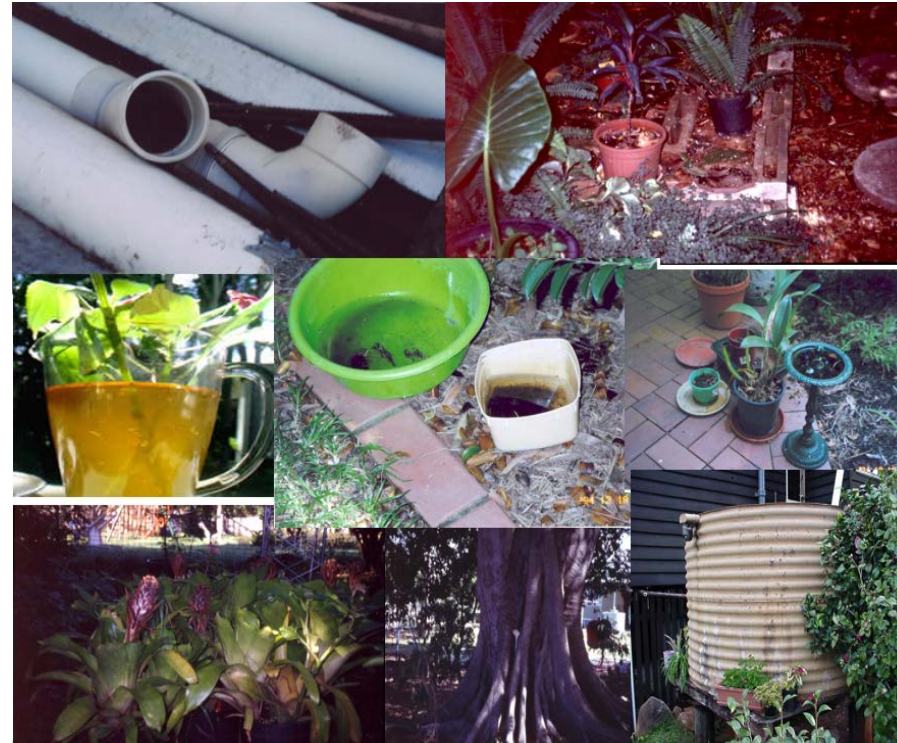
# Urban mosquito surveillance methods

Sensitivity of surveillance is dictated by logistics of yard inspections and/or trap arrays

## Mosquito life cycle



## Finding larvae and/or pupae in yards



*Regular inspections of hundreds of properties is long, slow, and gives biased results*

## Trap options



Ovitrap for eggs



Gravid Aedes trap for adults

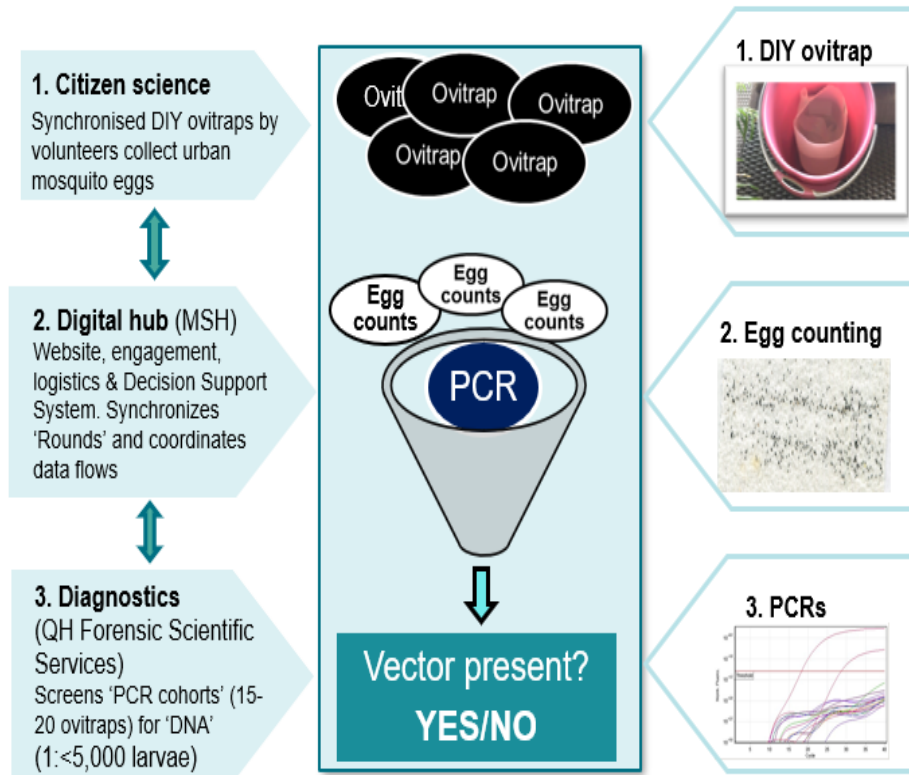


BGS (BioGents) Sentinel trap for adults



# ZMS: Innovative solution by empowering DIY citizen science

Electronic engagement and communications



## Recruitment

- Email invitation to registrants from prior Round
- Advertise in MSH electronic newsletters
- Social media
  - FB Boost within MSH
  - Qld Office Chief Scientist tag

*The more participants, the better the result*

## WANT TO BE A CITIZEN SCIENTIST?

Social media



Community engagement staff

Zika Mozzie Seeker

Be a 'Zika Mozzie Seeker'  
Registration is open for Round 13

Project updates

ZMS website

# Citizen scientists collect eggs in three-step DIY format

MSH mail out 'kits', participants supply a bucket to assemble ovitrap, then submit the sample



1. Kits mailed out

### ASSEMBLING YOUR DIY OVITRAP

We provide free	You provide
 Egg Collection Strip	 Sealable Bag
 Pre-addressed Envelope	 Blotting Paper
 Paperclip	 Lucerne Pallet
	 A large (e.g. 2L) dark container - an ice cream tub or a bucket is ideal.

- 1** Select your container. Rinse the container twice before use.
- 2** Hang the egg collection strip (supplied) in the container so it touches the bottom. Trim off any excess outside the container.
- 3** Fix the egg collection strip in place using a paper clip (supplied).
- 4** Fill the container with tap water (about three-quarters full); enough to last for 2-3 weeks.
- 5** Add the lucerne pellet (supplied) to the water (more than one will spoil the water).

