THE DEVELOPMENT OF PUBLIC HEALTH CONTENT FOR MICHIGAN RESIDENTS: HARMFUL ALGAL BLOOMS, CANINE BRUCELLOSIS, AND RABIES

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MPH Candidate

2023

KANSAS STATE UNIVERSITY

About Me

- From Hadley, Michigan
- Received my Bachelor of Science in Integrative Biology from Michigan State University in 2018
- Received my Doctorate of Veterinary Medicine from Michigan State University in 2023
- Began the MPH program at Kansas State University in Fall 2019
  - Area of Emphasis: Infectious Diseases and Zoonoses

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Outline

- Overview of Applied Practice Experience (APE)
- APE Objectives and Projects
- Importance of Harmful Algal Blooms, Canine Brucellosis, and Rabies to Public Health in Michigan
- APE Products
- Limitations, Current Status, and Future Directions of Projects
- MPH Competencies
- Emphasis Area Competencies
- Conclusion
- Acknowledgements

Applied Practice Experience

- APE Site: Michigan Department of Health and Human Services, Bureau of Infectious Disease Prevention, Emerging and Zoonotic Infectious Disease Section

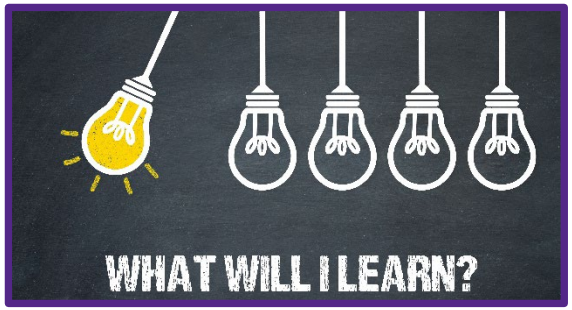
- APE Dates: July 10th, 2023 - August 18th, 2023
- Preceptor: Susan Peters, DVM, MPH

APE Site: MDHHS, EZID Section

- Michigan Department of Health and Human Services (MDHHS), Bureau of Infectious Disease Prevention, Emerging and Zoonotic Infectious Disease Section (EZID)
- MDHHS provides numerous programs to improve the health, safety, and wellness of Michigan residents
- EZID Section includes many infectious disease epidemiologists
- EZID's responsibilities include reportable disease surveillance, outbreak response, educational outreach, and response planning
- EZID works with many local, state, and federal partners

APE Objectives

- Evaluate the role of a public health veterinarian within state government
- Assess comprehensive knowledge about the various emerging and zoonotic diseases that are monitored in Michigan
- Select public health content for diverse audiences
- Develop skills in data analysis, interpretation, and presentation



https://www.simtutor.com/

APE Projects

- Project One
  - Created the Harmful Algal Bloom 2021 Data Summary and the Harmful Algal Bloom 2022 Data Summary
- Project Two
  - Produced the Harmful Algal Bloom Annual Section Summary for 2022
- Project Three
  - Created the Canine Brucellosis: Next Steps for Positive Dogs brochure
- Project Four
  - Created the Rabies Exposure and Control Plan for Animal Care Facilities document

Importance of Harmful Algal Blooms to Public Health in Michigan

- Harmful algal blooms are the rapid growth of cyanobacteria, also known as blue-green algae.
- Harmful algal blooms are a public health concern because they can cause illness and even death in humans and animals.
- Harmful algal blooms are increasing in frequency, duration, and geographic distribution across Michigan (Al-Ghelani et al., 2005).

Photo credit: Michigan Department of Environment, Great Lakes, and Energy

Importance of Canine Brucellosis to Public Health in Michigan

- Canine brucellosis is a contagious bacterial disease in dogs that can be transmitted to humans.
- Canine brucellosis is an incurable, life-long disease in dogs. Therefore, humane euthanasia is often recommended for dogs that test positive (Hollett, 2006).
- In Michigan, there is currently a concern of an increase in people who elect life-long quarantine over euthanasia for their canine brucellosis-positive dogs.

