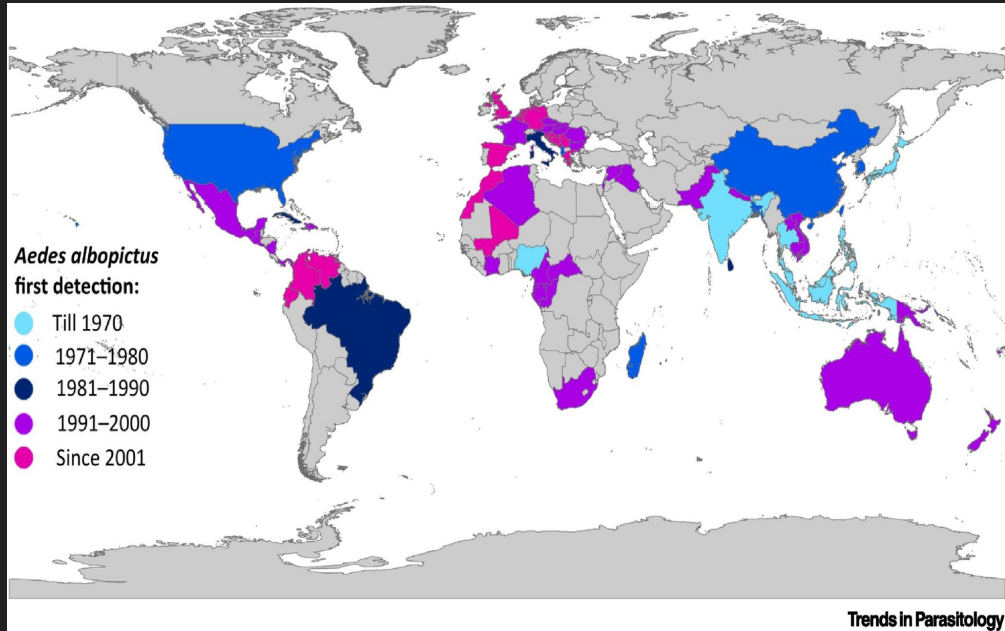


# Invasive Species Case Study: *Aedes albopictus*, Tiger Mosquito

MEES 718I  
Aubrey Tingler  
October 8, 2021

# Where did *Aedes albopictus* come from and how did it get here (Maryland)?



(Benelli et al., 2020)



(MDNR, 2020)

# Why is *Aedes albopictus* a problem?



Virus	Family	Genus	Transmitted by	
			<i>Aedes aegypti</i>	<i>Aedes albopictus</i>
DENV-1,2,3,4	Flaviviridae	Flavivirus	+	+
Yellow Fever Virus			+	+
West Nile Virus			+	+
Japanese Encephalitis Virus			-	+
St Louis Encephalitis Virus			-	+
Zika Virus	Togaviridae	Alphavirus	+	+
Usutu Virus			-	+
Chikungunya			+	+
Eastern Equine Encephalitis Virus			+	+
Venezuelan Equine Encephalitis Virus			+	+
Western Equine Encephalitis Virus			+	+
Ross River Virus			+	+
Sindbis Virus	+	+		
Mayaro Virus	+	+		
Getah Virus	+	+		
Rift Valley Fever Virus	Phenuiviridae	Phlebovirus	+	+
Potosi Virus			-	+
Cache Valley Virus		Bunyavirus	-	+
Tensaw Virus			-	+
Keystone Virus			-	+
San Angelo Virus			-	+
La Crosse Virus			+	+
Jamestown Canyon Virus			-	+
Trivittatus Virus			-	+
Oropouche Virus			+	+
Orungo Virus	Reoviridae	Orbivirus	+	+
Nodamura virus	Picornaviridae	Nodaviridae	+	+

Images from left to right: ([Wozzie, 2017](#); [Wikipedia, 2021](#); [Miller, 2015](#); [Houé et al., 2019](#))

# *Aedes albopictus* Arrival and Mosquito Management in Maryland

**Manager:** Brian Prendergast, Maryland Department of Agriculture, Program Manager, Mosquito Control Administration

- Species of concern in MD since 1990s
- MD does statewide mosquito control, but not especially targeted at *A. albopictus*
- Control efforts focus mostly on marshy areas along the Eastern Shore
- Invasion of *A. albopictus* made mosquito control in Western Maryland more of a concern



Maryland County Map

# Problems with *Aedes albopictus* in Maryland

- No specific management plan (BP)
- Some wide-area larviciding (WAL) may impact *A. albopictus* but not much (Abramides et al., 2011; BP).
- Source of many “tell on your neighbor” complaints (Bodner, 2016; Biehler, 2019; BP)
- People less likely to go outside (Beyer et al., 2018; Biehler, 2019; Bodner, 2016; Worobey, 2013)
- 3 bites in 2 minutes threshold for spraying (BP)
- Back checks of spray areas required by National Pollution Elimination System (BP)

