



2023

Michigan Emerging and Zoonotic Disease

SURVEILLANCE SUMMARY

Michigan Emerging and Zoonotic Disease **SURVEILLANCE SUMMARY 2023**

Prepared by the Michigan Department of Health and Human Services
Bureau of Infectious Disease Prevention
Emerging & Zoonotic Infectious Disease Section (EZID)
333 S Grand Ave, 4th Floor, Lansing, MI 48933
517-335-8165

Published November 2024



Photo credit: Lake Michigan, New Buffalo by Sara Palmer

Emerging & Zoonotic Infectious Disease Section (EZID)

Mary Grace Stobierski, DVM, MPH, DACVPM – Manager & State Public Health Veterinarian
Jennifer Beggs, MPH – Zoonotic and Vector-Borne Disease Epidemiologist
Rachel Burkholder, MPH – Vector-Borne Disease Epidemiologist
Emily Dinh, PhD, MSPH – Medical Entomologist
Matthew Flood, PhD – Wastewater Data Analyst
Susan Peters, DVM, MPH – Waterborne Disease Epidemiologist
Rebecca Reik, MPH – Zoonotic and Fungal Disease Epidemiologist
Anum Zia, MPH, MPhil – Wastewater Epidemiologist

Michigan.gov/EmergingDiseases

Cover photo: Lake Superior, Pictured Rocks National Lakeshore by Jinan Chen

Table of Contents

- Introduction..... 2
- Zoonotic Diseases in Michigan, 5 Year Table 3
- Arboviruses**
 - 2023 Arbovirus Activity 5
 - West Nile Virus..... 6
 - California Group Viruses 6
 - Vector-Borne Disease Surveillance..... 7
 - Vector-Borne Disease Resources and Success..... 8
 - Invasive Aedes Mosquitos..... 9
 - International Dengue Outbreak..... 10
 - What Can Be Done? 11
- Tickborne Diseases**
 - Lyme Disease 13
 - Other Tickborne Diseases 15
 - Lone Star Ticks..... 16
 - Statewide Tick Surveillance..... 17
 - Citizen Submission Tick Program..... 18
 - What Can Be Done? 19
- Wastewater Monitoring and Waterborne Diseases**
 - Wastewater Monitoring..... 21
 - COVID-19 Wastewater Surveillance 22
 - What Can Be Done?..... 23
 - Harmful Algal Blooms 24
 - Local Health Department Testing Project..... 26
 - What Can Be Done? 27
- Rabies**
 - 2023 Rabies Data 29
 - What Can Be Done? 30
- Fungal Diseases**
 - Histoplasmosis 32
 - Blastomycosis 33
 - 2023 Blastomycosis Outbreak 34
 - What Can Be Done?..... 35

Introduction

Zoonotic diseases are diseases that can be transmitted between animals and humans directly or through a vector (mosquitos, ticks, etc.). They can be caused by viruses, bacteria, parasites, and fungi. About 60% of infectious diseases in humans are transmitted from animals, and 75% of emerging infectious diseases are zoonotic. Other illnesses, such as those related to cyanotoxins produced by harmful algal blooms, are not zoonotic but affect both animals and humans through shared environmental exposures.

From anaplasmosis to Zika virus, emerging zoonotic diseases in Michigan develop and are spread within complex cycles involving people, animals, vectors, and the environment. Thus, it is essential for health care providers, veterinarians, public health officials, and environmental scientists to work together in the identification, prevention, treatment, and control of disease. This collaborative initiative is known as One Health.

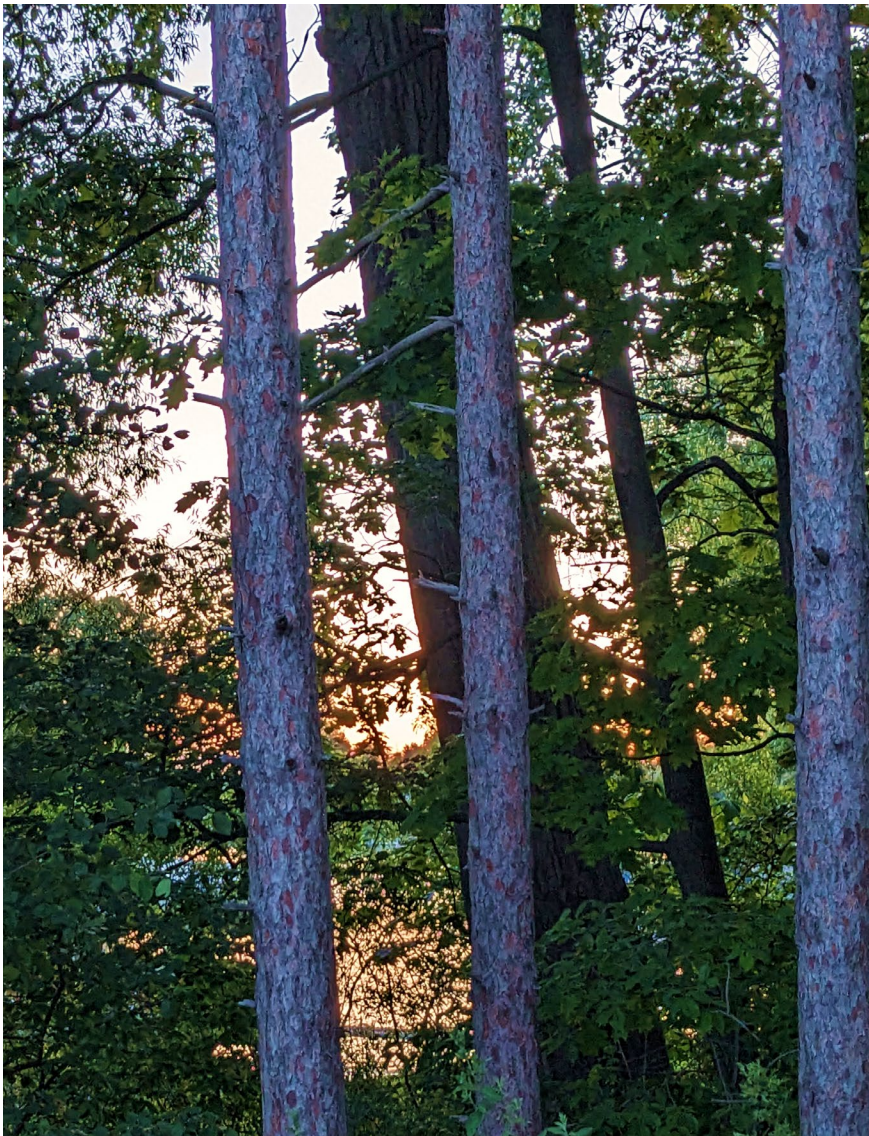


Photo credit: Lake Algonquin, Hastings, MI. Rebecca Reik

The Michigan Department of Health and Human Services (MDHHS) partners with federal, state, and local agencies, as well as public universities, to identify and define the geographic, environmental, and exposure risk of emerging diseases. MDHHS is also dedicated to providing stakeholders with information on emerging diseases and best practices for surveillance, prevention, and control, including the Emerging Diseases website. (Michigan.gov/EmergingDiseases)

This report provides a summary of epidemiologic information for select zoonotic, vector-borne, and One Health diseases in Michigan for 2023, and updates on special projects.

Zoonotic Diseases in Michigan

Five-Year Table

Disease	2019	2020	2021	2022	2023*
<i>Bird-Associated</i>					
Psittacosis	0	2	2	3	0
<i>Livestock-Associated</i>					
Anthrax	0	0	0	0	0
Q Fever, acute	5	4	4	3	0
Q Fever, chronic	1	1	0	2	1
Swine Influenza	1	0	0	4	4
<i>Mosquito Borne</i>					
Dengue Fever	20	3	5	8	19
Encephalitis, California (La Crosse or unspec.)	2	1	2	1	0
Encephalitis, Eastern Equine	10	4	1	0	0
Encephalitis, St. Louis	0	0	1	0	0
Encephalitis, Western Equine	0	0	0	0	0
Jamestown Canyon Virus	1	3	7	3	6
Malaria	26	13	14	44	37
West Nile Virus	13	32	49	13	24
Yellow Fever	0	0	0	0	0
Zika	0	0	0	0	0
<i>Multi-Mode Zoonoses</i>					
Brucellosis	1	3	2	4	1
Leptospirosis	3	3	1	2	4
Plague	0	0	0	0	0
Rickettsialdisease - Typhus	0	0	0	0	1
Tularemia	1	0	1	4	4
<i>Public Health Pest</i>					
Head Lice (Aggregate School Reporting)	6973	2474	1980	2773	4242
<i>Rabies and Animal Bites</i>					
Rabies, Animal	59	56	49	48	55
Rabies, Human	0	0	0	0	0
<i>Rodent Borne</i>					
Hantavirus	0	0	0	0	0
Hantavirus, Other	0	0	0	0	0
Hantavirus, Pulmonary	0	0	1	0	0
<i>Tick Borne</i>					
Babesiosis, <i>Babesia microti</i>	1	0	3	9	10
Ehrlichiosis, <i>Anaplasma phagocytophilum</i>	13	18	58	54	67
Ehrlichiosis, <i>Ehrlichia chaffeensis</i>	2	1	3	3	6
Ehrlichiosis, <i>Ehrlichia ewingii</i>	0	0	0	0	0
Ehrlichiosis, human other/undetermined	0	0	0	0	0
Encephalitis, Powassan	0	0	0	0	0
Lyme Disease	424	473	877	567	1146
Rickettsial Disease– Spotted Fever	10	5	6	8	3

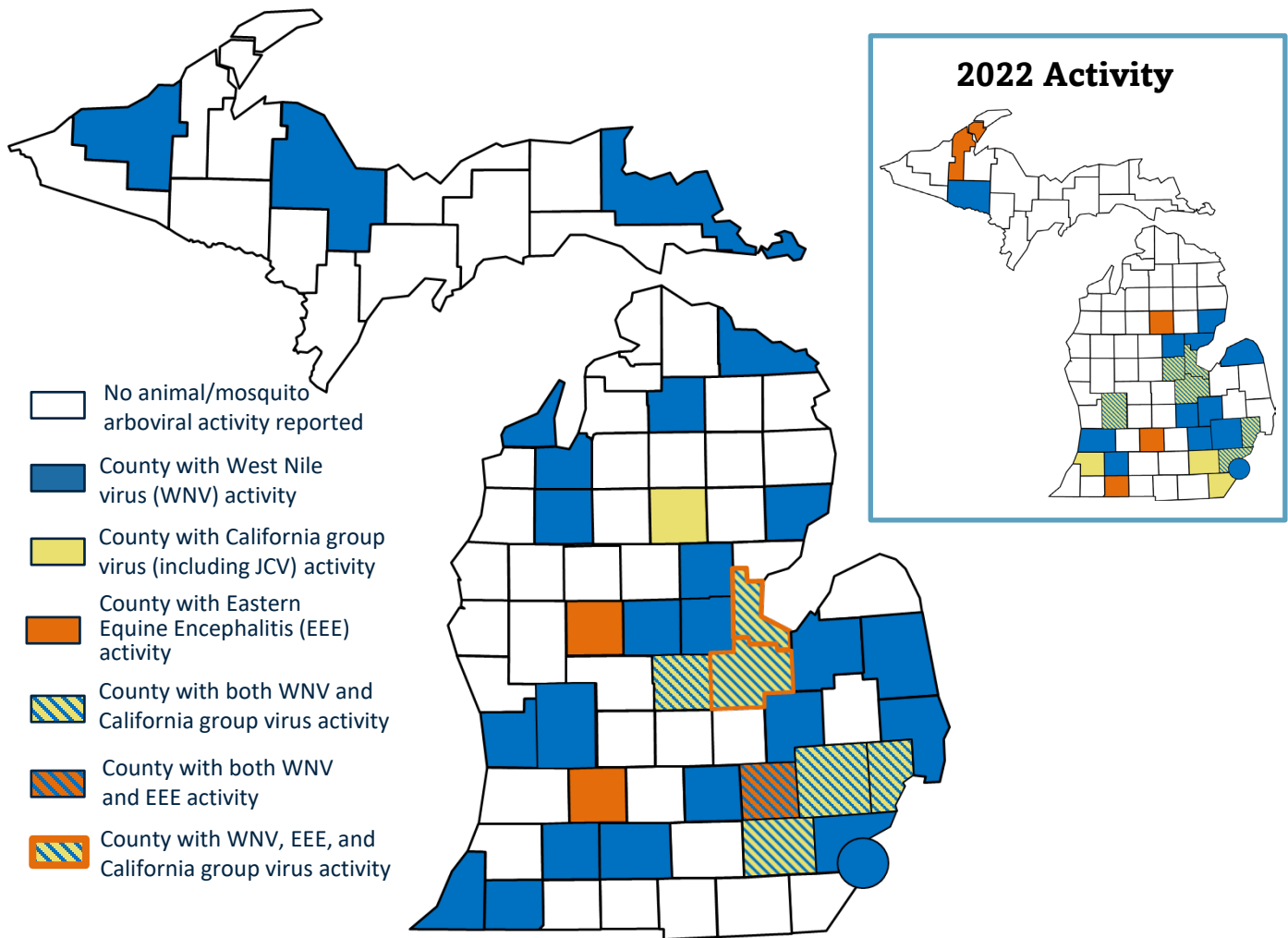
*Cases for 2023 are provisional, pending finalized review.