Live culture of *Brucella* on an agar plate
(Photocredit: CDC Public Health Image Library)

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Importance of *Rabies Lyssavirus* to Public Health in Michigan

- Rabies is a fatal viral infection of the central nervous system and a serious zoonotic disease.
- In Michigan, most rabies cases are found in bats, raccoons, skunks, and foxes, but cats and dogs are also a threat for human exposure (Michigan Department of Health and Human Services, Rabies).
- In Michigan, some veterinary clinics are hesitant to examine suspect rabid animals and are unsure of what precautions to take when evaluating them.

https://www.verywellhealth.com/rabies-overview-4156466

Example of Products from Project 1

MDHHS
Michigan Department of Health & Human Services

Harmful Algal Bloom 2022 Data Summary

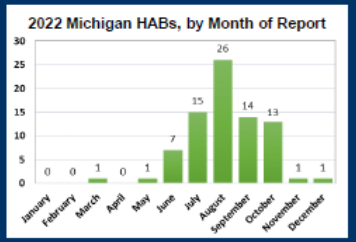
Harmful algal blooms (HABs) are the rapid growth of cyanobacteria (also known as blue-green algae). Cyanobacteria are a natural part of lakes, rivers, and ponds. However, HABs can form when cyanobacteria grow rapidly and produce toxins, called cyanotoxins. HABs can cause illness in people and animals.

The Michigan Department of Health and Human Services and the Michigan Department of Environment, Great Lakes, and Energy collect data about HAB events and associated human and animal illnesses in Michigan. This report summarizes HABs reported to these agencies in Michigan during 2022.

Michigan HABs monitoring is a collaboration between many groups:

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

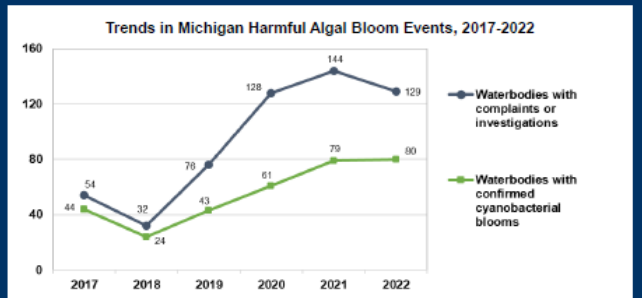
Photo credit: Mid-Michigan District Health Department



2022 Michigan Harmful Algal Bloom Events	
# of waterbodies with complaints and/or investigations	129
# of waterbodies with confirmed cyanobacterial blooms (HABs)	80
Public health actions taken*	42

* Examples include posting of signage, issuing an advisory or closure, press releases, and stakeholder or public communications.

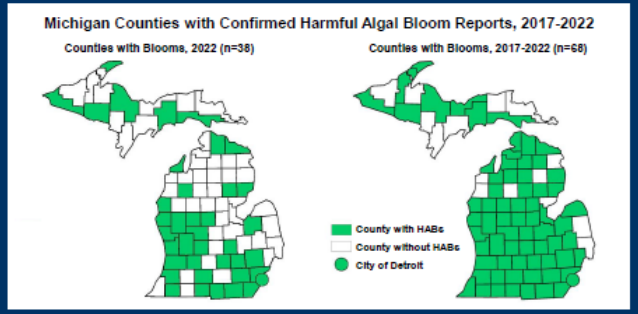
Some blooms are tested for cyanotoxins. 48.8% of blooms that were tested had cyanotoxins. Of the blooms with cyanotoxins, 66.7% had levels that were above recommended recreational levels.



Reported HAB-related Illnesses	2022	2017-2022
Human	0	12
Animal	0	14

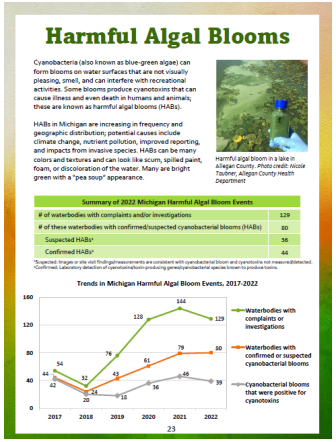
Public health actions were taken on 52.5% of waterbodies with HABs:

- Actions may include providing educational outreach, awareness, advisories, or closures of waterbodies.
- Actions are based on toxin concentrations, history of toxins, duration of the HAB, extent around the lake, proximity to recreational areas, and reported illnesses.