An ideal location for your trap is under cover. Place the trap away from disturbance by pets or children, out of the rain and wind and away from hoses or sprinklers.

Don't worry! We will be sending a series of SMS reminders.  
Graphics by Sophie Magee



2. Ovitrap assembled?

### 2 WEEKS LATER

Any female urban mosquitoes visiting your yard will lay their eggs (< 1mm) on the egg collection strip. The eggs need to stay unhatched. Please do not refill the bucket or splash water to prevent eggs hatching. After two weeks, check to see if there are any eggs on the collection strip.

**No eggs?** Leave the trap out for one more week; or send us a photo!

**I see eggs!** It's time to send them in.

### RETURNING THE STRIP

- 1** Remove the strip from the bucket. Mop up excess water using the blotting paper (supplied). Wrap the damp strip in the paper.
- 2** Place it in the barcoded sealable bag (supplied).
- 3** Seal and place the barcoded bag into the postage paid pre-addressed envelope and mail to us.

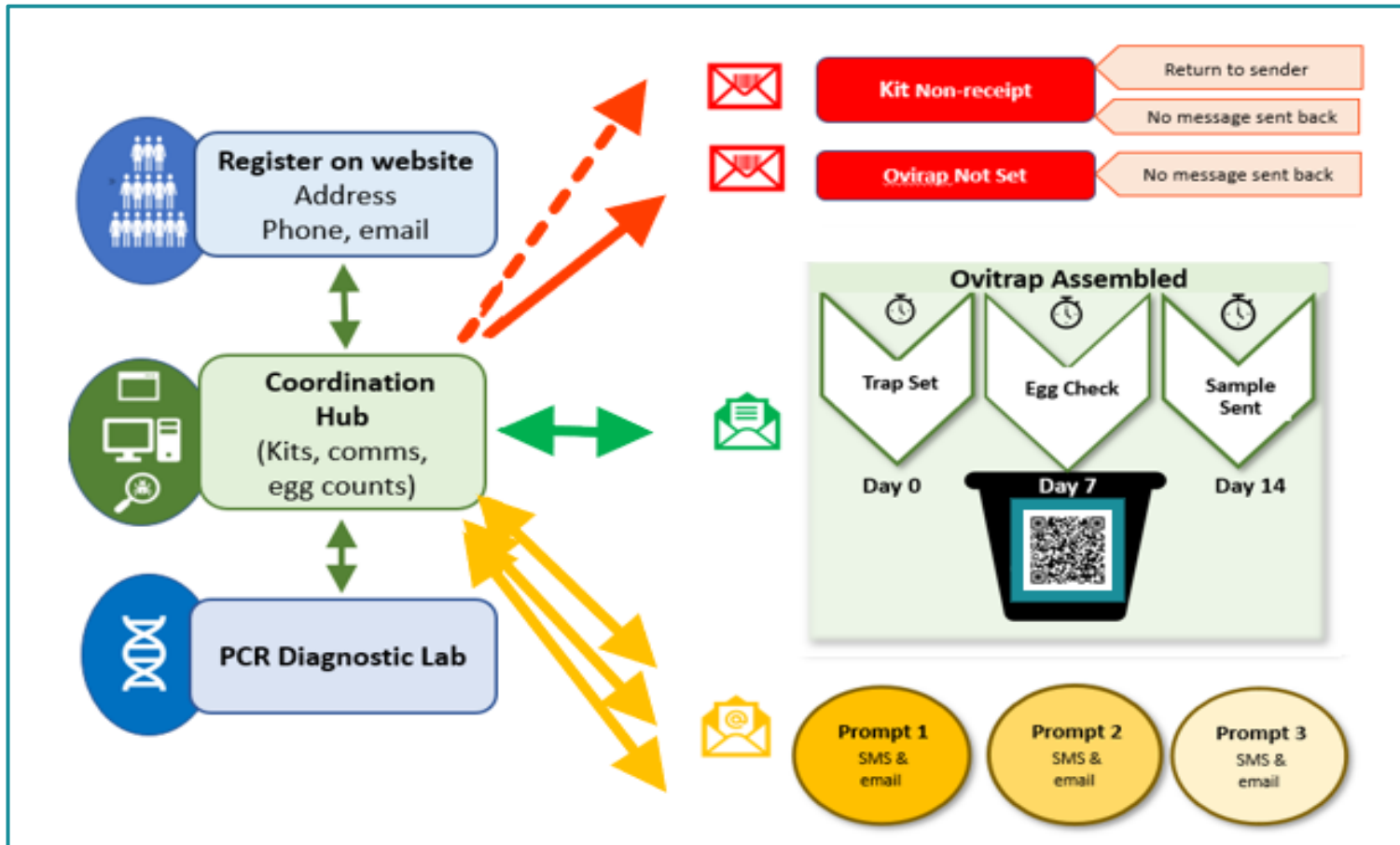
Any questions? Please send an email to [MSPHU-Med-Ent@health.gov.au](mailto:MSPHU-Med-Ent@health.gov.au)  
Graphics by Sophie Magee



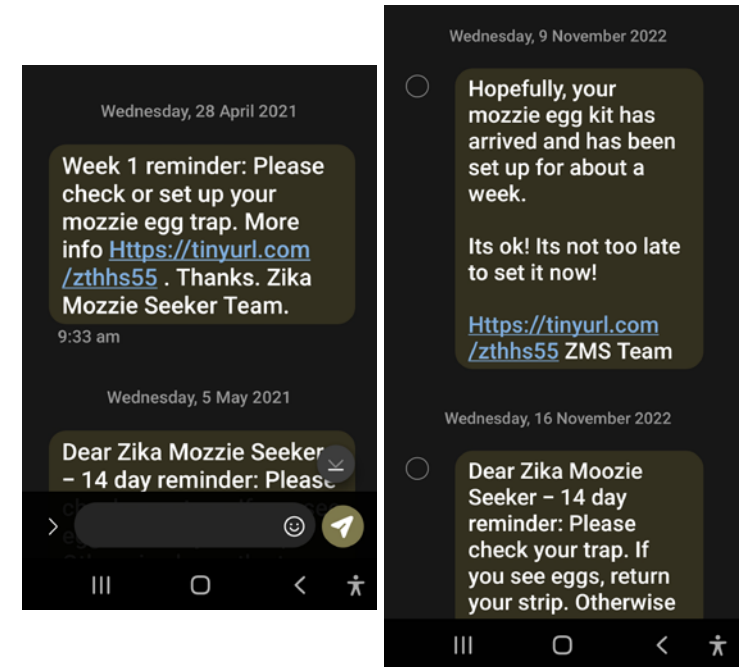
3. Egg strip mailed to MSH?