ARBOVIRUSES



Arboviruses: any group of viruses that are transmitted by mosquitoes, ticks, or other arthropods.
(Arthropod-Borne viruses)

2023 Arbovirus Activity

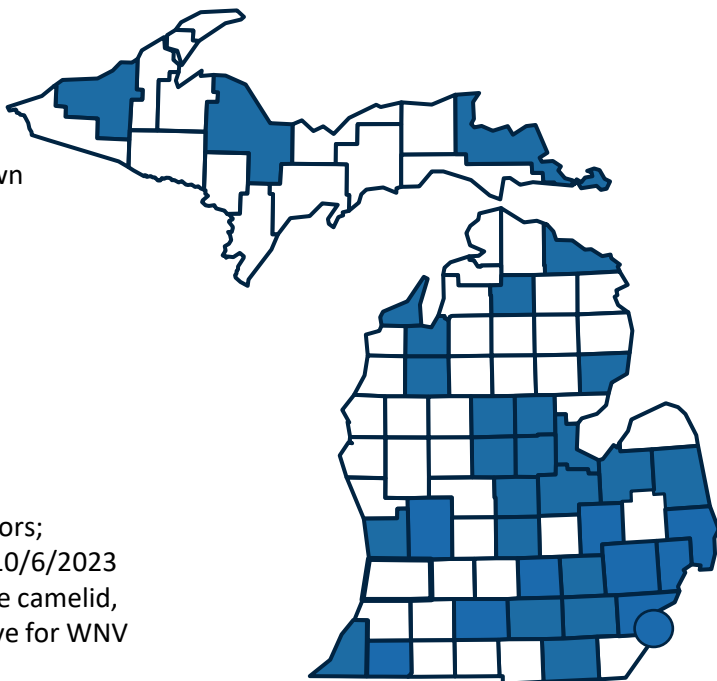


2023 Michigan Arbovirus Snapshot

Human EEE cases	0
Human WNV cases	24
Human California Group Virus cases	6
WNV Asymptomatic viremic blood donors	2
Animal WNV cases	33
Animal EEE cases	2
WNV positive mosquito pools	124
EEEV positive mosquito pools	4
JCV positive mosquito pools	6
Total number of mosquito pools tested	6,351

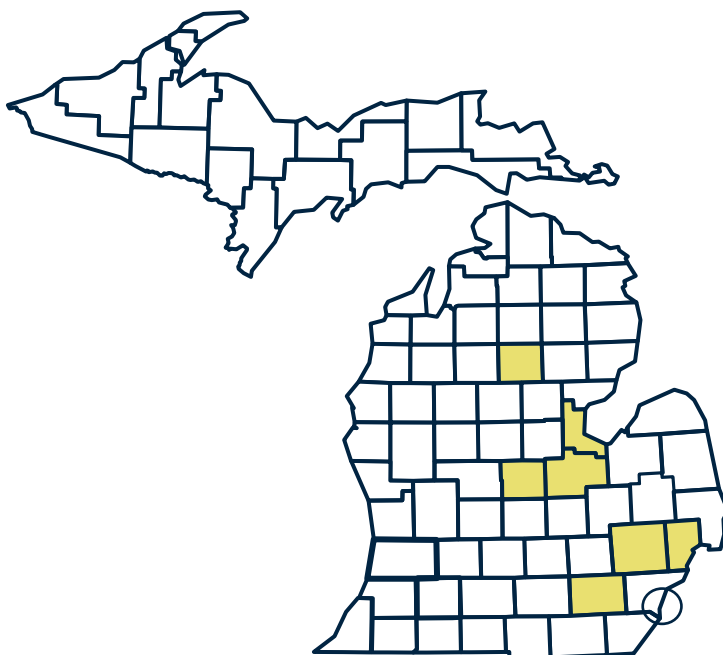
West Nile Virus

- 24 cases (+one travel-related)
 - 10 confirmed, 14 probable
- 19 neuroinvasive cases, three with West Nile fever, and two with unknown clinical presentation.
- 18 males, six females
 - Age range: 41-81 years
 - Median 68 years
- Five deaths
 - Four males, one female
 - Age range: 42-81 years
 - Median: 74 years
- Onset range: 7/29/2023- 10/1/2023
- Two asymptomatic viremic blood donors; donation dates were 8/18/2023 and 10/6/2023
- Additionally, four horses, 28 birds, one camelid, and 124 mosquito pools tested positive for WNV



Jamestown Canyon Virus

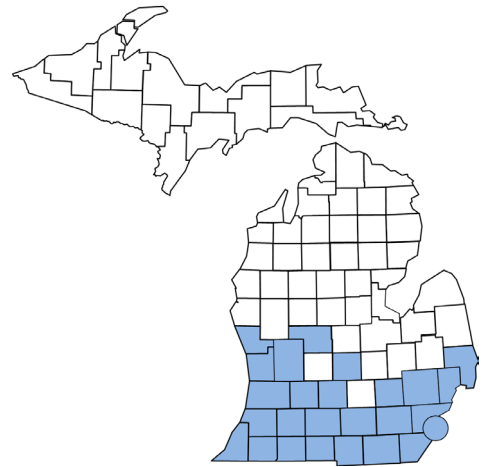
- Six JCV cases
 - Four confirmed, two probable
- Four neuroinvasive cases, one febrile illness, one unknown clinical presentation
- Two deaths
- Five males, one female
 - Age range: 50 years to 88 years
 - Median: 67.5 years
- Onset range: 6/15/2023 - 10/13/2023
- Additionally, six mosquito pools tested positive for JCV



Vector-Borne Disease Surveillance

MDHHS, in coordination with local health departments, conducts vector surveillance to assess the geographic distribution of various mosquito and tick species and evaluate the risk of vector-borne disease transmission in Michigan. In the summer of 2023, MDHHS provided funding to 21 of Michigan's local health departments (representing 25 counties and the City of Detroit) to participate in the Vector-Borne Disease Surveillance and Prevention (VBDSP) Project. This project aims to build a public health surveillance system capable of identifying: i) populations of mosquitoes that can transmit arboviruses such as Zika virus; and ii) *Ixodes scapularis* (blacklegged) ticks capable of transmitting Lyme disease and other pathogens. The local health departments participating in the VBDSPP project can tailor their efforts to meet the needs of the community they serve.

Several types of traps are set throughout the state to collect various species of mosquitos. Local health department staff identify the mosquitos, then send certain species to the MDHHS Bureau of Laboratories to test whether the mosquitos are positive for any arboviruses. Ticks are likewise collected in the field, identified, and tested for the presence various pathogens at the Centers for Disease Control in Fort Collins, Colorado. These efforts provide valuable information on both current vector-borne disease risks in Michigan and longer-term public health trends. Institutions such as the Michigan Mosquito Control Association, the Midwest Centers of Excellence, and Michigan State University also conduct mosquito surveillance and share data with MDHHS.



Counties (colored blue above) participating in the VBDSPP project, 2023

Mosquito Breeding Sites



Different mosquito species that transmit disease inhabit a variety of habitats

Left: sampling water in an industrial tire facility to detect larval invasive mosquitoes

Right: resting box in a wetland for Eastern equine encephalitis vector surveillance

Surveillance Efforts



Vector-Borne Disease Surveillance Project Successes

In 2023, MDHHS hosted in-person vector-borne disease surveillance training.

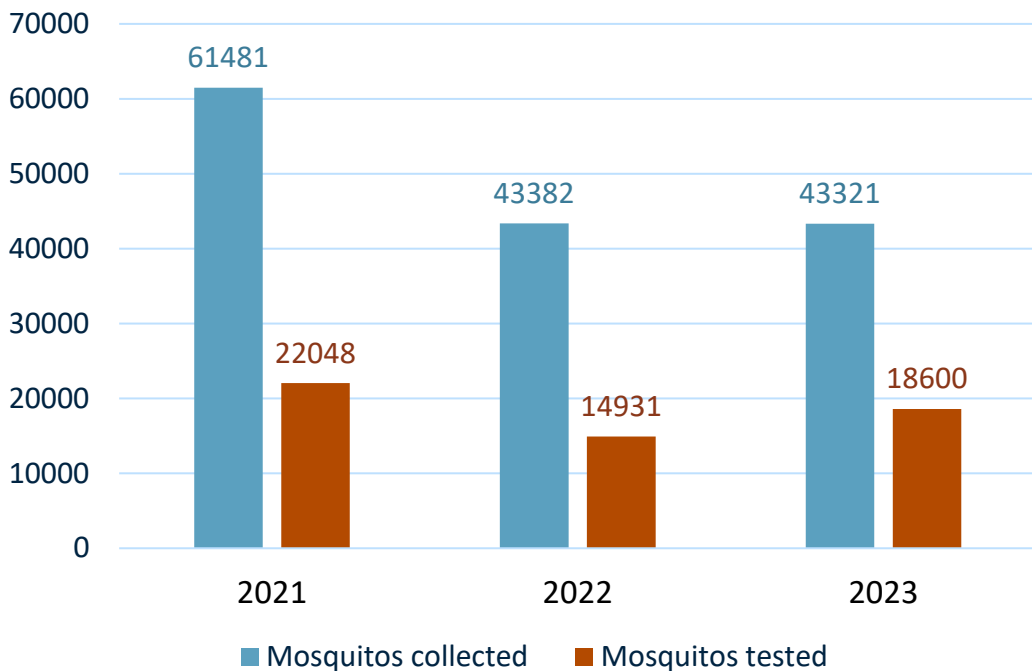
Topics included:

- Vector biology
- Tick identification
- Mosquito identification
- Tick drag demonstration



Right: Local health department staff conducting tick drags during vector-borne disease surveillance training.

LHD Mosquito Sampling

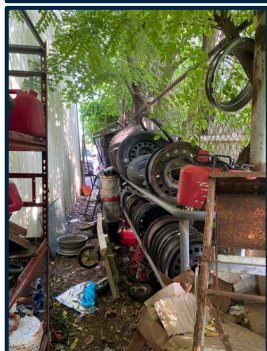
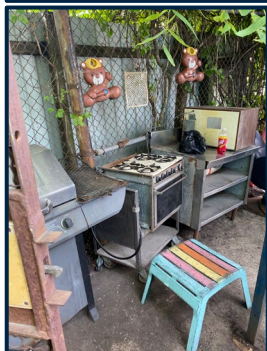
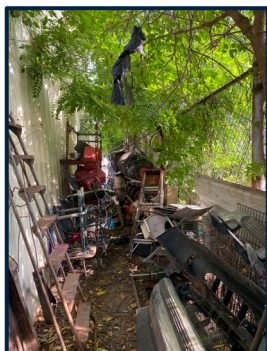


Invasive *Aedes* Mosquitos

The yellow fever (*Aedes aegypti*) and Asian tiger (*Aedes albopictus*) mosquitos can transmit many diseases to people, including Zika, Dengue, and Chikungunya viruses. Both are invasive species that would be serious public health and nuisance concerns if they establish breeding populations in Michigan. Michigan is currently considered outside their range in the U.S.