MDHHS For more information: michigan.gov/habs

Product from Project 2



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).

HABs in Michigan are increasing in frequency and geographic distribution; potential causes include climate change, nutrient pollution, improved reporting, and impacts from invasive species. 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.

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

Summary of 2022 Michigan Harmful Algal Bloom Events	
# of waterbodies with complaints and/or investigations	129
# of these waterbodies with confirmed/suspected cyanobacterial blooms (HABs)	80
Suspected HABs*	36
Confirmed HABs^	44

*Suspected: Images or site visit findings/measurements are consistent with cyanobacterial bloom and cyanotoxins not measured/detected. ^Confirmed: Laboratory detection of cyanotoxins/toxin-producing genes/cyanobacterial species known to produce toxins.

Trends in Michigan Harmful Algal Bloom Events, 2017-2022

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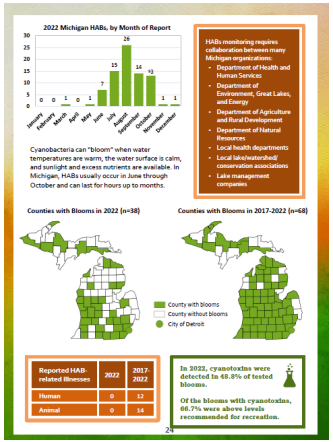

2022 Michigan HABs, by Month of Report

HABs monitoring requires collaboration between many Michigan organizations:
- 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

Cyanobacteria can "bloom" when water temperatures are warm, the water surface is calm, and sunlight and excess nutrients are available. In Michigan, HABs usually occur in June through October and can last for hours up to months.

Counties with Blooms in 2022 (n=38)

Counties with Blooms in 2017-2022 (n=68)

Reported HAB-related illnesses	2022	2017-2022
Human	0	12
Animal	0	14

In 2022, cyanotoxins were detected in 48.8% of tested blooms.

Of the blooms with cyanotoxins, 60.7% were above levels recommended for recreation.

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What can be done?

Everyone can:
- Know what HABs do and do not look like (visit the HAB Picture Guide at www.michigan.gov/habs).
- Know where HABs have been reported by looking at the Michigan Harmful Algal Bloom Reports Map at 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/habs/pdf/habsphysician_card.pdf) 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 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: www.michigan.gov/habs
- Michigan Harmful Algal Bloom Reports Map: www.michigan.gov/habsmap
- Centers for Disease Control and Prevention's Harmful Algal Bloom - Associated Illness website: www.cdc.gov/habs/

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Product from Project 3

CANINE BRUCELLOSIS: NEXT STEPS FOR POSITIVE DOGS

WHAT IS CANINE BRUCELLOSIS AND CAN IT BE CURED?

Canine brucellosis is a contagious bacterial disease in dogs. The disease can be transmitted to other dogs very easily, and sometimes to people. There are no vaccines available for brucellosis.

Unfortunately, there is no known cure for canine brucellosis. Positive dogs remain infected for life and will be a risk to other dogs and people.

WHAT ARE THE OPTIONS FOR DOGS THAT HAVE TESTED POSITIVE?

Since canine brucellosis is an incurable, life-long disease that can be spread to humans and other animals, humane euthanasia is often recommended for dogs that test positive. However, another option that can be considered is life-long quarantine. Both options have advantages and disadvantages:

EUTHANASIA	LIFE-LONG QUARENTINE
Euthanasia eliminates the risk of transmission to people and other animals.	A life-long risk of infecting people and other animals.
The situation is resolved quickly.	Quarantine requirements are life-long and often cumbersome.
Euthanasia is less expensive.	Antibiotic treatments and periodic testing can be expensive.
Euthanasia means the loss of a dog and possible grief for family members.	Life-long quarantine means that the dog remains alive.