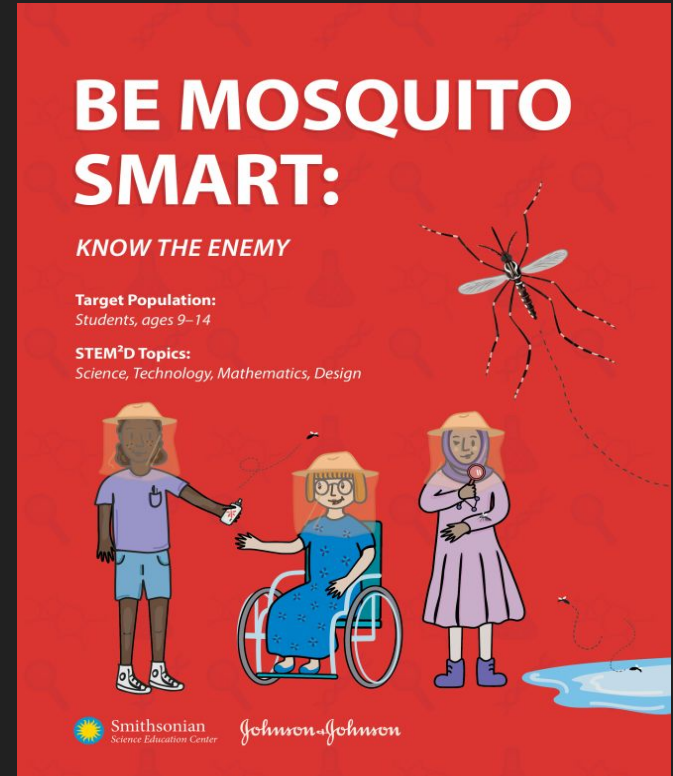


CDC, 2020a



# Funding, Monitoring, and Communicating Information

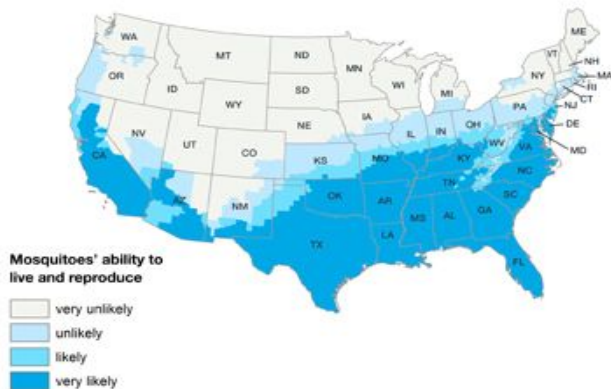
- “In general there’s no funding for my office to do anything” (BP)
  - Area wide Asian Tiger Mosquito control program from 2005 - 2015. This went to affected area universities for research purposes.
- Focus on public communication (BP)
- Need more knowledge of cryptic container sources (BP)
- Maryland has trapping program with intensive species and viral surveillance (BP)



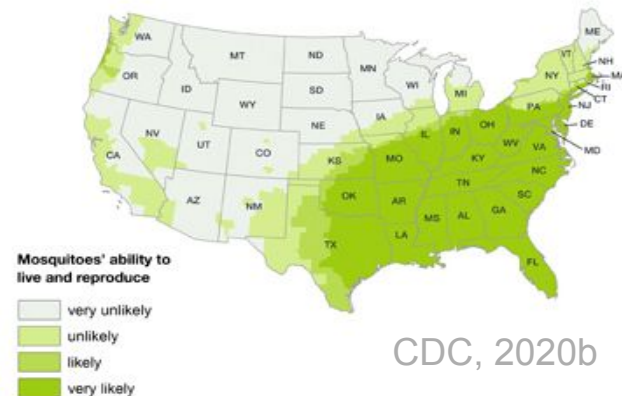
# Potential Future Impacts of *Aedes albopictus* in Maryland

- Currently has reached its northern limit (PA)(BM, CDC 2020b; Kraemer et al., 2015)
- Uncertain vector biology concerns (Benedict et al., 2007; Houé, 2019; Leta et al., 2018)
- Mostly not controlled in MD except for incidentally (BP)
- Filling a vacant niche, so not likely to have ongoing impacts on other species (Benedict et al. BP, JM)