# Rounds are synchronised via mail outs and SMS

Structured electronic messaging prompts to improve participation rates



*Participant: A registrant who returns a sample (eggs or not)*



*SMS prompts*

# Logistics rely on admin support by Metro South Public Health Unit (MSPHU)



*Egg collection kits (ECK) assembled onsite*



*ECK components: Inexpensive by design*



*ECKs tracked via barcode*



*...or by volunteers*



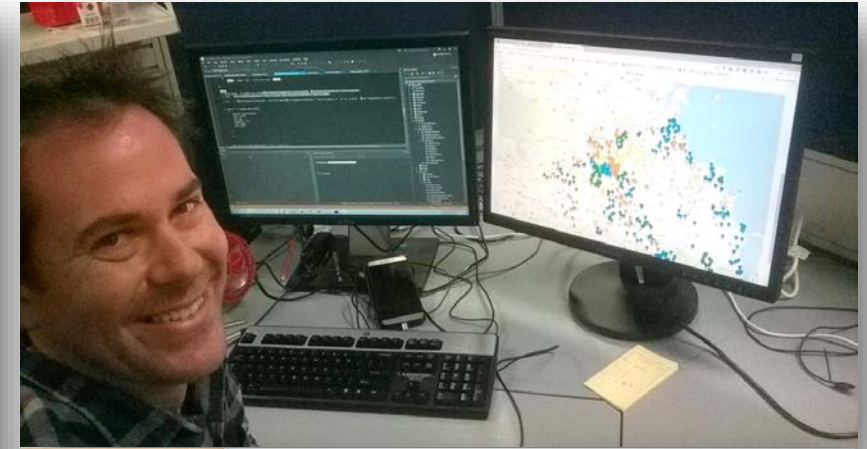
*Each ECK is barcoded & QR coded*



*Mail outs are synchronised*

# MSPHU laboratory links to a bespoke Decision Support System

Track via barcode, messaging, strip assessment, egg recording, map production, reporting



*Each ovistrip inspected for eggs*

*Eggs counted on strip & batched into PCR cohort (max. 5,000 eggs)*

*These smart guys have built a mozzie database*

# Keeping track: 'Zero eggs' is also an important result

Automated and rapid egg counting is linked to participant history, dashboards and maps

The screenshot displays the 'Mozzie Seeker' web application interface, which is used for automated egg counting and data management. The interface is divided into several sections:

- 1. Capture Image:** A 'Take Snapshot' button is visible.
- 2. Count Eggs:** A large image shows a strip of paper with numerous red dots representing eggs. Below the image, the 'Egg count' is displayed as 343. There are sliders for 'Threshold' (set to 00) and 'Multiplier' (set to 2.0). A 'Strip Quality' dropdown menu is also present.
- 3. Update Kit details:** A form for updating kit information, including fields for 'EggCount' (330), 'Egg\_Result' (Positive), 'Trap\_Sent\_Date' (06-11-2021 12:00:00), 'Trap\_Receive\_Date' (06-11-2021 12:00:00), 'Trap Number' (50002054), and 'Week Until' (Warm South Pacific Coast).
- Assign Kit:** A form for assigning a kit to a cohort. It includes a 'Create' button and an 'Optional info' section with fields for 'Run' (Round 9) and 'ImagePath' (Trap\_ID\_6110 PersonID\_4590Date\_163945627650.jpg).
- Attached Person:** A dropdown menu showing 'binan' as the selected person.
- Dashboard for Round KPIs:** A complex dashboard for 'Round 4 Tuesday, 20 February 2018'. It features several charts: a pie chart for 'Return Rates', a bar chart for 'Egg Counting Categories', and a bar chart for 'All Return Times'. Below these are sections for 'Closed Participation Rates' and 'Summary Data'.
- Summary Data:** A table with columns for 'Trap Registrations', 'Total Registered Trapping Area (including Schools and Stores)', 'School Registrations', 'SME Registrations', 'All registered participants', 'Signed Out Participants', and 'Registrations that have not been sent kits'. The values are: 493, 493, 0, 0, 25, 493, and 21 respectively.
- Participant History Table:** A table with columns for 'Kit', 'Stage', 'Class', 'Kit', 'Run', 'Person', 'Suburb', 'Counted', 'Result', 'Post', 'Trapline', 'Trap', 'TrapNumber', and 'Kit'. It contains a list of participants and their associated data.

