Aquaculture Biosecurity

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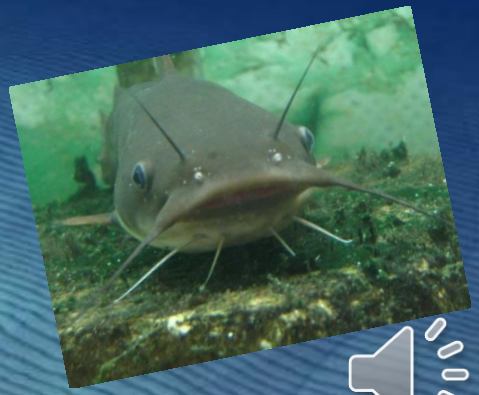
Aquatic Species



Management vs Treatment

Prevention of disease = Successful management

- **Good water quality**
- **Nutrition**
- **Sanitation**
- **Biosecurity**

Biosecurity

Procedures intended to protect humans or animals against disease or harmful biological agents

Safe life through cleanliness

Aquaculture Biosecurity

The 3 Principles of Biosecurity

- Reduce risk of pathogen introduction to facility
- Reduce risk of pathogen spread throughout the facility
- Reduce conditions within the facility that increase susceptibility to infection and disease (i.e. stress)

Biosecurity: Preventing the introduction

VECTORS

Water source

Domestic animals

New fish stocks/eggs

Live Feeds

Feral animals

Vehicles

People

Biosecurity: Preventing the Introduction

- Introduced fish
  - Reputable supplier
  - Health and feeding records

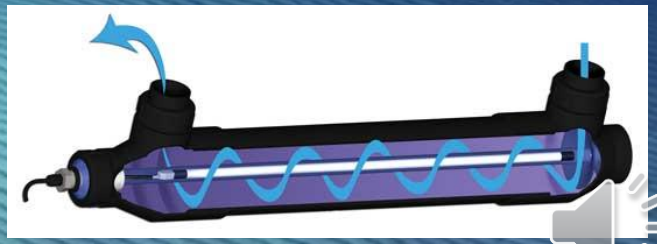
- Specific pathogen free animals
- Fish Health professional – diagnostics/screening

Biosecurity: Preventing the Introduction

- New fish stock – quarantine
- Fish eggs – quarantine and disinfection
- Live feeds – know source or culture yourself
- Domestic animals – fencing
- Feral animals – bird netting, sounds, traps

Biosecurity: Preventing the introduction

- People – washing hands prior and after; disinfectant foot baths
- Vehicles – park outside perimeter of facility
  - Refrain people or vehicles that were at another facility entering your facility for 24 hours
- Water source – UV, chlorination



Biosecurity: Prevent the Spread

- Vector control (birds, chickens, dogs, people, etc.)
- Dedicated/disinfected equipment (nets, buckets)
- All in - All out policy
- Quarantine new animals

Many factors affect the disinfection process

- Type of disinfectant
- Concentration
- Temperature/pH
- Contact time
- Organic matter
- Number of organisms
- Type and growth phase of organism

Virkon Aqua
Potassium peroxymonosulfate

- Approved by EPA for aquaculture
- Broad spectrum
- Fast acting
- Relatively safe for personnel
- Works at low temperatures
- Breaks down into harmless organic salts

Fish Quarantine

- Basic
  - Separate tank/system far removed from established aquaculture systems
  - Dedicated equipment (i.e., nets, pumps, airlines) for each quarantine system
- Upon Fish Arrival
  - Temperature acclimated by exposing incoming fish bag to quarantine tank
  - Critical parameters are temperature and pH

Acclimation

- Gradually acclimate fish with new tank water to bag water
- When water chemistries are similar between the incoming bag water and tank water, the fish can safely be moved with a dedicated net.
- NEVER put bag water into new tank.

Quarantine Duration

- Rule of thumb is 30 days
- Most pathogens will affect the quarantined fish during that interval.
- Fish Health Specialist/veterinarian

Biosecurity: Reduce the susceptibility

- Good husbandry skills
- Culling of dying and dead fish
- Proper Sanitation

Transportation

- **Basic Rule:**
  - Fish should not be fed 24 to 48 hours prior to transport
- **Within the Farm**
  - Important for water chemistries between the two systems (outgoing and incoming) are similar
  - Hauling system (e.g. buckets) should not be overpopulated
- **Outside Farm**
  - Hauling tank needs aeration (battery operated)
  - Keep stocking density low
  - Fish should be checked frequently for signs of poor water quality (oxygen deprivation) and functioning air pump

Daily Observations

Ensure daily observation of fish to assess their health and well-being.

