

## IACUC Guidelines for UWM Animal Health Surveillance: Aquatic/Semi-Aquatic Animals (Fish and Amphibian) Agents with Zoonotic Potential

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### Summary

Fish and other aquatic animals can serve as a source of exposure to zoonotic agents. Awareness of the hazards, particularly for those who may be immunocompromised, and good hygiene practices can reduce the risk of infection while handling fish and amphibians and their tank water in the animal laboratory.

### Zoonoses

#### Nontuberculous Mycobacteria

Nontuberculous mycobacteria (NTM) are environmental bacteria commonly found in water, soil, and a wide range of domestic and wild animals. NTM species associated with zebrafish that are most likely to cause disease in humans include *M. chelonae*, *M. abscessus*, *M. fortuitum*, and *M. marinum*. NTM can cause skin or soft tissue infections after exposure of broken skin to contaminated water or surfaces. NTM may also cause lung infections in immunocompromised persons.

Symptoms	Risk Factors	Transmission
<ul style="list-style-type: none"> <li>- Skin that is red, warm, tender, swollen, and/or painful</li> <li>- Boils or pus-filled vesicles</li> <li>- Fever, chills, muscle aches</li> </ul>	<ul style="list-style-type: none"> <li>- Open wounds</li> <li>- Use of needles or other sharps</li> <li>- Immunocompromised status or underlying respiratory conditions</li> </ul>	<ul style="list-style-type: none"> <li>- Accidental injection</li> <li>- Open wound contact with contaminated water, animals, or surfaces</li> <li>- Splashes to mucous membranes</li> </ul>

### ***Aeromonas* spp.**

*Aeromonas hydrophila* is a bacterium found worldwide in aquatic ecosystems and a wide range of host animals, including humans, birds, fish, and reptiles. It can also cause a fatal infection in frogs. *A. hydrophila* is an opportunistic pathogen, meaning that it typically does not cause disease in immunocompetent adult humans but may become infectious in immunocompromised individuals. *A. hydrophila* primarily causes gastrointestinal infection, which is transmitted via ingestion; it may also cause skin/soft tissue infections following contact with contaminated surfaces.

<b>Symptoms</b>	<b>Risk Factors</b>	<b>Transmission</b>
<ul style="list-style-type: none"><li>- Gastrointestinal infection: diarrhea</li><li>- Soft tissue infection: cellulitis</li></ul>	<ul style="list-style-type: none"><li>- Working with reptiles &amp; aquatic animals</li></ul>	<ul style="list-style-type: none"><li>- Ingestion</li><li>- Accidental inoculation</li><li>- Direct contact</li></ul>

### ***Cryptosporidium* spp.**

*Cryptosporidium parvum* is an intracellular protozoan parasite that is ubiquitous in the environment and is in the top five most common causes of infectious diarrhea. Immunocompetent individuals typically develop a self-limiting gastrointestinal illness, but the illness can become chronic and prolonged for immunocompromised individuals. *C. parvum* has a wide host range that includes fish, amphibians, and reptiles; however, most human infections are associated with drinking water contaminated by domestic and wild ruminants.

<b>Symptoms</b>	<b>Risk Factors</b>	<b>Transmission</b>
<ul style="list-style-type: none"><li>- Diarrhea, vomiting, nausea</li><li>- Abdominal pain, cramps</li><li>- Fever, fatigue, malaise</li></ul>	<ul style="list-style-type: none"><li>- Immunocompromised status</li><li>- Contact with naturally infected animals</li></ul>	<ul style="list-style-type: none"><li>- Ingestion</li><li>- Parenteral inoculation</li><li>- Contact with surfaces contaminated with aerosolized droplets</li></ul>

### ***Pseudomonas* spp.**

*Pseudomonas* spp. are Gram negative bacteria that are ubiquitous in the environment, including in various animal or plant hosts, water, and soil. Most infections are caused by *P. aeruginosa*, though other species can act as opportunistic pathogens as well. Most infections occur in the respiratory tract of immunocompromised hosts, but *Pseudomonas* spp. are also associated with eye infections among contact lens wearers, infections of burns or other open skin wounds, and ear infections in swimmers.