WHAT ARE THE HEALTH RISKS TO HUMANS?

In humans, brucellosis normally causes a fever, chills, lethargy, headache, weakness, muscle aches, and swollen lymph nodes. In more severe infections, joints, bones, or heart valves may be affected. Some people may not have any symptoms. Brucellosis during pregnancy carries the risk of causing spontaneous abortion.

WHAT ARE THE HEALTH RISKS TO ANIMALS?

Most dogs won't show any signs. However, some dogs may have a history of infertility, abortions, or giving birth to dead or weak puppies, back pain, lack of energy, enlarged lymph nodes, and cloudy or red eyes that may have a small pupil and seem painful.

CANINE BRUCELLOSIS: NEXT STEPS FOR POSITIVE DOGS

WHAT ARE THE REQUIREMENTS FOR LIFE-LONG QUARENTINE?

- Spay/neuter intact dogs
- Start appropriate long-term antibiotic therapy
- Lifetime periodic laboratory testing for *Brucella canis*
- Lifetime periodic visits by personnel from the Michigan Department of Agriculture and Rural Development
- Strict adherence to not taking the dog to public areas such as parks, beaches, pet stores, jogging paths, playgrounds, boarding facilities, etc.

WHAT TO DO IF SOMEONE IS EXPOSED TO *B. canis*:

Persons who believe they may have been exposed should be aware of the signs and symptoms of brucellosis and consult with a medical provider if they become ill.

HOW TO MINIMIZE RISK OF TRANSMISSION:

Brucella canis organisms are passed in urine, vaginal discharge, semen, aborted material, milk, nasal secretions, and saliva. Transmission may occur through accidental contact between these infectious materials and a person's or other animal's mucous membranes, or a break in the skin.

Below are ways to minimize the risk of transmission:

- Spay/neuter the dog to decrease shedding of the organism via reproductive secretions
- NEVER breed infected dogs
- Treat the dog with appropriate antibiotics, often for as long as 12 weeks
- Periodically test the dog to monitor its disease
- Keep the dog away from other dogs and visitors
- Do not take the dog to public areas such as parks, beaches, playgrounds, boarding facilities, pet stores, etc.
- Do not let the dog have contact with children, pregnant women, and immunocompromised people
- Do not allow the dog to mouth or kiss people
- Warn veterinarians of the dog's diagnosis
- Practice good hygiene, including wearing gloves when cleaning up pet waste and washing hands thoroughly after contact with infectious materials
- Launder contaminated clothing and dog bedding frequently
- Disinfect contaminated surfaces

FOR MORE INFORMATION:

- CDC, "Brucellosis" https://www.cdc.gov/brucellosis/veterinarians/dogs.html
- CDC, "Brucellosis Reference Guide" https://www.cdc.gov/brucellosis/resources/articles.html
- The Center for Food Security and Public Health, "Brucellosis: Brucella canis" https://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_canis.pdf

Michigan Department of Agriculture and Rural Development
Phone: 800-292-3939
www.michigan.gov/mdard

Michigan Department of Agriculture & Rural Development

MDHHS

Michigan Department of Health and Human Services
Phone: 517-335-8165
www.michigan.gov/mdhhs

Example of Product from Project 4

Rabies Exposure Control Plan for Animal Care Facilities

Animal Care Facility:

Any facility that may come into contact with a suspect rabid animal such as veterinary clinics, animal shelters, animal control, and wildlife laboratories.

Purpose:

To provide control measures that can be used to prevent exposure to the rabies virus and minimize the risk of infection of personnel who examine suspect rabid animals or their laboratory specimens.