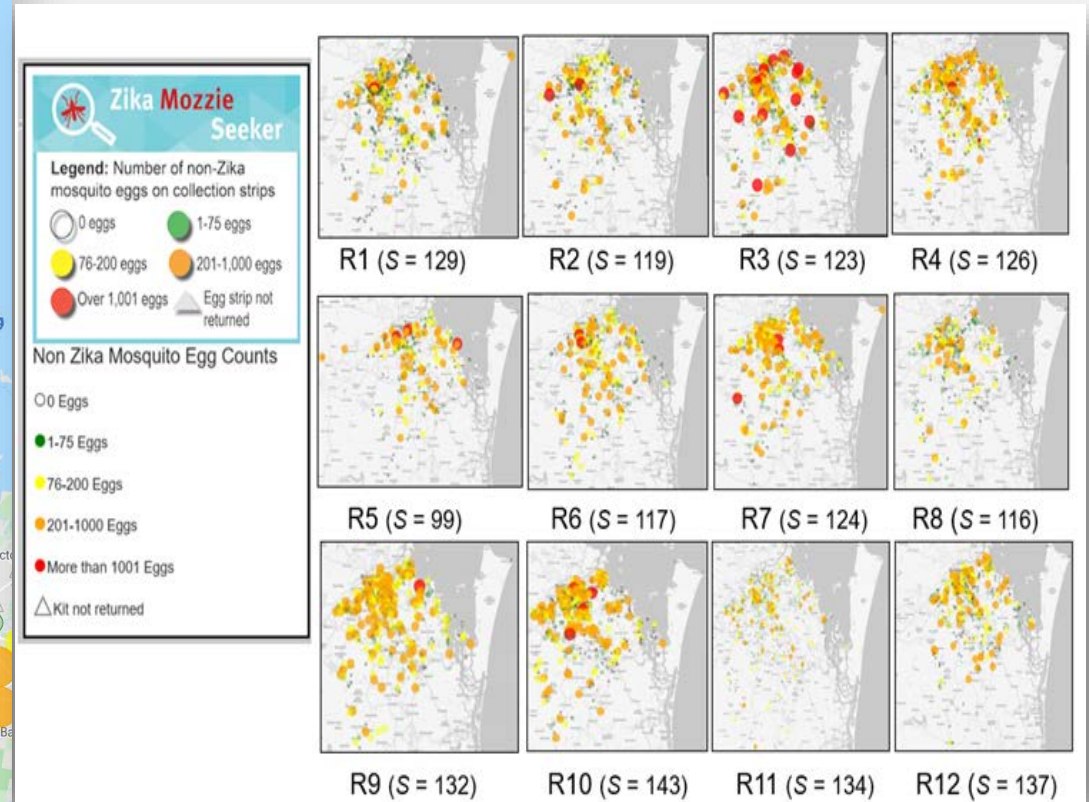
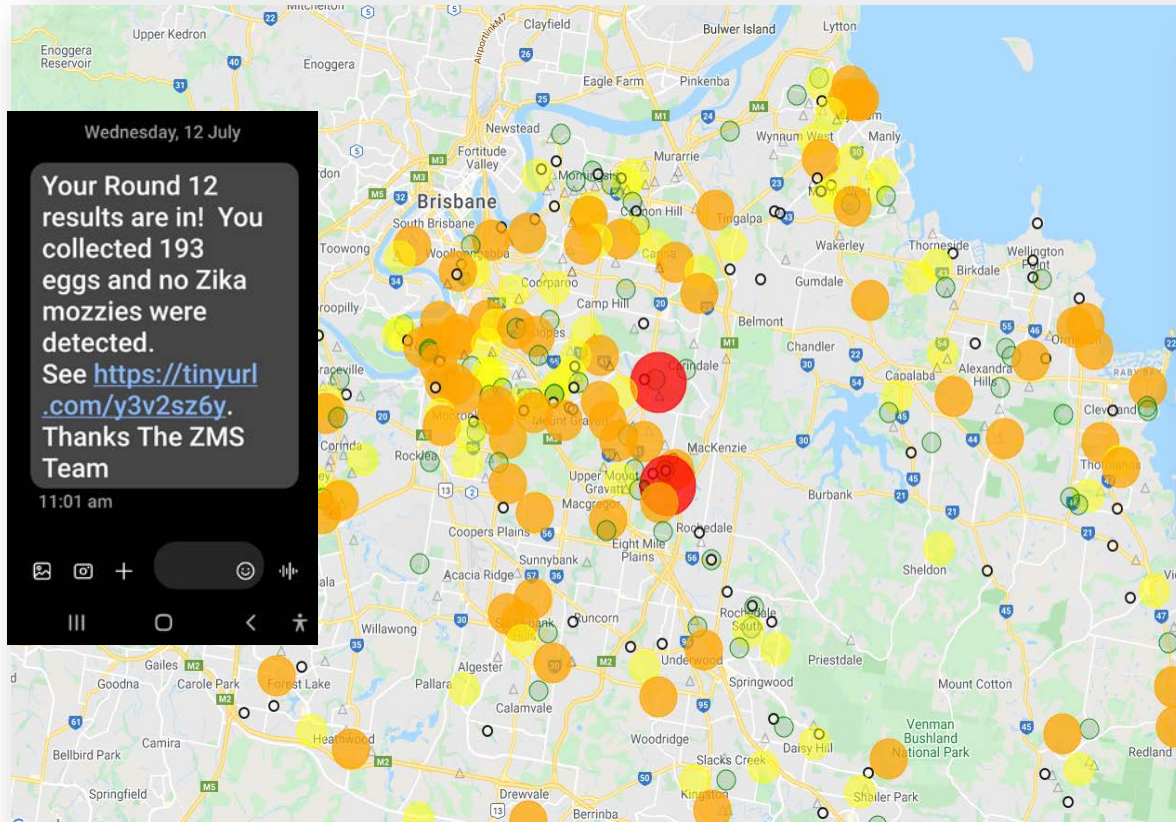
Each egg strip count is attributed to person via a linked barcode

Dashboard for Round KPIs



# Timely and targeted results: Reiterated biannually

Individuals can contextualise result by comparing with community results for egg abundances



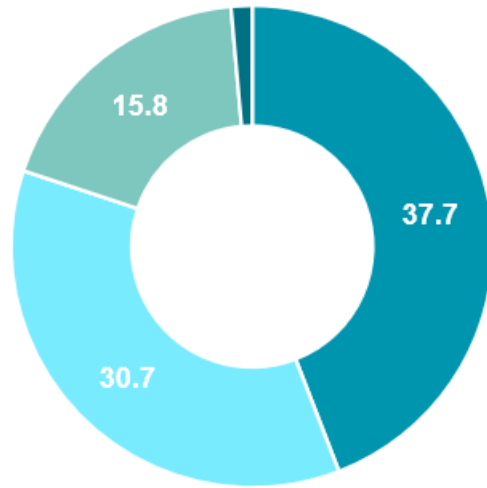
*Individual results: via SMS text*

*Community results: Egg abundances visualised on ZMS website for each Round (R)*

*Participation R1-12 (S = suburbs): Total 172 suburbs, avg. 125 S/R*

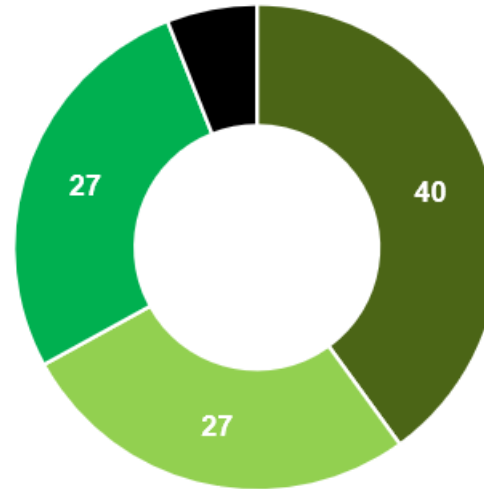
# Engaging citizen scientists in Metro South with data