Left – Yellow fever mosquito (*Aedes aegypti*); Right – Asian tiger mosquito (*Aedes albopictus*)
Images from [CDC PHIL](#)



First Detection of Invasive *Aedes* in Kent County

In August-September 2023, the Kent County Health Department (KCHD) detected both Asian tiger and yellow fever mosquitos at a local property. This was the first time invasive *Aedes* mosquitos were found in Kent County. In response, MDHHS, KCHD, and Michigan Department of Environment, Great Lakes, and Energy (EGLE) staff visited the property to:

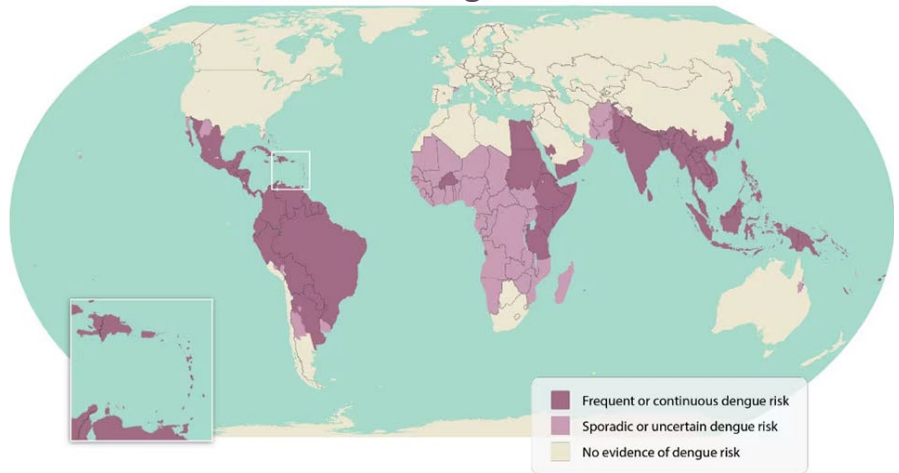
- 1) Advise the property owner on mosquito control strategies.
- 2) Perform enhanced mosquito trapping to determine the mosquitos' spread at and surrounding the property.
- 3) Eliminate the mosquitos in partnership with the property owner, surrounding property owners, and city managers. This involved:
 - KCHD - issued a press release and conducted local outreach to educate the public of the findings and how to reduce mosquitos around their homes.
 - Property owner - removed water-holding containers on their premises.
 - City - treated catch basins and regraded street surfaces to reduce mosquito breeding.

International Dengue Outbreak

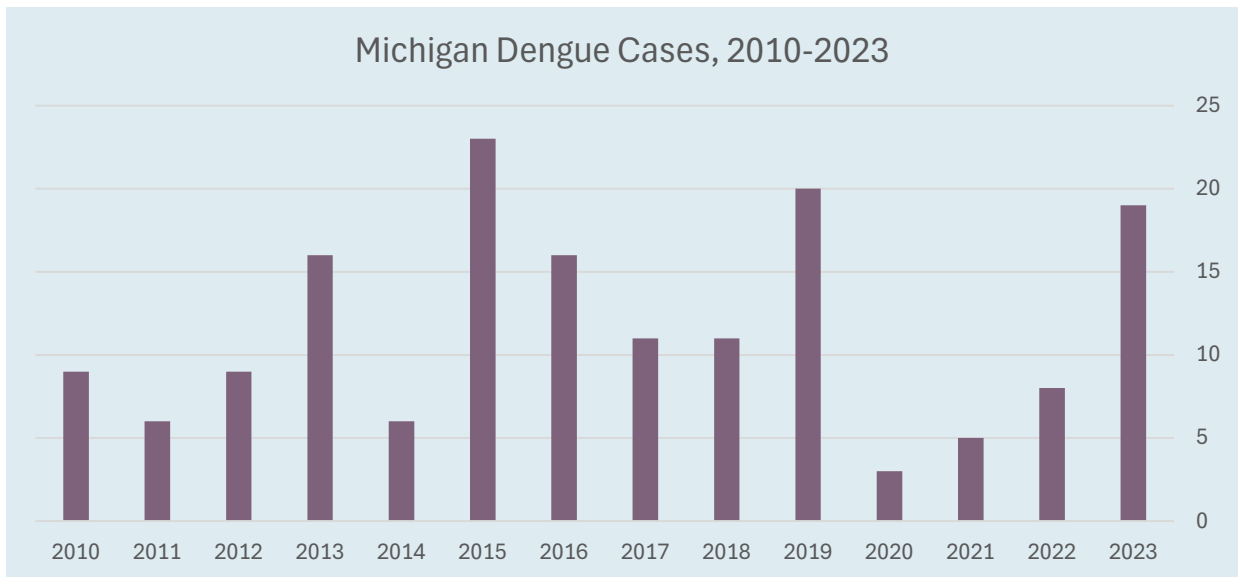
Dengue is an arboviral disease that occurs in tropical parts of the world. Although dengue virus does not circulate in Michigan, the disease affects Michigan residents who travel to endemic areas outside the state, including Mexico and the Caribbean.

In 2023, a large global outbreak of dengue began, with more than 4.1 million new infections reported. Michigan also saw an increase in cases among returning travelers. As the outbreak continues into 2024, it is likely that this trend will continue.

Global Dengue Risk



Michigan Dengue Cases, 2010-2023



For travelers to endemic areas, the best way to avoid getting dengue is to prevent mosquito bites. Using repellent, wearing long sleeves and pants, and sleeping under a bed net are some effective preventative strategies.



What Can Be Done?

Everyone can....

- » **Inform** yourself about where risk for contracting arboviruses is greatest (find up-to-date maps on the MDHHS MI Disease Mapper linked below)
- » **Inform** yourself about when the risk for contracting arboviruses is greatest:
 - » Summer
 - » At dusk and dawn, mosquitoes are most active
 - » Adults > 50 years of age are more susceptible to serious illness from WNV and EEE
 - » Children <15 years of age are more susceptible to serious illness from EEE and La Crosse encephalitis virus
- » **Eliminate** standing water where mosquitos can lay eggs
- » **Report** dead birds to your local authorities
- » **Protect.** Take precautions to prevent mosquito bites when engaging in outdoor activities
 - » Use the [EPA's search tool](#) to find a repellent that's right for you

Health providers can....

- » **Review** public health data regarding the risk of arboviruses in Michigan
- » **Diagnose** and treat infections using best practices
 - » **Submit** samples for arbovirus panel testing to MDHHS Bureau of Laboratories
- » **Report** cases promptly to your local health department
- » **Remind** patients about the risk of arbovirus infection in your area and ways to prevent

Public health agencies can....

- » **Monitor** Michigan's mosquito populations
- » **Maintain** a surveillance system for arboviral diseases
- » **Make** Michigan data publicly available
- » **Promote** arbovirus disease prevention guidance

GUIDES AND PRINTED RESOURCES

MDHHS

- Posters, pamphlets, and guides are available to download, print and order at: [Michigan.gov/documents/emergingdiseases/Publication_Order_Form_357623_7.pdf](https://www.michigan.gov/documents/emergingdiseases/Publication_Order_Form_357623_7.pdf)
- MDHHS West Nile Virus website: [Michigan.gov/westnile](https://www.michigan.gov/westnile)
- MDHHS Eastern Equine Encephalitis website: [Michigan.gov/eee](https://www.michigan.gov/eee)
- MDHHS Weekly Arbovirus Summary: [Michigan.gov/documents/emergingdiseases/Weekly_Arbovirus_Summary_698895_7.pdf](https://www.michigan.gov/documents/emergingdiseases/Weekly_Arbovirus_Summary_698895_7.pdf)

Centers for Disease Control and Prevention Arbovirus Websites

- www.cdc.gov/westnile
- www.cdc.gov/jamestown-canyon
- www.cdc.gov/EasternEquineEncephalitis



TICKBORNE DISEASES






LYME DISEASE

Lyme disease (LD) is the most commonly reported vector-borne disease in the United States; over 33,000 confirmed cases were reported nationally in 2019. In the U.S., cases tend to be geographically focused in the northeastern and north-central U.S., but LD is also endemic and expanding in Michigan. Of the 1,146 total cases in 2023, 970 were locally acquired, 65 were travel related, and 111 were not able to be classified. Most exposures occurred in the Upper Peninsula and western Lower Peninsula. Cases nearly doubled from 546 reported in 2022.

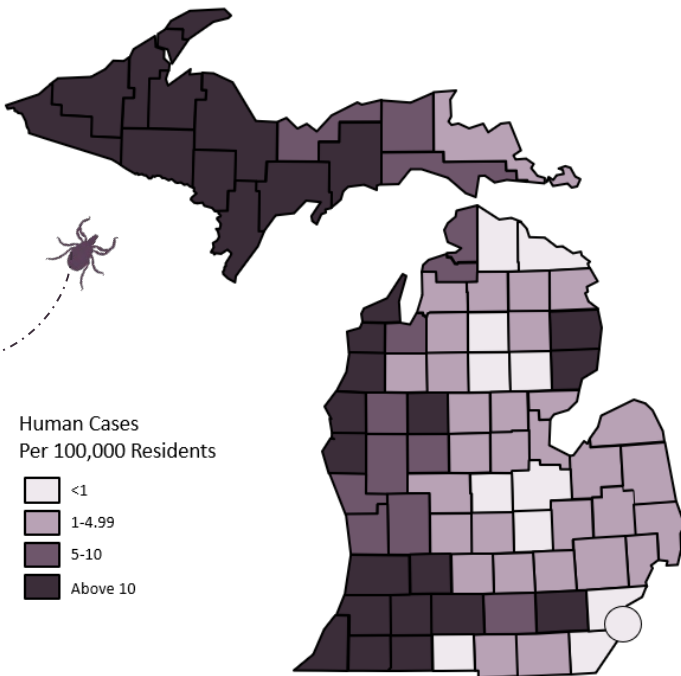
The tick vector, *Ixodes scapularis* (blacklegged tick), is endemic in portions of the Upper Peninsula and the western Lower Peninsula. In addition, the distribution of the blacklegged tick is expanding into new areas across the state.

In 2023, MDHHS conducted human case surveillance and field ecologic surveillance for blacklegged ticks throughout the state with the help of its partners, including Michigan State University and other state agencies. Educational materials will continue to be updated and made available to the public via the MDHHS Emerging Diseases website (Michigan.gov/emergingdiseases).

1,146 

In 2023, 1,146 confirmed and probable human cases were reported, with most Michigan exposures occurring in the Upper Peninsula and western Lower Peninsula.

Five-Year Lyme Disease Incidence by County of Residence, 2019-2023



Map of the average number of human Lyme disease cases per 100,000 persons in each county from 2019 to 2023

Highest Rates of Lyme Disease Incidence (per 100,000 residents)

Dickinson	203
Baraga	76
Menominee	71
Iron	70
Ontonagon	61

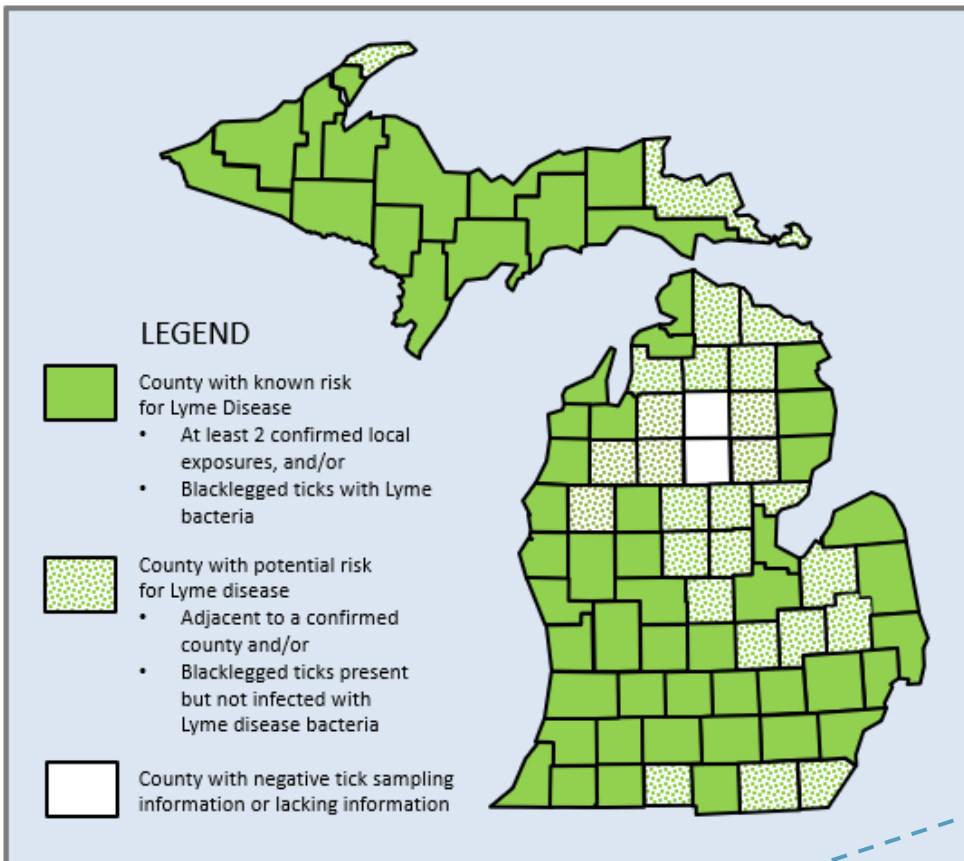
Reported Lyme Disease Cases in Michigan: 2023