Suspect Rabid Animal:

- Any mammal being euthanized for rabies testing
- Any mammal with history of potential exposure AND clinical signs of rabies
- Potential exposure: any bite, scratch or other situation in which saliva or nervous tissue from a potentially rabid animal enters an open or fresh wound, abrasion or break in the skin, or comes in contact with a mucous membrane by entering the eye, nose or mouth. Direct contact between an animal and a bat is also considered an exposure.
    - *Fights between dogs and cats are not usually considered rabies exposures unless one of the animals has clinical signs of rabies or past exposure to a rabid animal.*
    - *To help assess exposure, assessment flowcharts can be found at www.michigan.gov/rabies*
- Clinical signs: lethargy, fever, vomiting, anorexia, cerebral dysfunction, cranial nerve dysfunction, ataxia, weakness, paralysis, seizures, difficulty breathing, difficulty swallowing, excessive salivation, abnormal behavior, aggression, and/or self-mutilation

Rabies Facts:

- Rabies is a neurotropic virus in the genus Lyssavirus, family Rhabdoviridae. It is a fatal viral infection of the central nervous system and a serious zoonotic disease and public health problem.
- All mammals are susceptible to the disease. In Michigan, most rabies cases are found in bats, raccoons, skunks, and foxes, but cats and dogs are also a threat for human exposure. However, rabies is rare in vaccinated animals.
- The highest concentrations of rabies virus are found in saliva, nervous tissue, cerebrospinal fluid, and salivary glands. However, limited amounts of rabies virus have been found in ocular secretions and respiratory tract fluids.
- Rabies transmission to humans usually occurs through bites or scratches from infected animals. However, rabies can also be transmitted by saliva or neural tissue from a rabid animal coming into contact with mucous membranes (through the eyes, nose, or mouth) or cuts, wounds, and abrasions in skin.
- In rare cases, rabies virus has been found to spread through air in enclosed spaces such as laboratories. Direct human-to-human transmission has only been reported in cases of organ transplants.
- Saliva or neural tissue coming into contact with intact skin rarely constitutes a risk for rabies virus transmission. Petting a rabid animal does not usually constitute as a rabies exposure.
- Because rabies virus does not survive well outside of its host, rabies is not usually transmitted through contaminated objects or materials such as clothes or bedding.
- Rabies virus is not shed in blood, urine, or feces. Therefore, blood, urine, and feces are not infectious and contact with them is not considered an exposure.
- Only personnel who handle suspect rabid animals or their laboratory specimens are at risk of exposure/infection. This is because the rabies virus does not survive for long outside of its host and is rapidly inactivated by ultraviolet light and desiccation. Additionally, personnel who handle suspect rabid animals or their laboratory specimens are not a risk to their families or community.
- Rabies is a reportable disease. Therefore, all suspect rabid animals should be reported to the local health department or MDARD ??, and all animal bites to humans should be reported to the local health department.

Rabies Exposure Control Measures:

- There is a range of control measures that can be taken to reduce possible rabies exposure. These include elimination, substitution, engineering, administrative procedures, and the use of personal protective equipment (PPE).
    - Elimination or substitution of the hazard is the most effective measure, but it is not always ethical. Elimination would mean refusing to see a suspect rabid animal. This may be appropriate for veterinary offices who want to exclude native wildlife such as raccoons and skunks from the clinic. However, if the animal is a current patient, refusing care may be unethical and different control measures should be used.
    - Engineering controls are designing a building to facilitate infection prevention practices. Examples are putting sinks for handwashing in convenient locations, putting laundry bins and biohazard bags right by isolation rooms, and using restraint devices.
    - Administrative controls are policies that a facility has mandated to provide infection prevention guidelines. Examples include handwashing practices and rabies pre-exposure vaccination of staff.
    - PPE is usually considered the least effective control measure because it requires the most compliance by staff. However, for suspect rabid animal examination, engineering and administrative control options are limited, and PPE is important for prevention of exposure. Examples of PPE are a mask, gloves, and gown. Appropriate PPE to wear when handling a suspect rabid animal or its specimens is provided in more detail below.