New data outputs shared on ZMS website



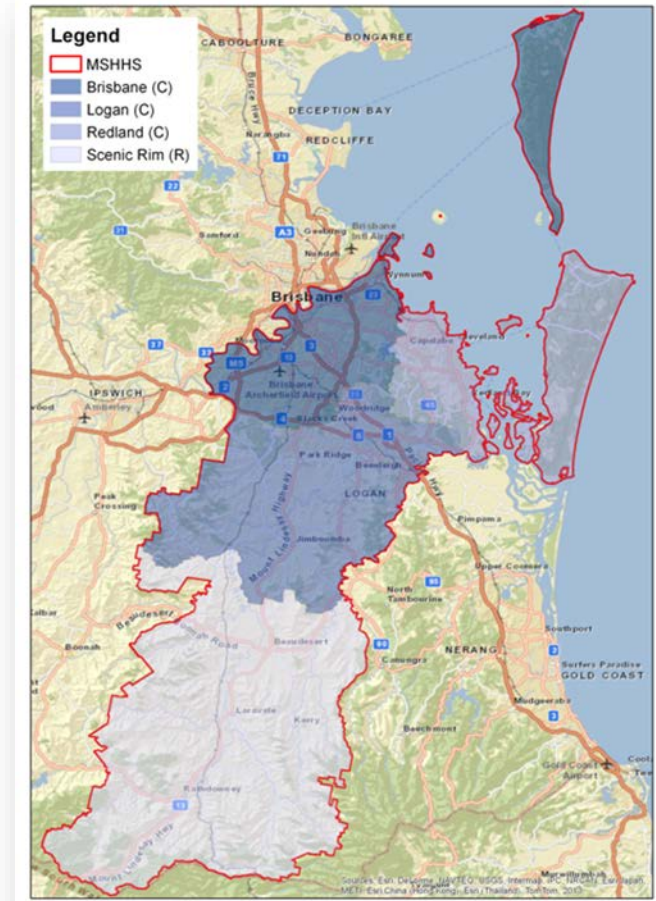
- Facebook/twitter post
- Email newsletter
- Word of mouth
- Other

Recruitment source (n = 100)



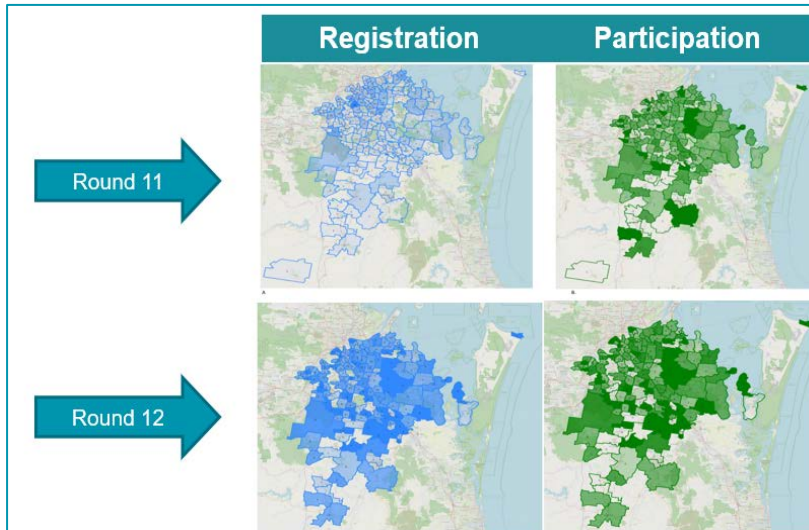
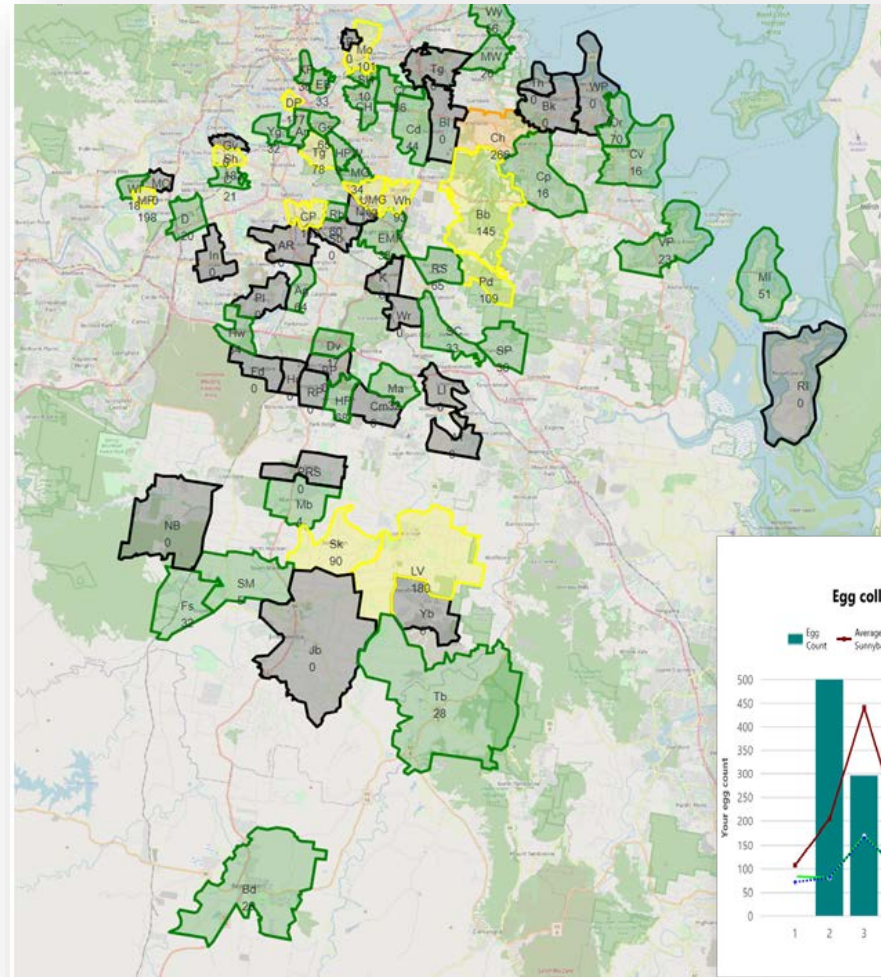
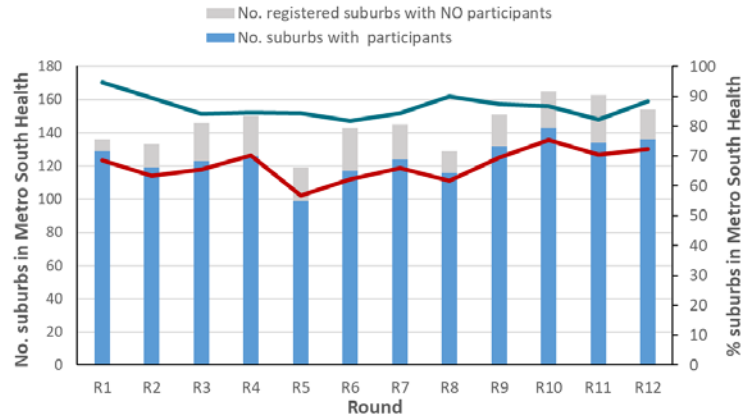
- Keeping community safe
- Keeping family safe
- Citizen science
- Other