2023 Lyme Disease Risk Map

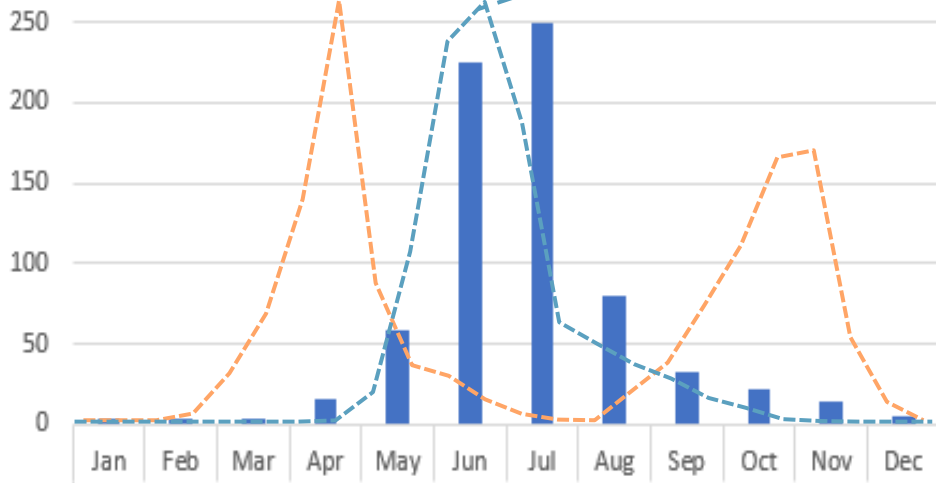


Nymphs:

Peak transmission season for Lyme disease in Michigan (May-August) is associated with nymphal blacklegged ticks. Although the Lyme pathogen is more prevalent in adult ticks, bites from nymphs contribute more to Lyme disease transmission because nymphal ticks are smaller, about the size of a poppy seed. Nymphal ticks often escape notice long enough to attach to their human host and transmit the pathogen. Frequent tick checks are important during this time of year as prompt removal of ticks can prevent Lyme disease.



Generalized blacklegged tick activity periods in Michigan:

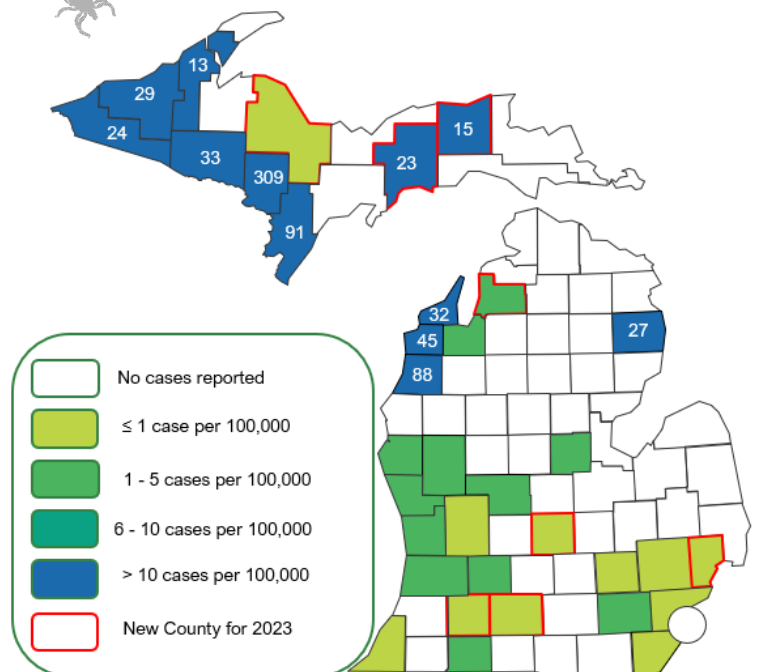


Other Tick-borne Diseases

ANAPLASMOSIS



Incidence of Human Cases of Anaplasmosis*, Michigan 2019-2023
by County of Residence



State-wide incidence:
2.07 cases per 100,000

Epi Profile: 2023 Anaplasmosis Cases

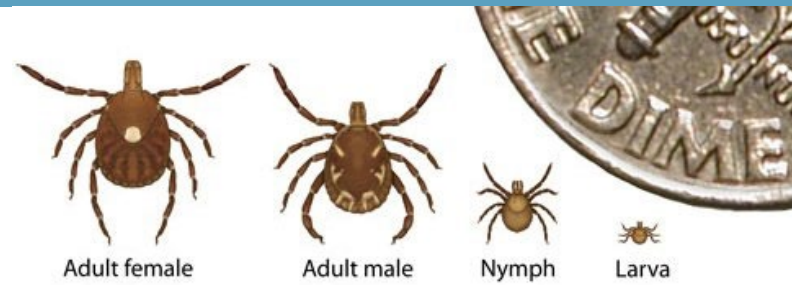
- 115 confirmed and probable cases
- 66 males, 49 females
- Age range: 7 years to 93 years, median 61 years
- Onset dates: Mar 1 – Dec 21, 2023

Other tick-borne diseases have been identified in Michigan residents, which include:

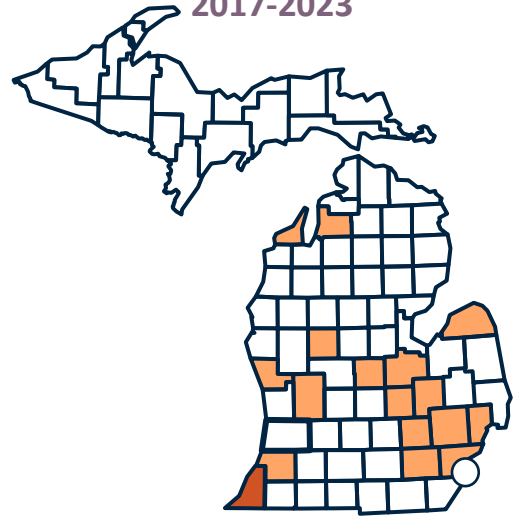
Tick-borne Disease	2023 Cases in Reported Michigan	Transmitted by (Species):
Babesiosis	9	Blacklegged Tick
Ehrlichia chaffeensis*	6	Lone Star Tick
Rocky Mountain spotted fever*	3	American Dog Tick

*In most cases, *Ehrlichia* and Rocky Mountain spotted fever were acquired while traveling out of state.

Lone Star Ticks



Lone Star Tick Distribution in Michigan, 2017-2023



- Counties in Michigan where two or more lone star ticks have been collected in field surveys and by members of the public.
- Counties in Michigan where at least two life stages or six individuals of one life stage collected in one calendar year.

The Lone Star tick (*Amblyomma americanum*) makes up approximately 5% of all ticks submitted in Michigan. It is rare in Michigan, however the species has become established in Berrien County. All life-stages of this tick will readily bite humans and animals. The Lone Star tick can transmit ehrlichiosis, tularemia, Bourbon virus, Heartland virus, and southern tick-associated rash illness (STARI). A bite from this tick may also be associated with Alpha-gal Syndrome (AGS).

About Alpha-gal and Alpha-gal Syndrome



- Alpha-gal (full name: galactose- α -1,3-galactose) is a sugar molecule found in most mammals and products made from mammals.
- Not normally found in fish, reptiles, birds, or humans.

What is Alpha-gal Syndrome?

- A serious, potentially life-threatening allergic reaction that may occur after a person eats red meat or is exposed to products containing alpha-gal.
- AGS may be triggered by the bite of a lone star tick – but more research is needed to understand why.
- Most cases reported to date are among people living in the southeastern US.
- Diagnosed by an allergist or other knowledgeable healthcare provider.

STATEWIDE TICK SURVEILLANCE

In 2023...



**>160 km² (62 sq. mi.)
sampled**

For the presence of blacklegged ticks (*Ixodes scapularis*) across 102 field sites



**713
blacklegged ticks**

collected from April through September

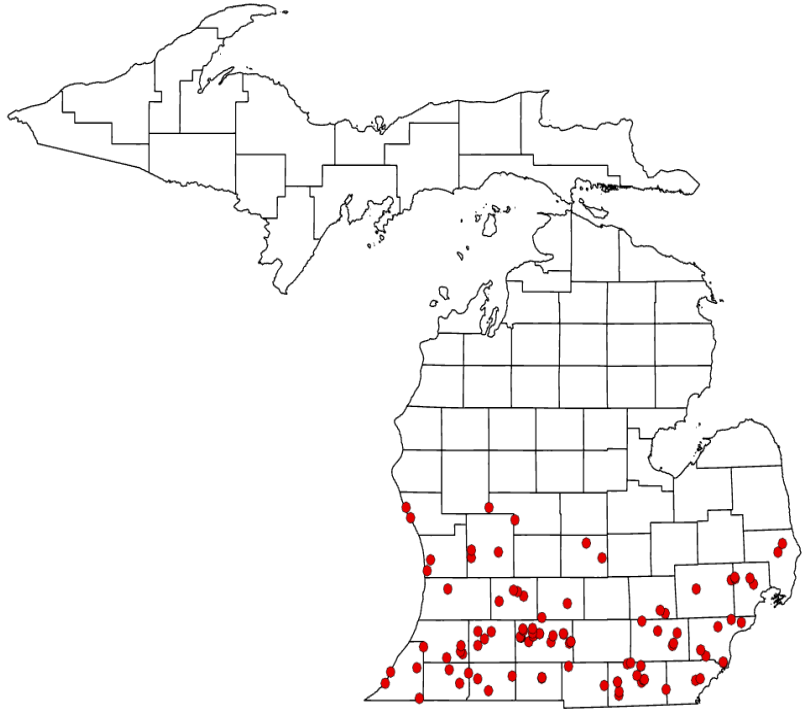


**618 ticks were
tested at CDC**

and 17.5% of those were positive for Lyme disease-causing bacteria (*Borrelia burgdorferi*). Approximately 2.3% of nymphs and 32.5% of adults collected were positive for *Borrelia burgdorferi*. One adult male tested positive for *B. miyamotoi*. Ten of the ticks tested were positive for *Anaplasma phagocytophilum* non-human strain. All ticks tested negative for *Borrelia mayonii*, *Babesia microti*, *Ehrlichia muris euclairensis*, and human strain *Anaplasma phagocytophilum*.

Given that Michigan is an emerging Lyme disease state, increasing efforts to detect blacklegged tick populations and *B. burgdorferi* in the field is a priority. In 2023, 26 counties in the Lower Peninsula participated in surveillance for ticks in their areas. We are working to expand these efforts each year.

2023 Field Sites



Tick surveillance using a drag cloth



Blacklegged Tick collected on a drag cloth



Citizen Submission Tick Program

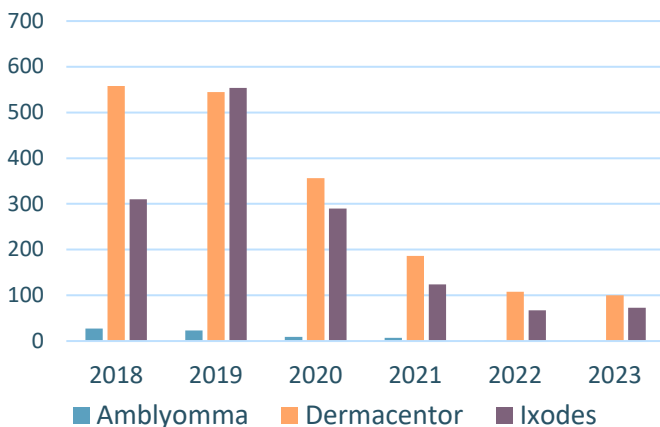
- MDHHS has been receiving and identifying ticks sent in by Michigan citizens since 2017.*
- The program was expanded in 2018 to allow citizens to email a picture of their tick to MDHHS-Bugs@michigan.gov.
- In 2022, 176 ticks were submitted via mail and an additional 950 tick photos were submitted via email.
- In 2023, 173 ticks were submitted via mail and 880 ticks were submitted via email; 47 were unidentifiable due to poor quality photos.