Vaccination as an Administrative Control Measure:

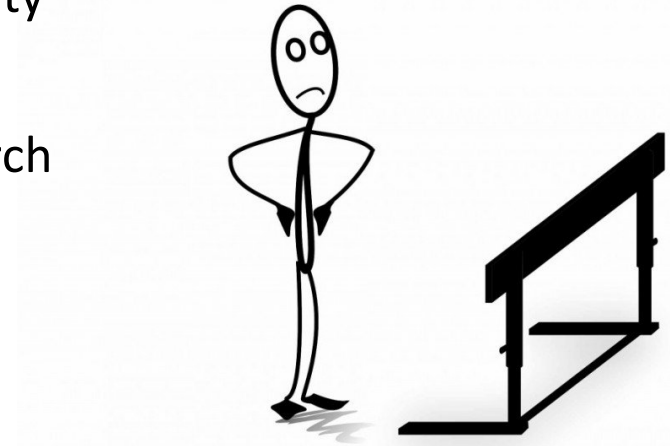
- Requiring vaccination of personnel is considered an administrative control measure.
- Personnel at high risk for exposure such as veterinarians, animal handlers, and laboratory workers should receive the rabies pre-exposure vaccination series.
- Only personnel who have completed the pre-exposure rabies vaccination series should handle suspect rabid animals and their specimens.

Personal Protective Equipment:

- All personnel handling a suspect rabid animal should wear the following personal protective equipment (PPE):

Limitations

- Project 1 & 2
  - Unable to choose what data was collected
- Project 3
  - Limited data availability
- Project 4
  - Lack of current research



https://gamescrye.com/blog/overcoming-game-design-limitations/

Current Status/Future Directions

- Project 1
  - Data summaries are in the last stage of publication: being reviewed by the Office of Communications at MDHHS
  - Will be published on the Michigan HABs website, michigan.gov/habs
  - The template will continue to be used annually to report Michigan HAB data
- Project 2
  - Posted in the 2022 Michigan Emerging and Zoonotic Disease Surveillance Summary
  - Published onto the MDHHS EZID website, michigan.gov/emergingdiseases, in October 2023
- Project 3
  - Waiting for review from key stakeholders
  - Will be published on the MDHHS EZID website, michigan.gov/emergingdiseases, when finalized
- Project 4
  - Waiting for review from key stakeholders
  - Will be provided as a resource to veterinarians when finalized

Importance of these Public Health Materials for the State of Michigan

- Harmful algal bloom materials:
  - potential illness with HABs exposure, increase in HABs frequency and geographic distribution, and popularity of recreational water activities across the state of Michigan
- Canine Brucellosis: Next Steps for Positive Dogs brochure:
  - incurable nature of the disease, zoonotic risk of the disease, and concern of an increase in Michigan residents choosing life-long quarantine as a treatment option
- The Rabies Exposure and Control Plan for Animal Care Facilities document:
  - fatality of the virus, zoonotic risk of the virus, and increased risk of contracting the rabies virus

MPH Competency 3

Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate

- Competency achieved in HM 802 Biostatistics for Public Health, a course taken through Michigan State University
  - Analyzed numerous quantitative and qualitative data sets using biostatistics and computer-based programming and software such as Excel and SPSS Statistics
  - The course focused on commonly used statistical methods in public health practice and practical application of these methods.

MPH Competency 4

Interpret results of data analysis for
public health research, policy or practice

- Competency achieved in project one, the Harmful Algal Bloom Data Summaries
  - Michigan's harmful algal bloom data was analyzed, interpreted, and presented in the form of graphs, tables, and maps for health professionals and the public.
  - Currently, the data analysis is used to track trends, educate, and guide public health practices.

MPH Competency 18

Select communication strategies for different audiences and sectors

- Competency achieved in HAB Data Summary project, HAB Annual Section Summary project, Canine Brucellosis project, and Rabies project
  - Responsible for selecting communication strategies for each of my products based on who the audiences were
  - Some of the products I made were for the general public, some were for health professionals, and some were for both.

MPH Competency 20

Describe the importance of cultural competence in communicating public health content

- Competency attained in MPH 818 Social and Behavioral Bases of Public Health and LEAD 801 Foundations of Leadership
  - During my coursework in these classes, there were readings, discussions, and assignments about cultural competency and its importance in communicating public health content.