Estimated Potential Range of *Aedes aegypti* in the United States, 2017



Estimated Potential Range of *Aedes albopictus* in the United States, 2017

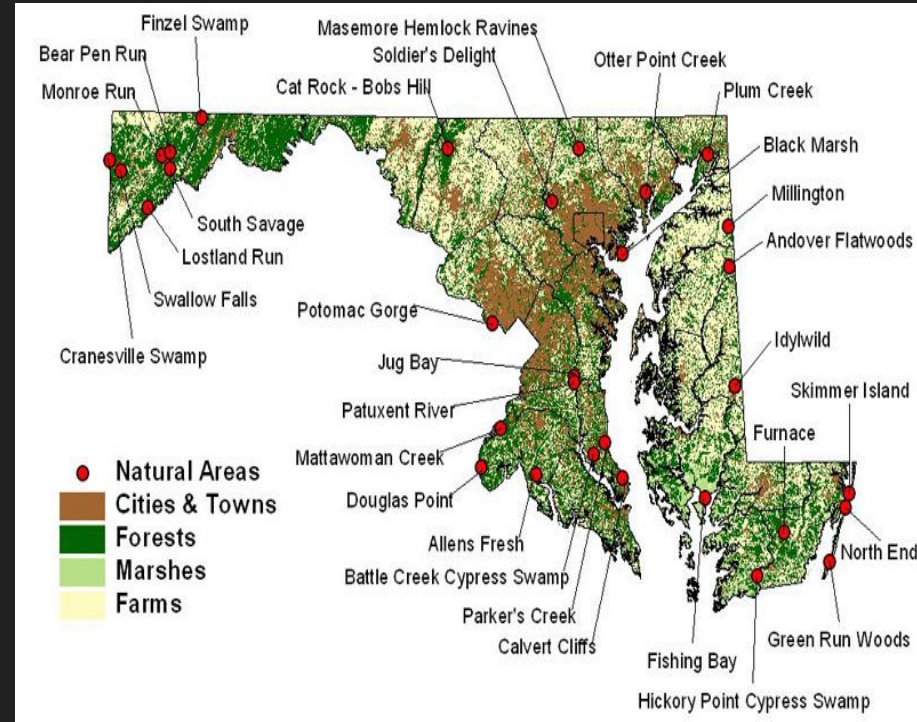


CDC, 2020b

# The Flip Side: Non-Target Impacts of Mosquito Control

**Manager:** James (Jim) McCann,  
Maryland Department of Natural  
Resources, State Zoologist

- Mostly concerned about particular compounds, such as methoprene, naled, and spinosad
- Native insect and higher trophic level impacts
- Local non-target impacts are not well-studied for specific habitats in Maryland



(MDNR, 2021)



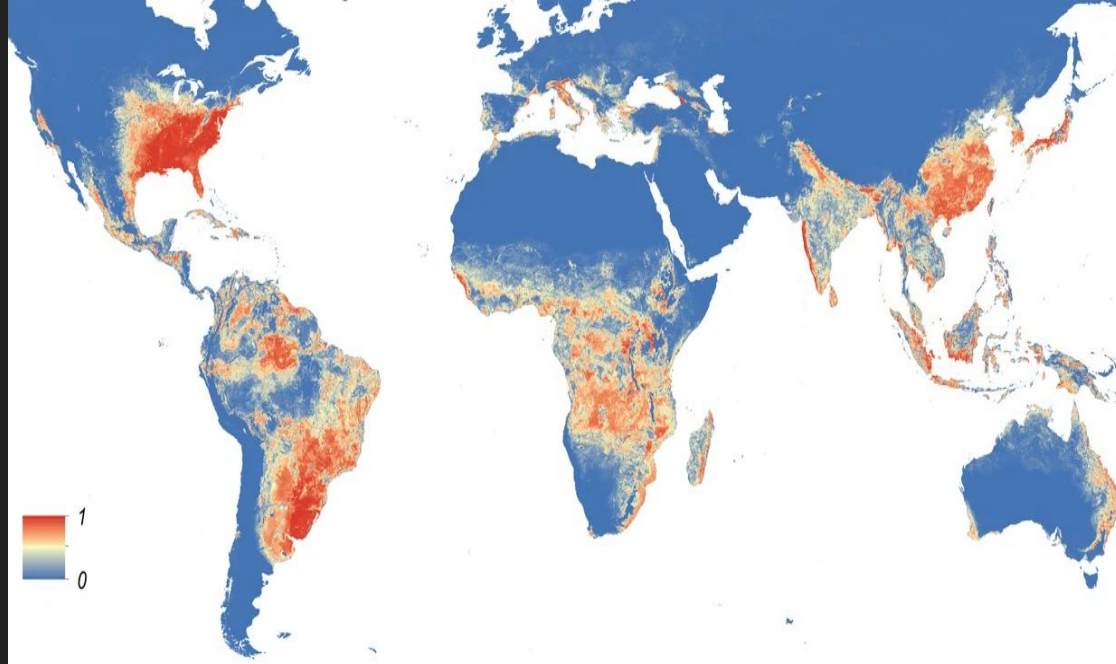
# Problems with Non-Target Impacts

- Affect public perception and may inhibit mosquito control efforts (Biehler, 2019; BP)
- Federal grant money used to pay time for environmental review, but no specific non-target impact allocation (JM)
- Need specific work on impacts of larvicides in mid-Atlantic (JM)



# Future Outlook

- Maryland's program makes them likely to catch new species early (BP, JM)
- Landscape of mosquito control may change if disease becomes more of a concern (BP, JM)
  - Assateague example for future vector management
- Open research questions and uncertain future



*Aedes Albopictus* probability of occurrence map (Kraemer et al., 2015)

# Questions?

A special thanks to Brian Prendergast and Jim McCann for taking the time to speak with me.

## A note on references:

You'll notice some references listed in the final reference section appear in in-text citations on the slides, while others do not. I included the additional references because I planned to include content I learned from them in the talk. However, due to space constraints, the information did not receive a specific bullet point to allow for an in-text citation. Initials of the two managers I spoke to were used in in-text citations after information I gleaned primarily from them to provide a more complete picture of who offered which perspectives. These were not intended to be formal citations.

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