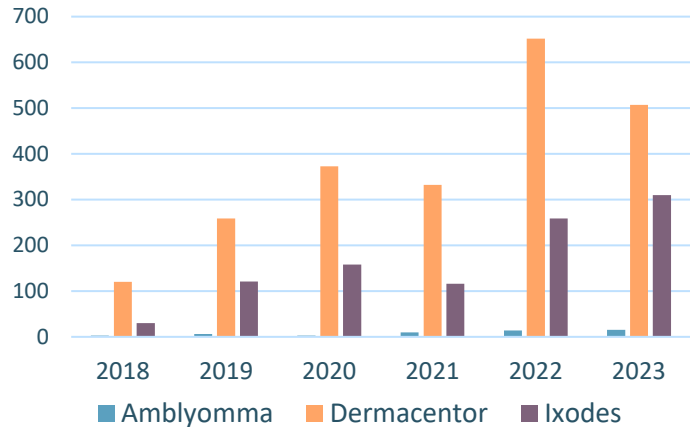
2023 Submitted Ticks by Number & Species

Tick Species	Number of Tick Photos Submitted	Number of Ticks Submitted	Identified in 2023
Lonestar Tick (<i>Amblyomma americanum</i>)	15	0	15
American Dog Tick (<i>Dermacentor variabilis</i>)	507	100	607
Blacklegged Tick (<i>Ixodes scapularis</i>)	310	73	383
Total	832	173	1,005

Mailed-in Tick Submissions, 2018-2023



Tick Photo Submissions, 2018-2023



*Ticks submitted for identification through this program are not tested for the presence of pathogens.

What Can Be Done?

Everyone can....

- » **Inform** yourself about where ticks can be encountered in Michigan
- » **Prevent** tick bites by using EPA registered repellents on skin and clothing
 - » <https://www.epa.gov/insect-repellents/find-repellent-right-you>
- » **Check** yourself and others for ticks regularly after spending time outdoors
- » **Remove** ticks promptly and safely if you have been bitten
- » **Submit** ticks you find on yourself or your pets for identification
- » **Recognize** the symptoms of Lyme disease
- » **Seek** prompt medical care if illness occurs after exposure to ticks

Health providers can....

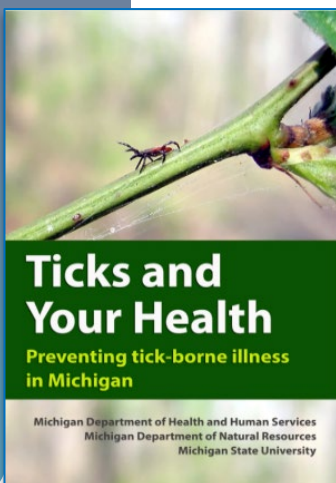
- » **Review** public health data regarding the risk of Lyme disease in Michigan
- » **View** CDC Tickborne Disease Continuing Education at <https://www.cdc.gov/ticks/hcp/training/index.html>
- » **Diagnose** and treat infections using best practices
 - » **Submit** samples for Lyme disease testing to MDHHS Bureau of Laboratories
- » **Report** cases promptly to your local health department
- » **Remind** patients about the risk of Lyme disease in your area, and ways to prevent infections

Public health agencies can....

- » **Monitor** Michigan's tick populations
- » **Maintain** Lyme disease surveillance system
- » **Offer** tick identification to the public and healthcare providers
- » **Make** Michigan data publicly available
- » **Promote** tick-borne disease prevention guidance



GUIDES AND PRINTED RESOURCES



Posters, pamphlets, tick submission kits, and guides are available to download, print and order via the Communicable Disease Division's publication order form at: www.michigan.gov/cdinfo



WASTEWATER MONITORING AND WATERBORNE DISEASES



Harmful Algal Bloom, Allegan County
Photo credit: Allegan County Health Department



SARS-CoV-2 wastewater testing at Hope College
Photo credit: Rhiannon Bednar

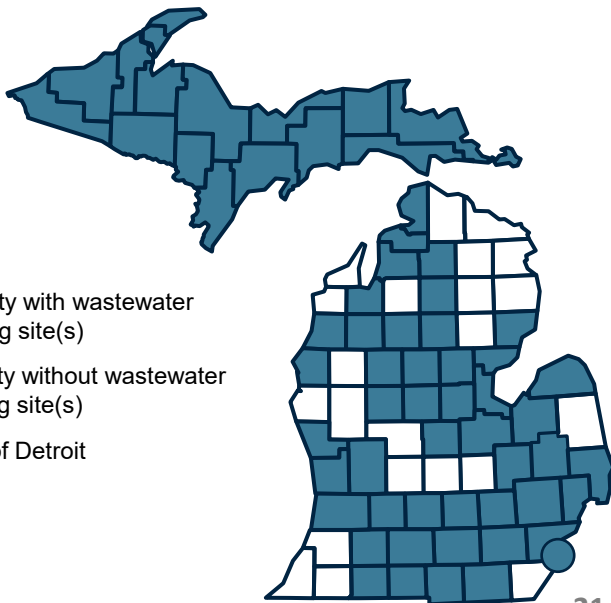
Wastewater Monitoring

Wastewater monitoring for SARS-CoV-2, the virus that causes COVID-19 disease, can provide an early and consistent indicator for presence of disease in a community and can be used to track trends over time. The virus is shed in human feces for several weeks, including before people become ill and in people who are infected but not showing symptoms. Therefore, SARS-CoV-2 may be detected in wastewater before increases in clinical cases are seen.

An increase in SARS-CoV-2 in wastewater in a specific community can alert public health agencies to a potential surge in cases and allow additional actions to prevent further spread of the virus. This has become more important recently as clinical case reports and other COVID-19 data have become underreported over time.

MDHHS has coordinated the SARS-CoV-2 Epidemiology – Wastewater Evaluation and Reporting Network since 2021. MDHHS EZID staff partner with EGLE, MSU, a statewide laboratory network, local health departments, utilities, and local stakeholders on this project. The Network has expanded to monitoring of other diseases, such as norovirus and respiratory syncytial virus.

[View wastewater results for the project sites at the Michigan COVID-19 Wastewater Testing Dashboard](#)



2023

Project Highlights



18 academic, local health department, and private labs conducted wastewater testing



386 wastewater sites were regularly sampled



26,511 wastewater samples were tested from January 1 – December 31, 2023



50% of the wastewater samples tested were positive for the virus



36 Local Health Departments and five Tribal Nations participated in the network



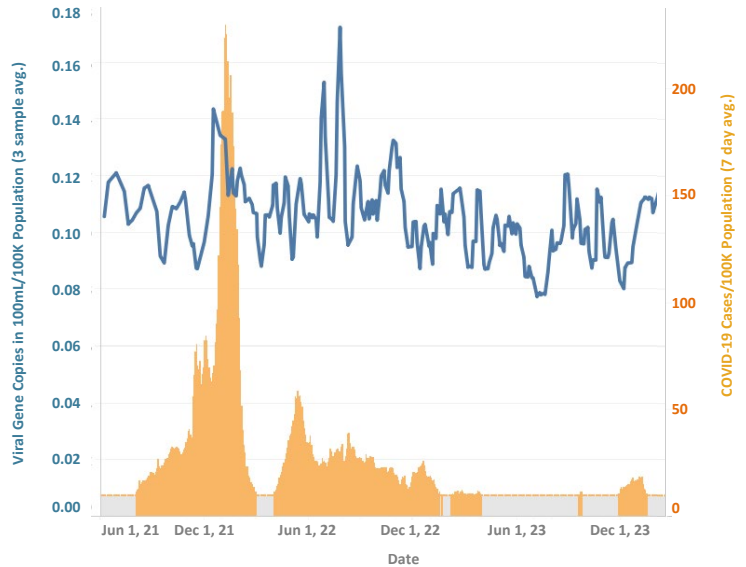
62 Michigan counties and the City of Detroit had at least one site sampled

COVID-19 Wastewater Data

The **Sentinel Wastewater Epidemiology Evaluation Project (SWEET)** gives a regional and statewide overview of Michigan's wastewater testing by providing weekly data analysis and interpretation for a subset of active monitoring sites. Twenty wastewater treatment plants in 18 counties and the City of Detroit serve as SWEET sentinel sites for their region.

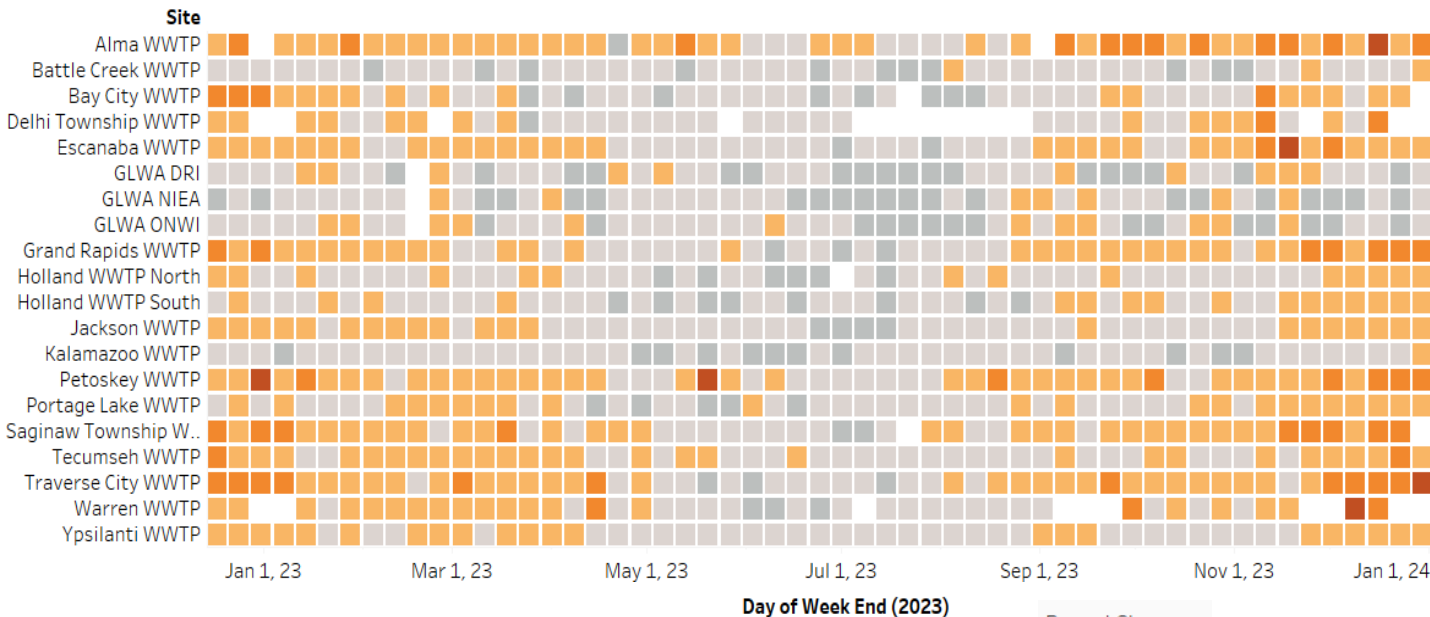
Wastewater is a consistent metric to evaluate COVID-19 over time. For example, the graph on the right shows that wastewater results at one site have some variation but remain relatively consistent, while reported COVID-19 cases have drastically decreased, most likely due to a lack of clinical testing.

Wastewater SARS-CoV-2 Levels and COVID-19 Cases

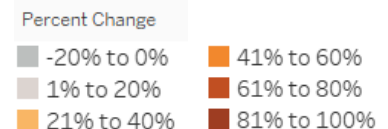


An example of wastewater results (blue line) and corresponding clinical COVID-19 cases (orange bars) from one SWEET sampling site.

