

# AQUACULTURE BIOSECURITY

## SOURCE WATER



### HOW SOURCE WATER CAN SPREAD INFECTIOUS DISEASE

Aquatic animals depend on water for survival; however, some water sources can carry infectious pathogens (i.e., bacteria, viruses, fungi, parasites). Water contamination occurs from the urine, feces, reproductive fluids, and mucus of infected animals. Land-based aquaculture farms use various water sources to rear their animals. These may include surface water, groundwater, or municipal supplies, which vary in potential risks for pathogen spread. Additionally, transport water (e.g., hauling tanks, buckets) or residual water from equipment use, including boats, can also spread pathogens. Some pathogens can also be spread between tanks by aerosols, sprays, or splashes.



### HOW TO MANAGE AND PREVENT PATHOGEN INTRODUCTION

#### Water Sources

- Consider the water source used for your operation and understand any pathogen introduction risks associated with its use.
  - Surface water sources (e.g., rivers, streams, lakes, coastal waters, surface runoff) pose the most risk to aquatic animals.
  - Groundwater sources (e.g., springs, wells, aquifers) have less risk than surface water.
  - Municipal water sources are generally pathogen-free but can contain toxic chlorine compounds, and may require neutralization (e.g., sodium thiosulfate) or inactivation before use.
- Screen inflow pipes to prevent the introduction of wild stocks and predators.
- Divert source water to settling ponds or reservoirs to reduce solids and organic load before use in the main farming area. This also helps to interrupt parasite life cycles and allows for the breakdown of pathogens. Settling ponds and reservoirs may require periodic cleaning.
- Use mechanical and biological filtration systems to remove suspended solids, organic matter, and ammonia from source water.



- Aerate source water to maintain adequate oxygen levels, reduce stress on animals, remove harmful gases (e.g., carbon dioxide, nitrogen gas, hydrogen sulfide), enhance waste breakdown, and prevent stagnant areas where pathogens can thrive.
- Disinfect water (e.g., UV sterilization or ozonation) to kill pathogens present. Use recommended zap doses (for UV) and ozonation levels to target pathogens of concern. Maintain disinfection units according to the manufacturer's recommendations.
- Prevent pathogen spread by aerosols, splashes, or spray by properly managing aerators, covering tanks or aquaria, building barrier walls, or increasing the distance between rearing units.

### Water Quality

- Frequently test, record, and monitor water quality data, as this is crucial to ensure the health of farmed aquatic animals.
  - Maintain water quality within the optimum range for the species and life stage being reared.
  - Inappropriate levels in pH, temperature, dissolved oxygen, alkalinity, salinity, chlorine, chloride, ammonia, nitrite, nitrate, and other parameters will impact animal health and increase susceptibility to disease.
  - Monitoring can help find unexpected changes over time.
- Water testing can also identify harmful substances (e.g., hydrogen sulfide, carbon dioxide, nitrogen, ammonia).
- For intensive systems, use filtration systems and optimum water exchange rates to minimize waste and pathogen buildup and maintain water quality.



### Transport Water

- Remove any water or debris from transport equipment or vehicles (including bilge water from boats).
- Before and after transport, ensure all vehicles and equipment (e.g., nets, tanks, containers) are cleaned and disinfected.
- Use dedicated vehicles and equipment for transport purposes to avoid cross-contamination.
- Use pathogen-free water sources or disinfect water (and neutralize if necessary) before transport. Common treatments include chlorine, ozone, and UV light.
- Use portable filtration units to remove debris, contaminants, and harmful substances during transport.
- Use temperature control devices (e.g., heaters, chillers) to maintain optimum water temperature.
- Use aeration and/or oxygenation units to maintain adequate oxygen levels and remove carbon dioxide during transport.
- Monitor water quality during transport to identify and address health issues quickly.



## BIOSECURITY ASSESSMENT CHECKLIST

Use the following checklists to identify biosecurity actions you currently use or can use to manage and reduce disease introduction risks from water sources for your farm and animals.

### Water Sources and Water Quality

YES	NO	BIOSECURITY QUESTION
Y	N	Are pathogen-free water sources (e.g., groundwater) used for the farm or hatchery?
Y	N	Are water sources tested for pathogens of concern for the aquatic animals being farmed?
Y	N	Are settling ponds used to reduce solids and organic load before use?
Y	N	Are water sources adequately aerated to improve water quality?
Y	N	Are mechanical and/or biological filtration systems used to remove suspended solids, organic matter, and ammonia?
Y	N	Are inflow pipes screened to prevent the introduction of wild stocks and predators?
Y	N	Are higher-risk water sources, if used, treated using ozone or ultraviolet light for disinfection/sterilization, and according to the manufacturer's recommendations?
Y	N	Is chemically treated water (e.g., municipal sources) neutralized or inactivated before use?
Y	N	Are covers, barriers, or distancing used to reduce disease transfer by aerosol, splash, or spray?
Y	N	Are water quality parameters tested regularly?
Y	N	Are water quality parameters recorded and evaluated on a set schedule?
Y	N	For intensive systems, are filtration and regular water exchange rates used to minimize waste and pathogen buildup?

### Transport Water

YES	NO	BIOSECURITY QUESTION
Y	N	Is residual water and debris removed from transport equipment or vehicles before use?
Y	N	Are vehicles and equipment cleaned, disinfected, and dried before and after transport?
Y	N	Are dedicated vehicles and equipment used solely for transport purposes?
Y	N	Are pathogen-free or treated water sources used for aquatic animal transport?
Y	N	Are portable filtration units used in transit to remove debris and other harmful substances?
Y	N	Are temperature control devices and aerators used to maintain optimum water parameters?
Y	N	Is water quality monitored during transport to address health issues quickly?

## FOR MORE INFORMATION

Find additional resources on the [Aquaculture Farm Biosecurity website](#), including disease transmission pathway tip sheets, videos, biosecurity assessment questions, a biosecurity plan template, and farm biosecurity signs.



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