Motivation (n = 100)

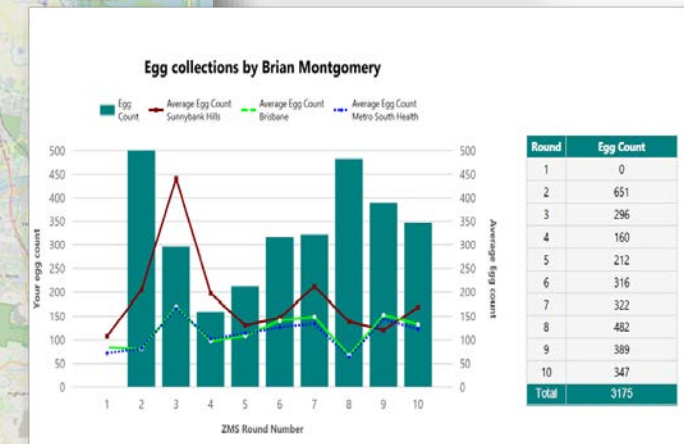


Metro South Health

# Data outputs are evolving



Maps of Zika Mozzie Seeker Round 11, showing registrants (A) and participants (B). Darker shades of green (Map B) indicates suburbs with higher percentage of participation. Participants are defined as the number of people that sent in a sample (zero eggs or eggs). Darker shades of blue (Map A) indicate suburbs with higher numbers of registrations.



R12 avg. no. eggs: Map by suburb

Egg collection history

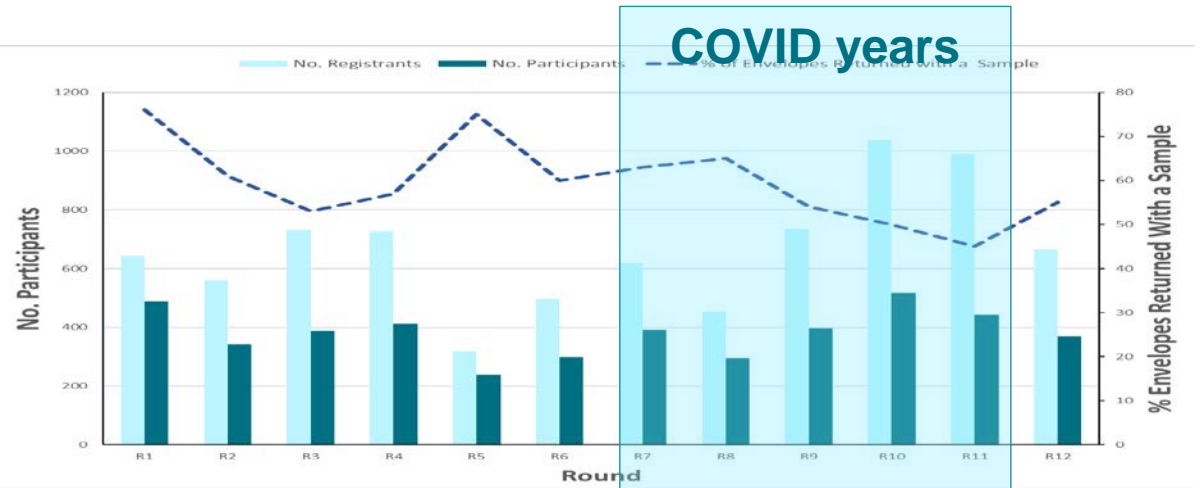
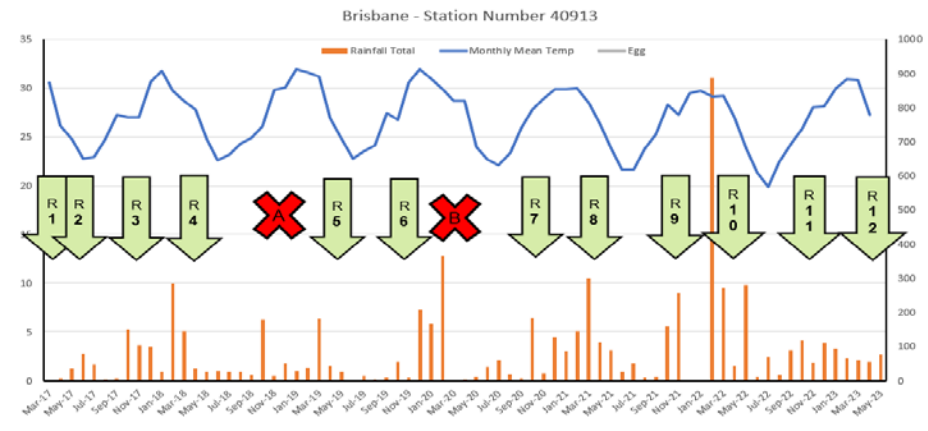
# ZMS is proving to be efficient, effective and sustainable