SARS-CoV-2 in Wastewater of SWEET Sites as a Percent Change from 2022 Baseline Levels



On the heat map above, the colored squares show the percentage change in SARS-CoV-2 concentrations from 2022 baseline levels. Blank squares represent weeks without available sampling data.



What Can Be Done?



Everyone can....

- » **Vaccinate** against COVID-19 to protect yourself and others. Find a vaccine clinic at [vaccines.gov/](https://www.vaccines.gov/).
- » **Protect** yourself and others from COVID-19 by getting vaccinated, washing hands, and following other measures listed at [cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html).
- » **Seek** COVID-19 testing when you have symptoms of COVID-19. Find testing sites at [testinglocator.cdc.gov/](https://www.testinglocator.cdc.gov/).

Health providers can....



- » **Educate** yourself on symptoms of COVID-19 and risk factors for disease ([cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/clinical-considerations-presentation.html](https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/clinical-considerations-presentation.html)).
- » **Educate** patients about the benefits of COVID-19 vaccination.
- » **Protect** yourself and others by following infection control guidance ([cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html](https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html)).

Public health agencies can....



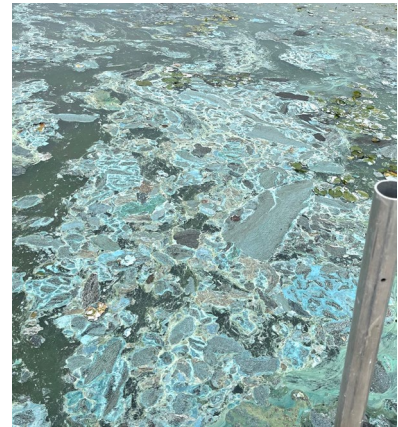
- » **Alert** healthcare and other public health response partners of increased SARS-CoV-2 found in wastewater.
- » **Communicate** with the public on the importance of COVID-19 prevention measures when levels of SARS-CoV-2 are increasing in wastewater.
- » **Investigate** reported and suspected cases of COVID-19 in the community and other settings to prevent further spread.
- » **Provide** COVID-19 testing and vaccination clinics in the community.

RESOURCES

- » State of Michigan COVID-19 Wastewater website: [michigan.gov/covidwastewater](https://www.michigan.gov/covidwastewater)
- » Michigan COVID-19 Wastewater Testing Dashboard: <https://gisportal.state.mi.us/portal/apps/insights/index.html#/view/52bb104ed574887918f990af9f3debe>
- » Michigan SWEEP Dashboard: [michigan.gov/coronavirus/stats/wastewater-surveillance/dashboard/sentinel-wastewater-epidemiology-evaluation-project-sweep](https://www.michigan.gov/coronavirus/stats/wastewater-surveillance/dashboard/sentinel-wastewater-epidemiology-evaluation-project-sweep)
- » Centers for Disease Control and Prevention's National Wastewater Surveillance System website: [cdc.gov/nwss](https://www.cdc.gov/nwss)

Harmful Algal Blooms

Cyanobacteria (also known as blue-green algae) can form blooms on water surfaces that are not visually pleasing, smell, and can interfere with recreational activities. Some blooms produce cyanotoxins that can cause illness and even death in humans and animals; these are known as harmful algal blooms (HABs).



Harmful algal bloom in a lake in Allegan County. *Photo credit: Allegan County Health Department*

Globally, HABs are increasing in frequency and duration; potential causes include climate change, nutrient pollution, and invasive species. Cyanobacteria usually “bloom” when water temperatures are warm, the water surface is calm, and sunlight is available. In Michigan, HABs usually occur in May through October and can last for as little as one day up to several weeks.

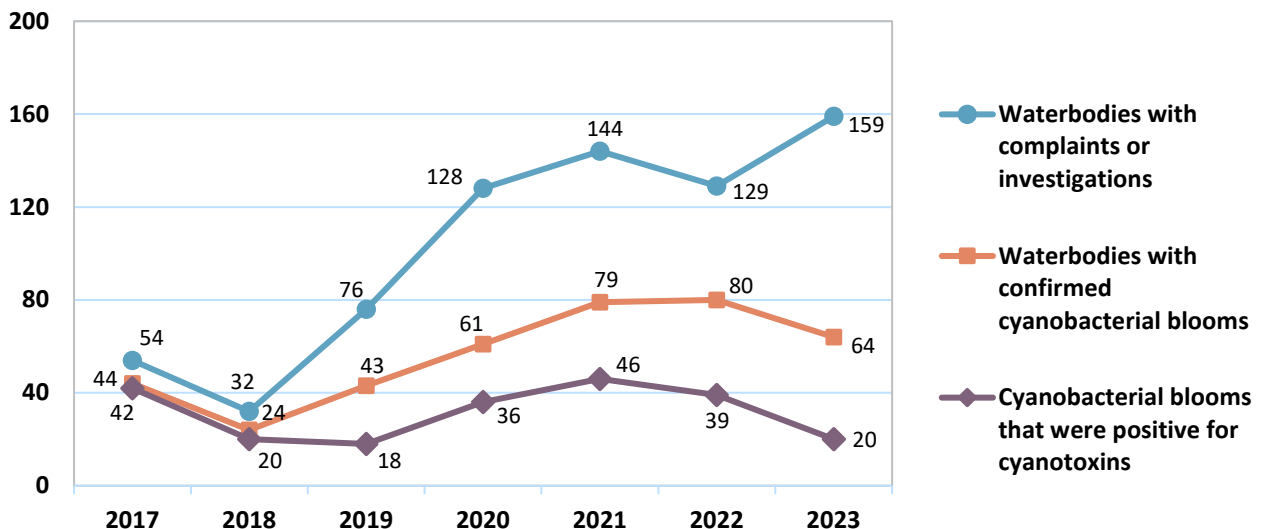
Summary of 2023 Michigan Harmful Algal Bloom Events

# of waterbodies with complaints and/or investigations	159
# of these waterbodies with confirmed/suspected cyanobacterial blooms (HABs)	64
Suspected HABs ¹	36
Confirmed HABs ²	28

¹Suspected: Images or site visit findings/measurements are consistent with cyanobacterial bloom and cyanotoxins not measured/detected.

²Confirmed: Laboratory detection of cyanotoxins/toxin-producing genes/cyanobacterial species known to produce toxins.

Trends in Michigan Harmful Algal Bloom Events, 2017-2023



HABs can be many colors and textures and can look like scum, spilled paint, foam, or discoloration of the water. Many are bright green with a “pea soup” appearance. Some blooms will turn light blue as they die off.

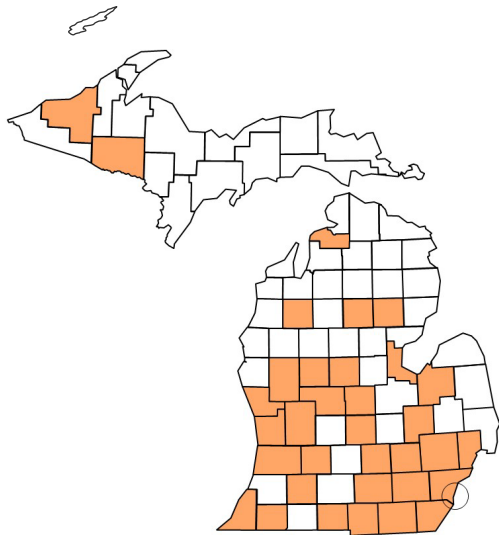


Harmful algal bloom in a lake in Kalamazoo County.
Photo credit: Kalamazoo County Health Department

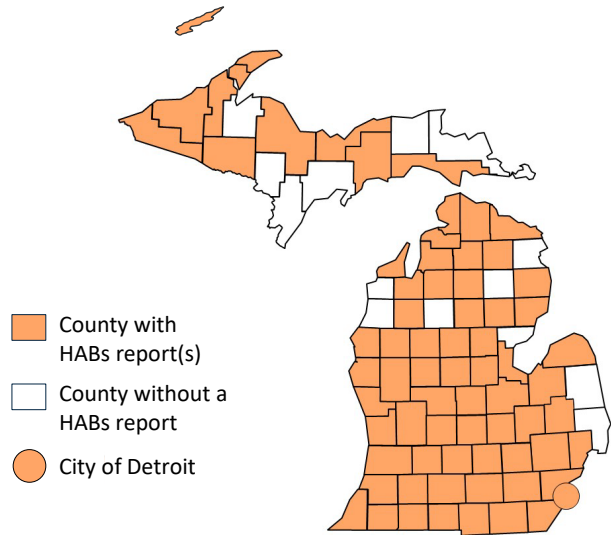
Monitoring for HABs is a collaboration between many Michigan agencies, including:

- Department of Health and Human Services
- Department of Environment, Great Lakes, and Energy
- Department of Agriculture and Rural Development
- Department of Natural Resources
- Local health departments
- Local lake/watershed/conservation associations
- Lake management companies

Counties with HABs in 2023 (n=34)



Counties with HABs in 2017-2023 (n=69)



HAB-related illnesses in 2017-2023

- Human: 12
- Pet/livestock: 15



In 2023, 50% of tested blooms were positive for cyanotoxins

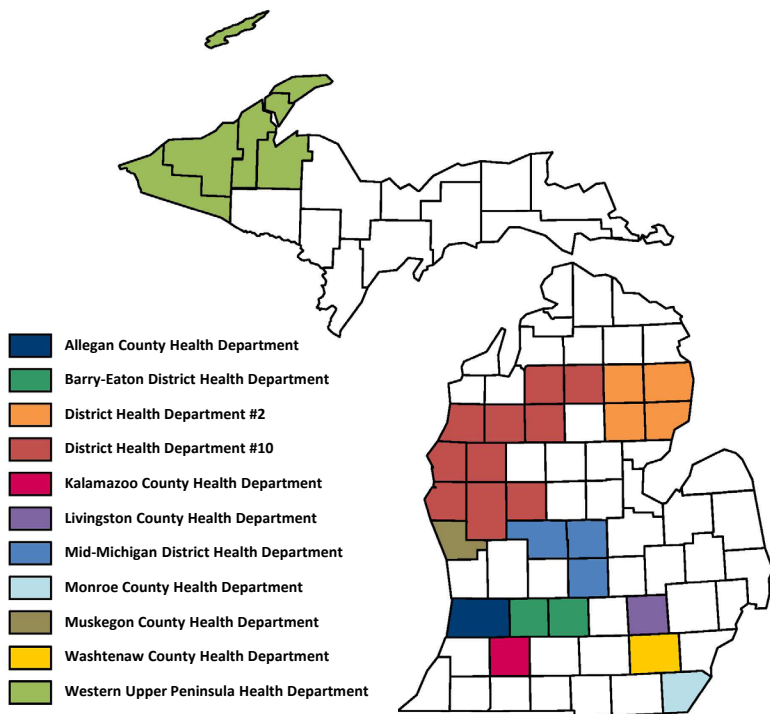
Spotlight: Local Health Department Testing Project

To address the increasing need for capacity to respond to harmful algal blooms (HABs) in Michigan, MDHHS is coordinating a new project to provide a subset of Michigan local health departments (LHDs) with training, supplies, and support so that LHDs can evaluate, sample, and conduct rapid testing for suspect HABs. Ten LHDs voluntarily participated in 2022, with 11 in 2023.

By supporting additional recreational water testing, public health assessments of suspect HABs occurred faster, and resulting public health recommendations and actions were implemented sooner. This effort also developed LHD proficiency to assess and sample HABs and conduct rapid cyanotoxin testing.

Project collaborators include the MDHHS Division of Environmental Health (staffing, 2023 funding), the Michigan Department of Environment, Great Lakes, and Energy (staffing, laboratory funding) and the U.S. Environmental Protection Agency (2022 funding).

Participating Michigan Local Health Departments MDHHS 2023 Harmful Algal Bloom Testing Project



2023 Project Highlights



30 counties covered



LHDs responded to **27 waterbodies**
• **74% had a HAB**



52 site visits
were conducted



Average time from notification to site visit was **one day**



116 rapid cyanotoxin tests
were run



86% of LHDs did public messaging or outreach



EGLE staff demonstrating a cyanotoxin rapid test.
Photo credit: Susan Peters, MDHHS

What Can Be Done?