Symptoms	Risk Factors	Transmission
<ul style="list-style-type: none"> <li>- Respiratory infection: pneumonia</li> <li>- Eye infection: scarring, vision loss</li> <li>- Soft tissue infection: abscess, discoloration</li> <li>- Ear infection</li> </ul>	<ul style="list-style-type: none"> <li>- Immunocompromised status (e.g., HIV/AIDS, cystic fibrosis, severe burns, diabetes)</li> <li>- Contact lens use</li> <li>- Contaminated water contact</li> </ul>	<ul style="list-style-type: none"> <li>- Inhalation of aerosols</li> <li>- Direct skin contact</li> <li>- Accidental parenteral inoculation</li> </ul>

### ***Salmonella enterica* spp.**

*Salmonella enterica* are common gastrointestinal pathogens that have a wide range of hosts, including warm-blooded and cold-blooded animals. All *Salmonella enterica* subspecies are potentially pathogenic to humans and cause gastroenteritis via accidental ingestion. *Salmonella* can be transmitted from animals to humans via contact with infective animals or their feces, and flies may also serve as vectors of the bacterium. Transmission of *Salmonella* from pet reptiles and amphibians is a known risk, and therefore these animals may also pose a hazard in the laboratory.

Symptoms	Risk Factors	Transmission
<ul style="list-style-type: none"> <li>- Nausea, vomiting, abdominal cramps, diarrhea</li> <li>- Headache, chills, fever</li> </ul>	<ul style="list-style-type: none"> <li>- Immunocompromised status</li> <li>- Contact with infected animals</li> <li>- Inadequate hand hygiene or surface disinfection</li> </ul>	<ul style="list-style-type: none"> <li>- Accidental parenteral inoculation</li> <li>- Accidental ingestion</li> </ul>

### *Chlamydia* sp

Chlamydiosis is caused by the intracellular bacteria of the genera *Chlamydia* (now *Chlamydophila*). Outbreaks have been reported in captive frogs. *Chlamydia pneumoniae* is an important human pathogen and has been identified as the cause of disease in captive frogs used for research. *Chlamydia* is mainly transmitted by inhalation of contaminated aerosols and can lead to the development of pneumonia in people. Until more is known about the epidemiology and prevention of *Chlamydial* infections, caution must be exercised in human contact with *Xenopus* and *Rana* species of frogs in particular.

Symptoms	Risk Factors	Transmission
<ul style="list-style-type: none"> <li>- pneumonia</li> </ul>	<ul style="list-style-type: none"> <li>- Immunocompromised status</li> <li>- Contact with infected animals</li> </ul>	<ul style="list-style-type: none"> <li>- inhalation</li> <li>- Contact with infectious droplets</li> </ul>

	<ul style="list-style-type: none"> <li>- Inadequate hand hygiene or surface disinfection</li> <li>- aerosols</li> </ul>	
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## Prevention

### General Animal Husbandry

- **Wash hands** and arms with warm water and soap after handling animals and contacting tank water.
- **Wear gloves** if you have an acute or chronic skin injury (e.g., cuts, recent tattoos, psoriasis, etc.) or if you will spend a significant amount of time with your hands immersed in water. Prolonged water contact can cause skin to become chapped, which increases the risk of infection after contact with zoonotic organisms.

### Additional Precautions for Work with Infected Animals

- **Avoid use of sharps.** Use safe sharps practices in cases where sharps are necessary.
- **Avoid generating aerosols or splashes.** If you need to conduct procedures with high potential for creating aerosols (e.g., harvesting/homogenizing infected tissue), use a biosafety cabinet or other combination of additional PPE and physical containment devices.
- **Decontaminate surfaces with an appropriate disinfectant.** Many pathogens associated with aquatic animals are hardy organisms that can survive in water and on various surfaces. Regularly decontaminate work surfaces and equipment that come into contact with infected animals or tank water using an appropriate disinfectant.