AQUACULTURE BIOSECURITY: STEP 1

IDENTIFY PATHOGEN TRANSMISSION PATHWAYS FOR LAND-BASED AQUACULTURE FARMS AND HATCHERIES

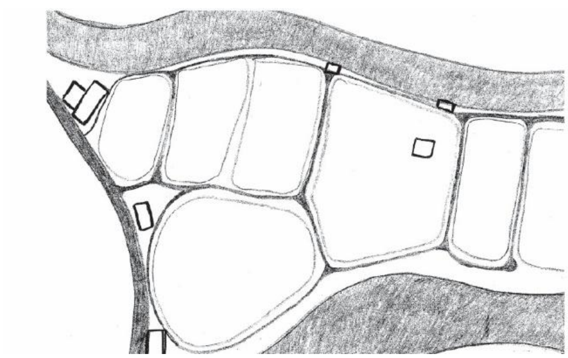
One of the first steps when starting a biosecurity plan is understanding the infectious diseases of concern for your species and how pathogens can enter and spread on your farm. The movement of animals, water, feed, vehicles and equipment, people, and wildlife are significant risk factors and pathways for pathogen transmission onto and within land-based aquaculture farms and hatcheries. Careful consideration of these factors helps to manage, reduce, or eliminate disease risks and protect your aquatic animals.

UNDERSTAND DISEASES THAT CAN AFFECT YOUR AQUATIC ANIMAL STOCK

Different aquatic animal species and different ages of animals have different disease concerns. Learn about the infectious (e.g., bacteria, viruses, fungi, parasites) and non-infectious diseases (e.g., water quality or nutritional issues) that can affect your animals and how each can spread. Make a list of these diseases and talk about them with your aquatic veterinarian, fish health specialist, or aquatic animal health team.

DIAGRAM YOUR FARM

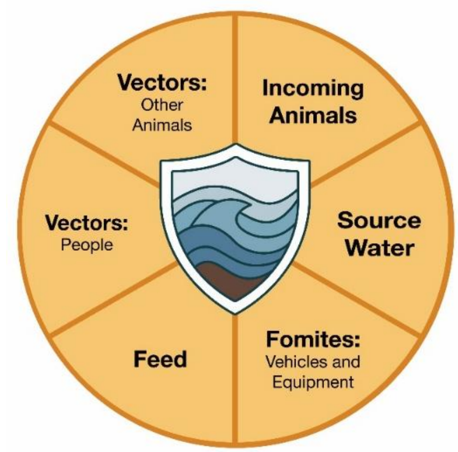
Every farm is different. Looking at your farm from a bird's eye view can help you see how and where things move onto and within the site. This, in turn, helps recognize risk areas and determine possible prevention or management solutions.



- Start with an aerial image or diagram of your farm.
  - This can be a sketch, a computer-generated diagram, or a Google Earth image.
  - For indoor systems, also diagram the production setup (e.g., tanks) within each building.
- Mark the following areas on your map.
  - ☐ Farm entrance points and any perimeter fencing for the farm or production areas
  - ☐ Main roadways and vehicle drive paths
  - ☐ Animal production areas and points of entry
  - ☐ Animal loading/unloading locations
  - ☐ Source water inputs, including inflows, treatment units or areas, reservoirs, natural bodies of water
  - ☐ Any buildings onsite, including quarantine and isolation areas, employee buildings, and feed storage
  - ☐ Other areas, such as dead animal disposal areas, cleaning and disinfection stations, or designated parking areas.
  - ☐ Movement pathways (drive paths, foot paths) for incoming animals, vehicles, and people.

IDENTIFY PATHOGEN TRANSMISSION PATHWAYS ON YOUR FARM/HATCHERY

Think about things moving onto and within your farm or hatchery. Pathogen transmission pathways (or critical control points) include six key areas: incoming aquatic animals; source water; fomites (contaminated objects, such as vehicles or equipment; feed; and vectors – living organisms that can transfer pathogens – which includes people on the farm and non-production animals (e.g. predators, scavengers, vermin), pets, or livestock.



Use the following list to consider possible pathogen pathways. The list is not all-inclusive. Consider these questions for each item you check:

- Is it currently located on your farm?
- Does it enter your farm or animal production areas from off-site locations?
- Where does each move once on your farm?
- How often do the movements occur (e.g., daily, weekly, monthly)?
- Are there ways to reduce, restrict, or modify movements into animal areas to manage or prevent infectious disease transmission or spread?

INCOMING AQUATIC ANIMALS

- ☐ New broodstock
- ☐ Seedstock
- ☐ Animal products: Eggs, larvae, or seed

SOURCE WATER

- ☐ Water inflow and source(s)
- ☐ Reservoir locations
- ☐ Location of pumps and aerators
- ☐ Movement of water on the farm
- ☐ Transport water
- ☐ Bilge water from boats

FEED

- ☐ Manufactured feed
- ☐ Live feed sources
- ☐ Frozen or semi-processed feed organisms

MOVEMENT PATHS

- ☐ Movement paths to dead animal disposal areas
- ☐ Movement paths to trash disposal
- ☐ Movement paths for all vehicles

EQUIPMENT AND VEHICLES

- ☐ Equipment used to handle, care for, capture, or dispose of animals (e.g., nets, buckets)
- ☐ Clothing, waders, footwear, or dive suits worn by visitors or employees
- ☐ Transport trucks for animals or water
- ☐ Vehicles or vessels (e.g., boats, ATVs) used to access, stock, or harvest animals
- ☐ Groundskeeping equipment: Skid loaders, mowers, tractors
- ☐ Delivery vehicles: feed, fuel, packages
- ☐ Employee or visitor vehicles that access farm areas or that have been on other aquatic sites or facilities
- ☐ Trash or recycling vehicles that visit other animal operations

PEOPLE

- ☐ Employees
- ☐ Family members
- ☐ Animal health professionals: veterinarians, fish health specialists, nutritionists, extension
- ☐ Federal or State personnel
- ☐ Maintenance (e.g. electricians, construction)
- ☐ Other service providers
- ☐ Sales vendors
- ☐ Tourists
- ☐ Customers for sales

VECTORS

- ☐ Wild mammals or birds (e.g., scavengers and predators)
- ☐ Wild aquatic organisms (fish, frogs, reptiles, snails, other invertebrates)
- ☐ Parasites (e.g., lice)
- ☐ Rodents and other vermin
- ☐ Pets or other agricultural livestock or poultry

NEXT STEPS:

Once you have identified items entering or accessing your farm, take the next step.

- **Step 2: Biosecurity Self-Assessment Checklist**, walks you through the six pathogen transmission pathways to help you identify areas of concern, biosecurity strengths, and preventative actions to take to protect your farm or hatchery.
- **Step 3: Biosecurity Plan Template for Land-Based Aquaculture Farms**, is a fully customizable biosecurity plan template to help you quickly get started on a site-specific, written biosecurity plan.
  - The form can be printed and completed by hand or edited electronically.
  - A video explaining how to use and modify the plan template is available.
- **Transmission Pathways Tip Sheets and Videos:** These resources include short handouts and videos that overview infectious disease risks and possible biosecurity actions for land-based aquaculture farms.

TOOLS TO HELP YOU WITH YOUR BIOSECURITY PLANNING

Visit the aquaculture biosecurity website for a library of free tools and resources for land-based aquaculture operations. All materials are available in English and Spanish.

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