Everyone can....

- » **Know** what HABs do and do not look like (see previous pages for examples and visit the HAB Picture Guide at [Michigan.gov/habs](https://www.michigan.gov/habs)).
- » **Know** where HABs have been reported by looking at the Michigan Harmful Algal Bloom Reports Map at [Michigan.gov/habsmap](https://www.michigan.gov/habsmap).
- » **Report** suspect algae blooms or bloom-related illnesses to EGLE by calling 1-800-662-9278 or e-mailing AlgaeBloom@Michigan.gov. If available, pictures of suspected blooms are very helpful.
- » **Seek** medical care if you, your family, or your pet become sick after swimming or contact with algae.



Health providers can....

- » **Learn** about symptoms (www.cdc.gov/harmful-algal-blooms/hcp/clinical-signs/symptoms-freshwater-harmful-algal-blooms.html) and ask patients about potential water exposures.
- » **Educate** patients about the risk of HABs.
- » **Report** any suspected HAB-related illnesses to your local health department and consult with state/local public health on uncertain cases.



Veterinarians can....

- » **Educate** yourself about clinical presentations of HABs (www.avma.org/resources-tools/animal-health-and-welfare/animal-health/harmful-algal-blooms-habs).
- » **Ask** clients about potential animal exposures and educate them on the risk of HABs for both them and their pets.
- » **Collect** clinical specimens and conduct necropsies on suspect HAB cases.
- » **Report** HAB illness in pets or livestock to MDARD by submitting a Reportable Disease Form (found at [Michigan.gov/dvmresources](https://www.michigan.gov/dvmresources) under 'Reportable Diseases') or calling 800-292-3939.



Public health agencies can....

- » **Report** suspected algae blooms or bloom-related illnesses to EGLE by calling 1-800-662-9278 or emailing AlgaeBloom@Michigan.gov.
- » **Respond** to HABs by posting signage, issuing appropriate advisories, and providing information to community stakeholders.



RESOURCES

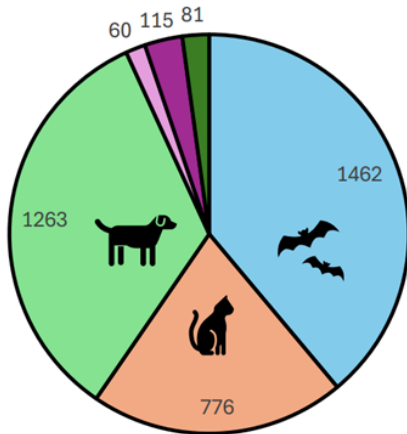
- » State of Michigan Harmful Algal Bloom website: [Michigan.gov/habs](https://www.michigan.gov/habs).
- » Michigan Harmful Algal Bloom Reports Map: [Michigan.gov/habsmap](https://www.michigan.gov/habsmap).
- » Centers for Disease Control and Prevention's Harmful Algal Bloom-Associated Illness website: www.cdc.gov/habs.

RABIES



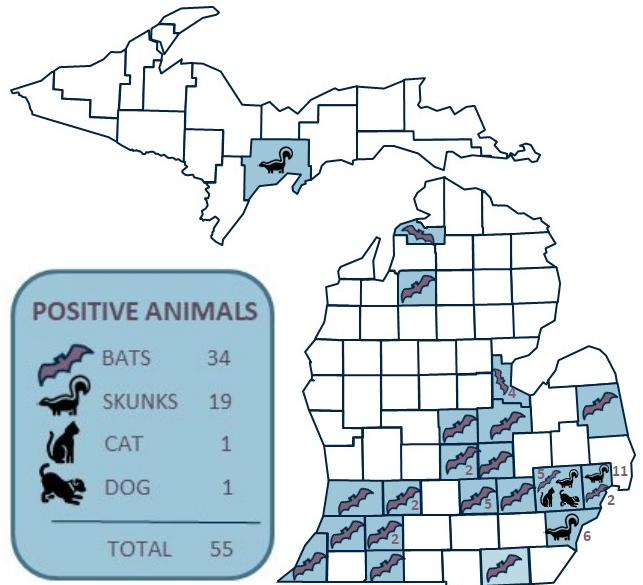
2023 Rabies

Animals Tested for Rabies at MDHHS, 2023



■ BAT ■ CAT ■ DOG ■ SKUNKS ■ RACCOON ■ OTHER

Rabies Positive Animals, 2023



Response to Rabies in a Captive-Bred Skunk

In November 2023, a veterinarian in Marquette County submitted a skunk for rabies testing at BOL. The skunk had been living with its owners in Delta County. The skunk was found to be positive for rabies. Persons that had exposure in the 14 days prior to the skunk’s death were evaluate. A detailed exposure assessment was performed. Persons who were considered exposed received rabies post-exposure treatment.

The skunk had been purchased from a breeder in Lapeer County but the skunk had been housed in Macomb County. The Michigan Department of Natural Resources was consulted since they have jurisdiction over the sale of captive-bred skunks in Michigan. The rabid skunk had several litter mates that had been sold throughout Michigan and out of state. Each buyer was contacted to alert them to the situation and to look for signs and symptoms associated with rabies. Contact with the breeder and seller was made to determine the health of the remaining skunks on their properties.

At the end of the investigation the rabid skunk was thought to have encountered a rabid wild skunk while housed in Macomb County. There had been a cluster of rabies-positive skunks found nearby in Macomb County around that time. Collaboration with multiple state and local agencies was required for a thorough public health investigation.

What Can Be Done?

Everyone can....

- » **Vaccinate** your pets against rabies and keep them up to date.
- » **Avoid** contact with wild or unfamiliar animals.
- » **Know** what to do if you find a bat in your home (talk to your local health department before you let it go).
- » **Keep** a list of important phone numbers that includes animal control and your local health department.
- » **Seek** prompt medical care if you are bitten by an animal.

Health providers can....

- » **Report** animal bites to your local health department, and consult with state or local public health concerning cases that are uncertain.
- » **Treat** potential exposures using (ACIP) best practices.
- » **Report** Rabies Post-Exposure Prophylaxis administrations to your local health department.

Veterinarians can....

- » **Vaccinate** pets and livestock against rabies.
- » **Educate** your clients and the public about rabies prevention.
- » **Ensure** your rabies titers remain at protective levels.

Public health agencies can....

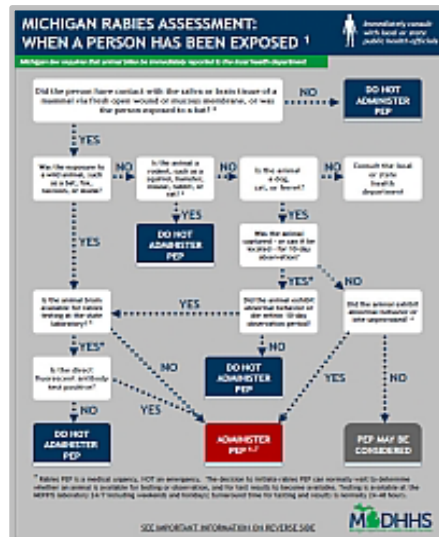
- » **Maintain** a rabies surveillance system.
- » **Provide** rabies testing services to the public.
- » **Provide** consultation to health care providers and the public.
- » **Make** Michigan data publicly available.
- » **Maintain** relationships with animal control and animal health organizations.
- » **Promote** rabies prevention.

RESOURCES

MDHHS Rabies Flowcharts:
www.michigan.gov/rabies

MDHHS Poster: Rabies PEP Guidance for Healthcare Providers and Facilities: www.michigan.gov/rabies

Communicable Disease Publication Order Form:
www.michigan.gov/cdinfo



FUNGAL DISEASES

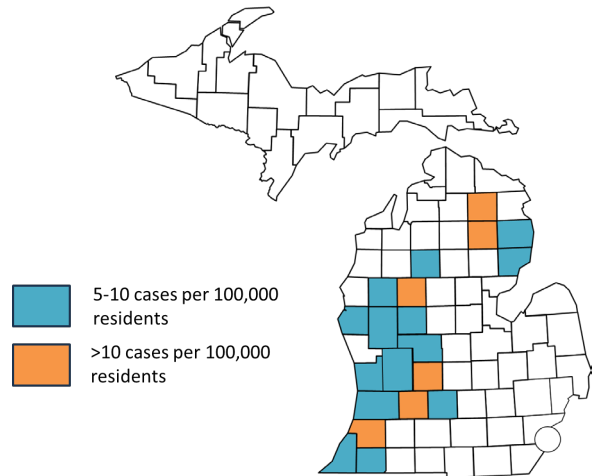


Histoplasmosis

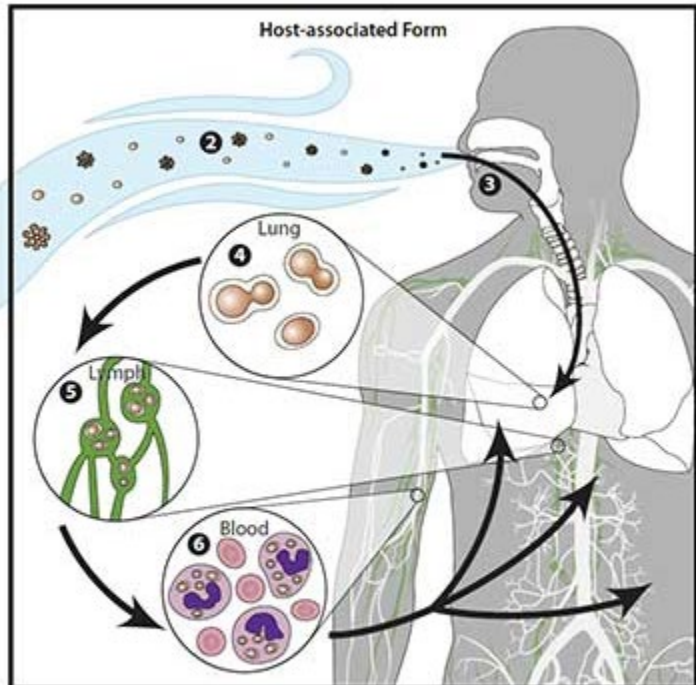
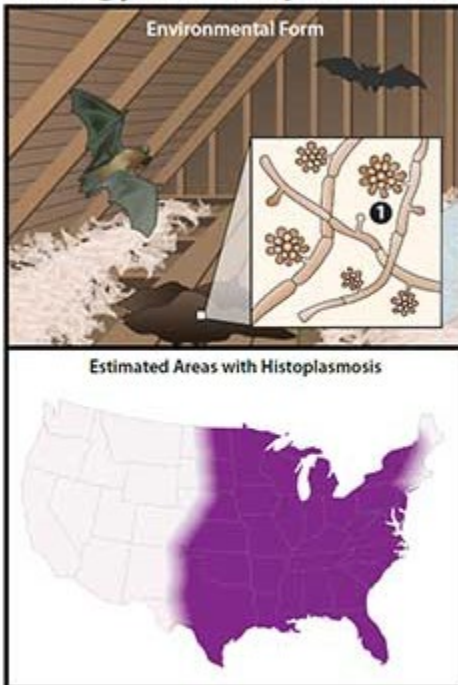
Histoplasmosis is an infection caused by the fungus *Histoplasma*. The fungus lives in the environment in Michigan, particularly in soil that contains large amounts of bird or bat droppings. People can get histoplasmosis after breathing in the microscopic fungal spores.

Most people who breathe in the spores do not become ill. In others, the inhaled spores change into a yeast form and infect the lungs, causing symptoms like fever, cough, and fatigue. Infants, older adults, and those with weakened immune systems are at higher risk for severe illness. In some cases, the infection can spread from the lungs to other parts of the body.