- Provide a mechanism of direct and frequent communication between workers, manager, & owner
- Timely and accurate information on problems or animal health, behavior and well-being is conveyed to the fish health specialist or veterinarian.
- These observations should be recorded.

Sanitation

- Keep surrounding area clean
- Store equipment/disinfecting tubs away from systems
- Separate areas for eating
- Washroom available

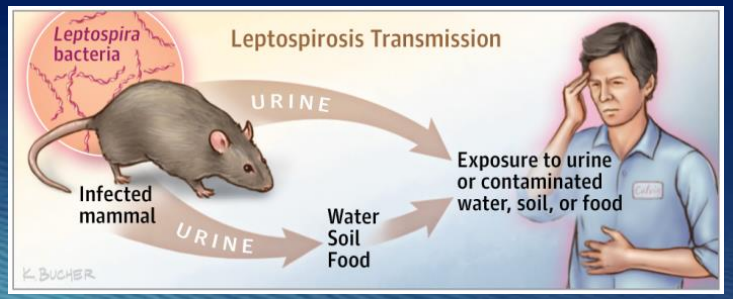
Occupational Health and Safety Training

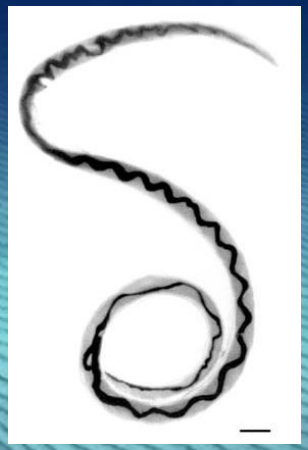
- Provide training and protection from potential hazards related to animal activity. For example:
  - Zoonotic Diseases: diseases that can be transmitted between animals and man
  - Bite/Scratch Injuries
  - Physical methods of euthanasia such as decapitation
  - Chemical exposure

Aquatic Zoonotic Diseases

- **Bacteria:**
  - ***Aeromonas hydrophila***
  - ***Streptococcus iniae***
  - ***Vibrio spp.***
  - ***Mycobacterium spp.***
  - ***Salmonella spp.***
  - ***Listeria spp.***
  - ***Leptospirosis***
- **Parasite:**
  - ***Angiostrongylus cantonensis***

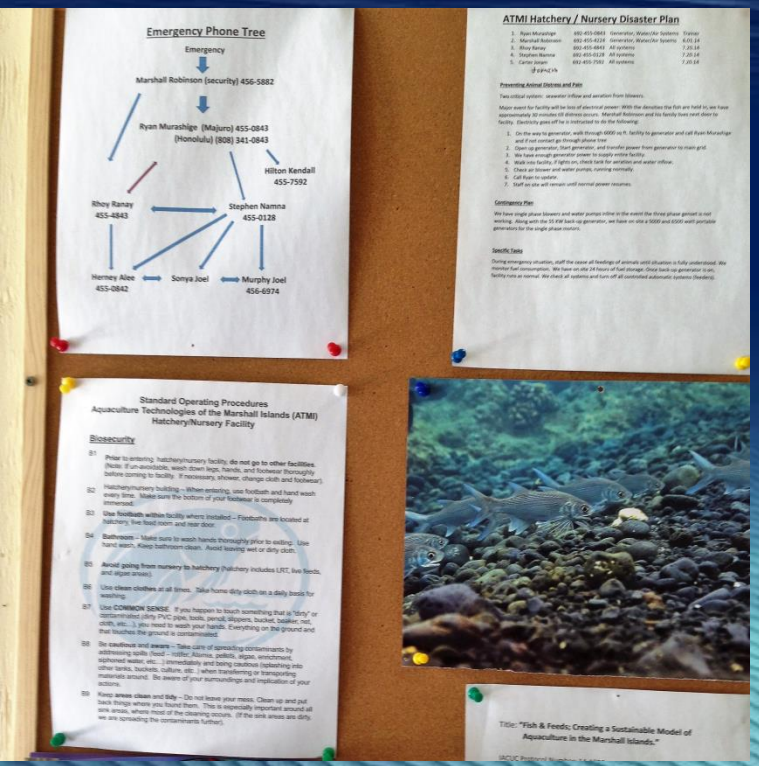
"Fish Handlers disease"
Caused by *Mycobaterium*





***Angiostrongylus cantonensis* nematode**

Record Keeping



- Train, train, train
- SOPs:
  - Water chemistries
  - Feeding
  - Water exchanges/system changes
  - Stocking/quarantine
- Other
  - Visitor logbook

The So What???

Economic strain

- Direct loss of product (mortality)
- Diagnostics
- Time spent – diversion of personnel management and labor
- Reduced quality of survivors
- Missed markets