No Zika mozzies detected in Metro South since 2017

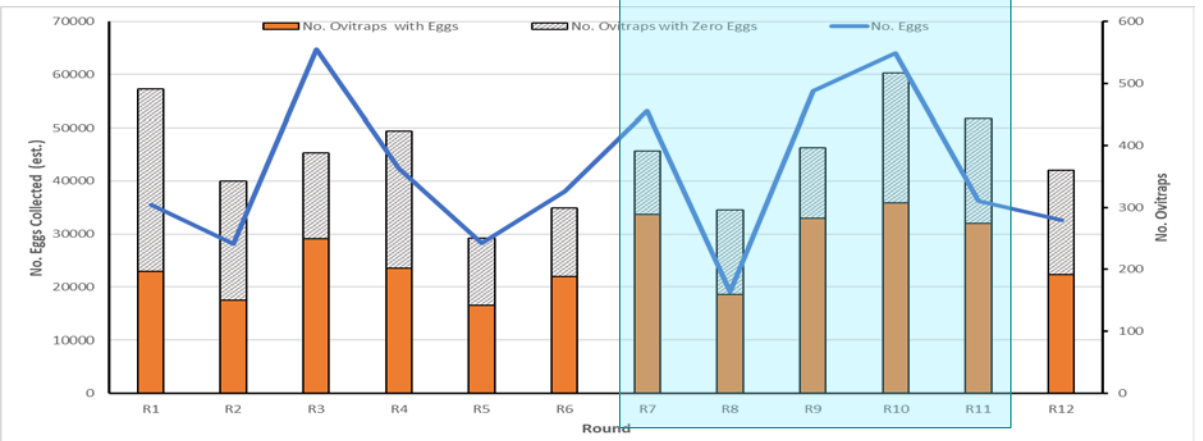
## Summary of Rounds 1-12

- Suburbs with a participant 172 (77%)
- Registrations (kits mailed out) 7,969
- Participants (ovitraps assembled) 4,590 (57.8%)
- Ovitrap with eggs 2,639 (57.5%)
- Eggs collected 502,000
- No. PCR tests 153 (12.7 p.R)

## Rounds 1-12 chronology



Participation summary



Eggs abundances summary

# ZMS is also helping next-gen citizen scientists in Queensland

Collaborations via *Advance Queensland Engaging Science Grants*  
Queensland Government (Department of Science, Information Technology & Innovation)



## Collaborations

1. *ZMS Secondary School Module* 2018
2. *Mozzie Augmented Reality (AR) App*  
Primary schools QUT 2019
3. *STEM Champion Mozzie Hunters*  
Secondary schools QIMR Berghofer 2023



# 'ZMS - Secondary Schools' STEM module

Metro South partnership with Toohey Forest Environmental Education Centre (TFEEC)

## Delivery and Results

- One immersion event per year (2018, 2019). Two days/event (Nine schools per day invited by TFEEC)
- Subsequent ovitrapping offered as a voluntary extra-curricular opportunity, not delivered in a classroom setting
- Six schools (30.3%) followed through with egg submissions
  - Y1: Three schools  
3,522 eggs (29 ovistrips)
  - Y2: Three schools  
1,548 eggs (22 ovistrips)
- COVID-19 restrictions put immersion days on hold until 2024



*Grant funding provided great;*

- *Teachers for content (Darren Shepherd, Brad Lambert) in a format that aligns with school curriculum*
- *Presenter (Brad Lambert)*
- *Venue*

*Well received by students*

# Learning with hands-on activities

## Immersion Day Format

- 1. Introduction:** PowerPoint on urban mozzies, vectors and diseases
- 2. Field booklet:** Lab activities introduce traps, samples, microscopy and ZMS diagnostics
- 3. Companion activity:** Introduce DIY modern diagnostics (Dr Brian Johnson, QIMR Berghofer)
- 4. Egg collections:** Teachers take egg collection kits back home/school. One contact person (teacher) for ZMS per school

**Zika Mozzie Seeker**  
Field Booklet

Name: \_\_\_\_\_

Students will:

- Recognise that the transmission of disease (Zika virus) is facilitated by regional and global movement of organisms
- Identify and differentiate (through classification) "Zika mosquito" species from other endemic species, that do not transmit the virus, using structural characteristics
- Describe the life cycle of mosquitoes, and the process through which these vectors transmit Zika virus to humans
- and ultimately:
- Implement monitoring techniques for the presence of *Aedes aegypti* and *Aedes albopictus* in our region South-East Queensland to confirm their absence and low risk of Zika virus becoming a problem in the region


**Pre-Visit Activity:** The two mosquitoes in the photos opposite are different species and are two very important vectors in a number of mosquito-borne diseases. Try to find some physical characteristics that you might use to identify them if you found them in the field.



**Zika Mozzie Seeker**

**Activity:** Estimate the number of mosquito eggs on the test samples below and then from the samples collected from the Toohey Forest EcoCentre.

Estimate the number of mosquito eggs collected on the ovitrap strips below.



Strip 1 Estimate: \_\_\_\_\_

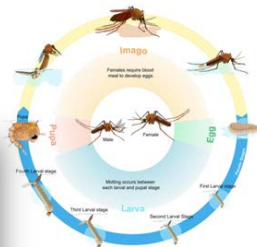
Strip 2 Estimate: \_\_\_\_\_

Mosquito Strip Sample	Approximate Egg Numbers
A	
B	
C	
D	
E	
F	
G	
H	
I	
AVERAGE	

Field booklet

**Zika Mozzie Seeker**

**Activity:** Use the cards provided and place them in order from the first to last stage in the mosquito life cycle.



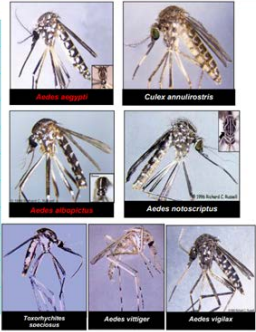
Order	Stage Description
	First adult meal for males and females is often nectar or plant juices.
	Female lays eggs typically 4 days after blood meal.
	Males swarm and females are attracted to them.
	Four feeding larval stages (Day 1 – 6) feed on small particles found on substrate.
	Males feed on nectar or plant juices entire lives.
	Eggs can last a long time before hatching.
	The pupal stage (Day 6 – 8) is non-feeding.
	After mating the female seeks out a blood meal.
1	Urban <i>Aedes</i> adults lay a few to hundreds of eggs on surfaces above the waterline.
	Eggs only hatch after rain and eggs become submerged.

**Zika Mozzie Seeker**

**Activity:** Identify the abundance of adult mosquito species found in the various trap samples taken from different locations in Toohey Forest.