Five-Year Histoplasmosis Incidence by County, 2019-2023



Biology of Histoplasmosis



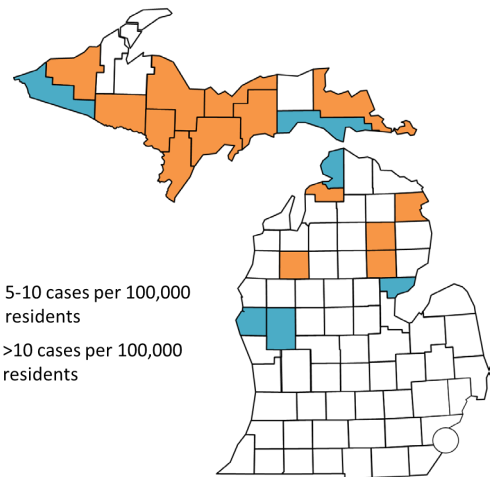
In the environment, *Histoplasma capsulatum* exists as a mold (1) with aerial hyphae. The hyphae produce macroconidia and microconidia (2) spores that are aerosolized and dispersed. Microconidia are inhaled into the lungs by a susceptible host (3). The warmer temperature inside the host signals a transformation to an oval, budding yeast (4). The yeast are phagocytized by immune cells and transported to regional lymph nodes (5). From there they travel in the blood to other parts of the body (6).



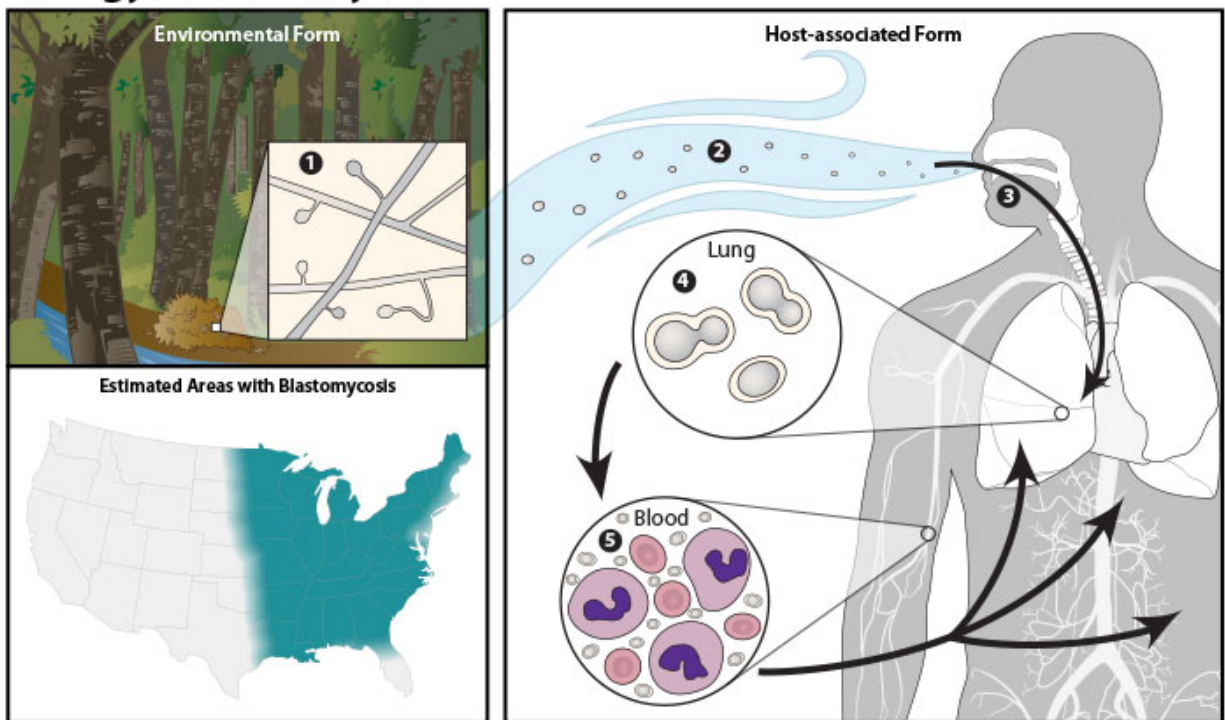
Blastomycosis

Blastomycosis is an infection caused by the fungus *Blastomyces*. The fungus lives in the environment in Michigan, particularly in moist soil and in decomposing organic matter such as wood and leaves. People can become infected with *Blastomyces* when they disturb infected soil or other decomposing plant matter (digging in dirt, raking leaves, etc.) and inhale microscopic spores. Although most people who breathe in the spores don't get sick, others develop symptoms like fever and cough. In some people, such as those who have weakened immune systems, the infection can become severe, especially if it spreads from the lungs to other organs.

Five-Year Blastomycosis Incidence by County, 2019-2023



Biology of Blastomycosis



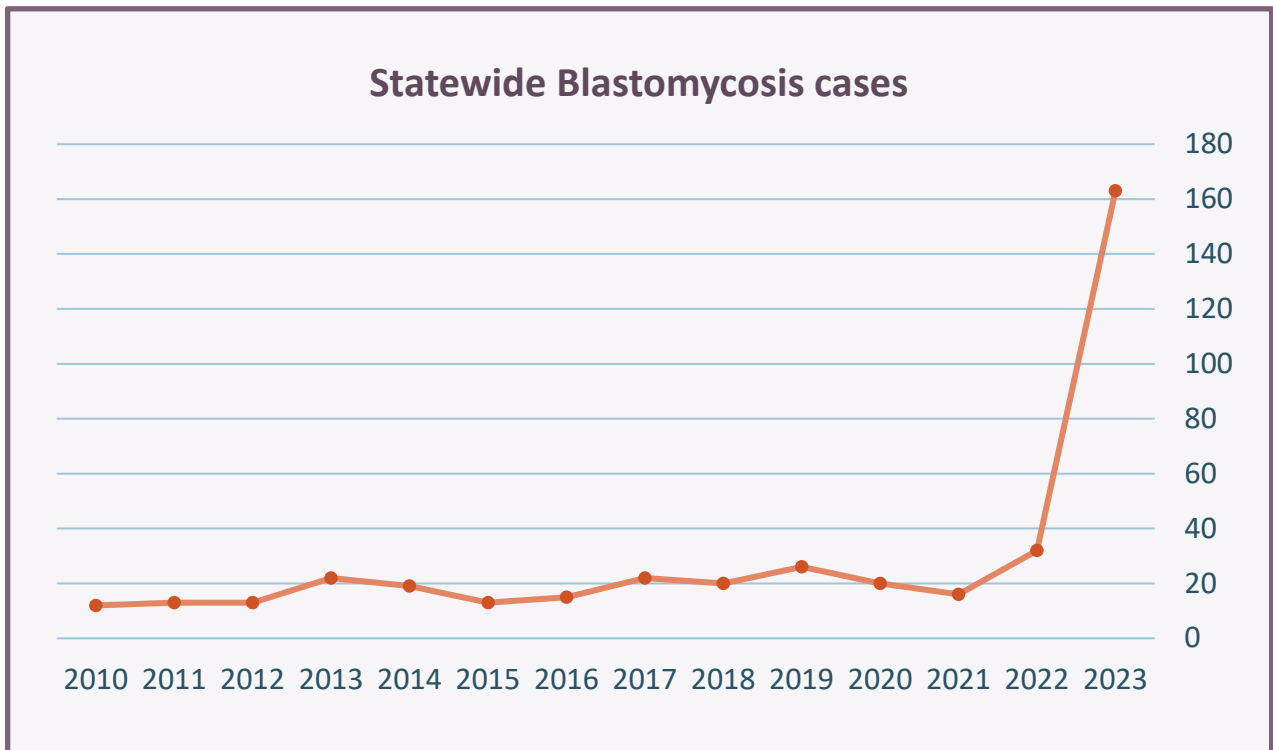
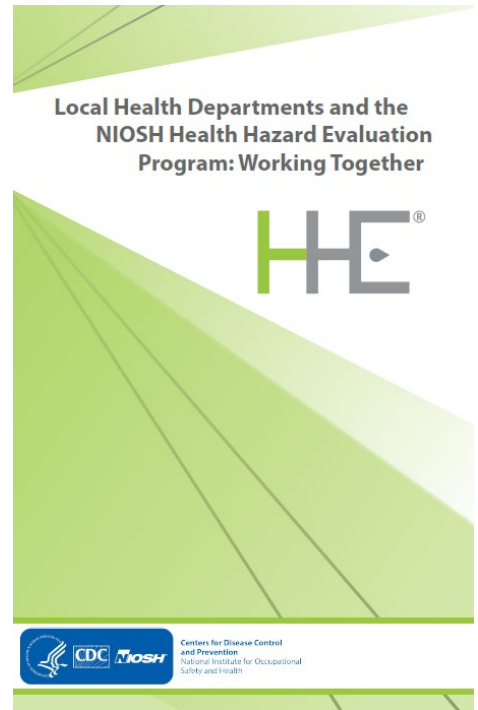
In the environment, *Blastomyces* exists as mold (1) with septate aerial hyphae. The hyphae produce spores (2). These spores are either inhaled, or inoculated into the skin (3) of a susceptible host. The warmer temperature inside the host signals a transformation (4) into a broad-based budding yeast. The yeast may continue to colonize the lungs or disseminate in the bloodstream (5) to other parts of the body, such as the skin, bones and joints, organs, and central nervous system.

2023 Escanaba Blastomycosis Outbreak

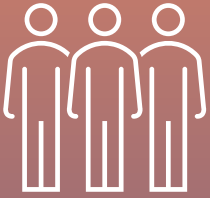
In 2023, there was a large outbreak of 131 blastomycosis cases among workers at a paper mill in Escanaba, MI. At the request of the paper mill, the National Institute of Occupational Safety and Health (NIOSH) initiated a Health Hazard Evaluation (HHE). The subsequent investigation was a cooperative effort by Public Health Delta & Menominee Counties (PHDM), MDHHS, NIOSH, CDC, and area healthcare providers.



As part of the HHE, informational town hall meetings were held on April 20-21, to answer employee questions about blastomycosis, risks, exposures, and the HHE process. After that, employees were invited participate in the HHE by taking a urine antigen test and answering a questionnaire about their work duties, locations, and health.



What can be done?



Everyone can:

- » **Learn** about blastomycosis risk in your area, conditions that can put you at high risk, and symptoms that should be discussed with a doctor.
- » **Avoid** activities like cleaning, remodeling, or tearing down old buildings if you are a person at high risk for severe disease.



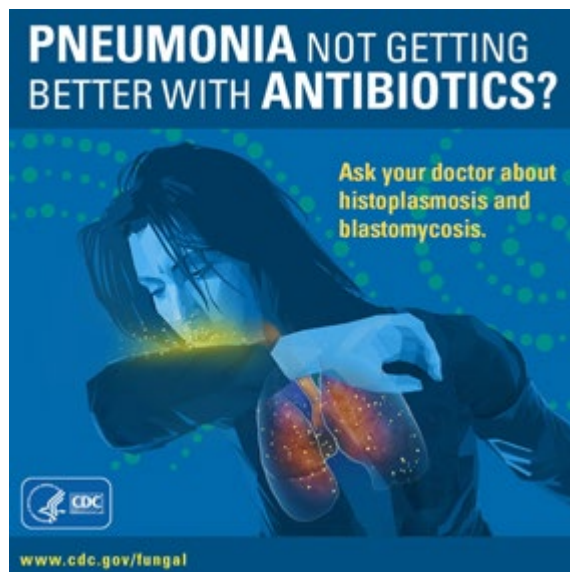
Health providers can:

- » **Think fungus** – Fungal diseases are increasing worldwide, and signs suggest this trend will continue.
- » **Be aware** of the risk for fungal diseases in your area and when testing a patient for a fungal disease is appropriate.



Public health agencies can:

- » **Maintain** a surveillance system for endemic fungal diseases.
- » **Make** Michigan data publicly available.
- » **Investigate** outbreaks of fungal diseases.



Michigan Emerging and Zoonotic Disease **SURVEILLANCE SUMMARY 2023**

Prepared by the Michigan Department of Health and Human Services
Bureau of Infectious Disease Prevention
Emerging & Zoonotic Infectious Disease Section (EZID)
333 S Grand Ave, 4th Floor, Lansing, MI 48933
517-335-8165

Published November 2024



Photo: Lake Superior, Copper Harbor by Ivy Wong

[Michigan.gov/EmergingDiseases](https://www.michigan.gov/EmergingDiseases)

The Michigan Department of Health and Human Services (MDHHS) does not discriminate against any individual or group on the basis of race, national origin, color, sex, disability, religion, age, height, weight, familial status, partisan considerations, or genetic information. Sex-based discrimination includes, but is not limited to, discrimination based on sexual orientation, gender identity, gender expression, sex characteristics, and pregnancy.