MPH Competency 21

Integrate perspectives from other sectors and/or professionals to promote and advance population health

- Competency achieved in HAB Data Summary project, Canine Brucellosis project, and Rabies project
  - I worked closely with the MDHHS' EZID team.
  - Most of my products were made in collaboration with other state departments, and I took meetings and corresponded with members of those departments.
  - Michigan Department of Agriculture and Rural Development, Michigan Department of Environment, Great Lakes, and Energy, Division of Environmental Health at MDHHS

Emphasis Area Competency 1

Pathogens/Pathogenic Mechanisms

Evaluate modes of disease causation of infectious agents

- DMP 812 Veterinary Bacteriology and Mycology and DMP 718 Veterinary Parasitology
  - Learned about major characteristics of different organisms, their virulence factors, and their pathogenesis of infection
- Provided the foundation I needed to apply these concepts to my APE through the creation of my products: Canine Brucellosis: Next Steps for Positive Dogs and the Rabies Exposure and Control Plan for Animal Care Facilities
  - Understanding the pathogenesis of these diseases was imperative to providing information on how to minimize the risk of transmission/infection.

Emphasis Area Competency 2

Host response to pathogens/immunology

Investigate the host response to infection

- DMP 705 Principles of Veterinary Immunology
  - Learned the functions of the immune system and its role in combating diseases
- Provided the foundation I needed to apply these concepts to my APE
  - Canine Brucellosis: Next Steps for Positive Dogs brochure: I used my knowledge of immunology to inform the public on how canine brucellosis is diagnosed, if it can be treated, and what the health risks are to humans and animals
  - Rabies Exposure and Control Plan for Animal Care Facilities document: I used my knowledge of immunology to inform animal care professionals about the rabies pre-exposure vaccination series and rabies post-exposure prophylaxis

Emphasis Area Competency 3

Environmental/ecological influences

Examine the influence of environmental and ecological forces on infectious diseases

- MPH 802 Environmental Health and DMP 710 Introduction to One Health
  - Learned about the impacts of air pollution, water quality, waste management, deforestation, climate change, and other environmental influences on the transmission, spread, and emergence of infectious diseases
- Provided the foundation I needed to apply these concepts to my APE
  - Understanding the influence of environmental and ecological forces on harmful algal blooms was useful in understanding the effect this environmental hazard may have on public health in Michigan.

Emphasis Area Competency 4

Disease Surveillance

Analyze disease risk factors and select appropriate surveillance

- MPH 754 Introduction to Epidemiology and DMP 710 Introduction to One Health
  - Learned about the importance of surveillance, the required data for surveillance, types of surveillance such as active and passive, uses of surveillance, and obstacles to surveillance
- Provided the foundation I needed to apply these concepts to my APE
  - Data analysis of harmful algal blooms
  - Clinical symptoms and illness associated with exposure to harmful algal blooms is reportable in Michigan; this is a form of passive surveillance. I used the data from these reported cases to identify trends in the frequency of HAB-related illnesses over the years.

Emphasis Area Competency 5

Disease Vectors

Investigate the role of vectors, toxic plants, and other toxins in infectious agents

- DMP 710 Introduction to One Health and DMP 718 Veterinary Parasitology
  - Gained an understanding of toxins, toxic plants, and different types of vectors such as mosquitos, ticks, flies, fleas, and lice
- Provided the foundation I needed to apply these concepts to my APE
  - Applied in my field activities during my APE
  - All of my field activities during my APE involved mosquitos and mosquito-borne diseases such as EEE.
  - In these activities, I identified mosquito species, collected adult mosquitos and mosquito larvae for identification and surveillance, and visited a site where the invasive mosquito species *Aedes albopictus* had been collected.
  - Together, these experiences have improved my understanding of disease vectors, their associated diseases, and their importance in the public health field.

Conclusion

- This presentation provided an overview of my applied practice experience at MDHHS EZID, the projects I completed, and the integration of the knowledge and skills I gained throughout my coursework and during my APE.
- The projects that I completed at MDHHS EZID will provide Michigan residents with important information on significant public health concerns.

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Thank You
Questions?

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