Date Sample Collected: \_\_\_\_\_

Mosquito Species	Trap Type and Location	Abundance



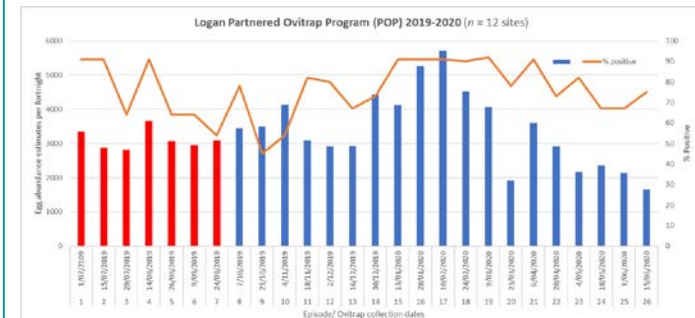
# ZMS is now business-as-usual in MSH

- Biannual Rounds in the lead up to Brisbane Olympics will increase confidence that Zika mozzies are absent
- A sustainable and scalable system. Many suburbs need more sites to be a robust early warning program
- Data management efficiencies will continue to evolve
- Integration with *Regional RSVP Program* (Queensland Health and SEQ councils monitor commercial precincts) provides a novel ‘best-practice’ model
- Complements other CS platforms to increase options for community participation
- *ZMS Secondary Schools* will continue in 2024, in collaboration with TFEEC and QIMRB

RESEARCH ARTICLE

## Rapid Surveillance for Vector Presence (RSVP): Development of a novel system for detecting *Aedes aegypti* and *Aedes albopictus*

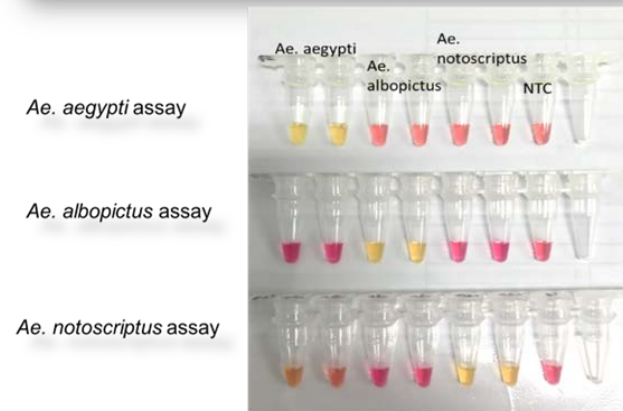
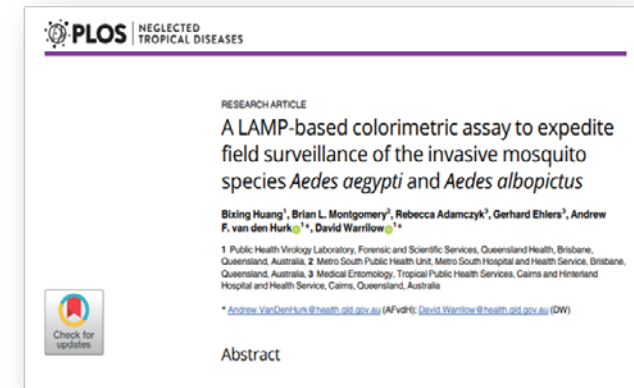
Brian L. Montgomery<sup>1</sup>, Martin A. Shivas<sup>2</sup>, Sonja Hall-Mendelin<sup>3</sup>, Jim Edwards<sup>4</sup>, Nicholas A. Hamilton<sup>5</sup>, Cassie C. Jansen<sup>6</sup>, Jamie L. McMahon<sup>3</sup>, David Warrilow<sup>3</sup>, Andrew F. van den Hurk<sup>2\*</sup>



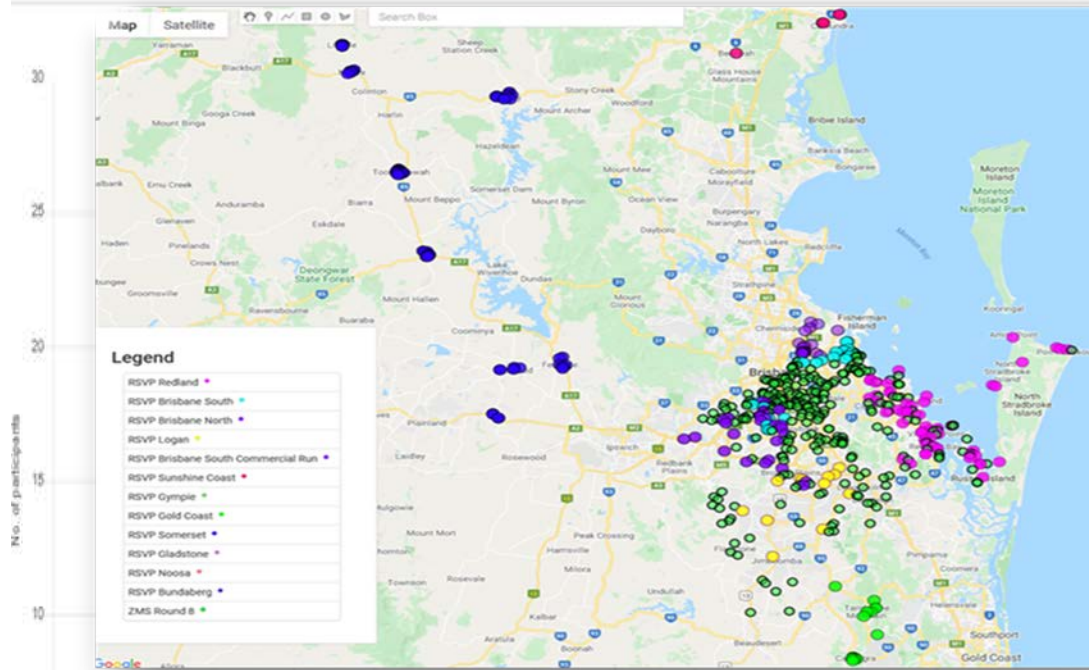


# Where to from here?

- Expanding ZMS beyond MSH will require strategic investment in program infrastructure to support engagement, logistics, coordination and diagnostics
- A LAMP-based colorimetric diagnostic method (optimised via *Mosquito & Arbovirus Research Committee* grant with Dr Brian Johnson QIMRB) may supplement PCRs
- Genomic study of local mosquito species (*Ae. notoscriptus*) may predict pathways for invasion to identify riskier suburbs (partnered with Dr Gordana Rasic QIMRB)



# Thanks to our intrepid citizen scientists and all others involved!



SEQ ovitrap sites: Combined ZMS and RSVP program

