

**Pennsylvania Fish and Boat Commission  
Cooperative Nursery Unit  
Biosecurity Plan**

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**Introduction**

The threat of aquatic invasive species (AIS) to the environment and the aquaculture community has existed for many years. However, never has an AIS impacted the aquaculture industry as much as the discovery of Viral Hemorrhagic Septicemia (VHS) in the Great Lakes basin. This is a devastating disease, with no known cure; resulting in immediate and total extermination should it infect an aquaculture facility. Federal agencies were first to act, with the development of more stringent “biosecurity plans,” designed to hopefully contain not only viruses, but all pathogens, and prevent any further introduction or transfer between facilities. The states were quick to follow and developed site specific protocols to control the spread of AIS, as well as all previously established fish pathogens. This biosecurity plan for the Cooperative Nursery Unit (CNU) and its 161 volunteer operated nurseries will follow the guidelines previously established by the Pennsylvania Fish & Boat Commission (PFBC).

According to the U.S. Department of Agriculture’s Animal and Plant Health Inspection Service (USDA-APHIS), biosecurity is, “the protection from transmission of infectious diseases, parasites and pests among and between animals and pathogen sources.” In the past, this was not a major concern for the cooperative nurseries, as all available resources were directed toward maximizing production within each nursery. As awareness of fish health and infectious disease issues has increased over the past decade, so has the need for developing biosecurity protocols at all cooperative nurseries.

Biosecurity protocols are designed to eliminate or minimize the risk of transferring diseases and pathogens throughout the nursery, from nursery to nursery, or back and forth between nursery and a PFBC hatchery. Reducing the number of disease outbreaks within a facility generally results in better growth and fewer mortalities each season. It also helps to ensure a more plentiful supply of bigger, healthier fish to stock into the waters of the Commonwealth.

The following information will help to reduce the risk of disease outbreaks within the nursery. As each nursery is unique, it will be necessary to tailor this information to best fit the individual facility. The CNU is available to help implement these practices and provide an ongoing source of technical assistance.

## **CNU Staff Biosecurity Protocols**

### **CNU Staff Disinfection Procedures**

There are three Cooperative Nursery Unit (CNU) staff members conducting routine and emergency nursery inspections. All three vehicles will be equipped with a spray container filled with Virkon® Aquatic, which will be used at each nursery visited to disinfect all equipment prior to departure. The most significant piece of equipment capable of transferring pathogens is the dip net. Only nursery-owned nets will be used for collecting fish at each facility. In the event that a net is not available, previously disinfected CNU nets will be used and disinfected after use. Every effort will be made to use nursery equipment during site visits. This will save time, effort, and money, while reducing the risk of disease transfers.

#### **Disinfectant:**

Virkon® Aquatic- 1% solution mixed at 1.3 ounces: 1 gallon of water.

#### **Equipment:**

1. Dip net
2. Dissolved oxygen meter probe and cable
3. pH kit test vials
4. Waders (rarely required)
5. Rubber gloves
6. Buckets
7. Measuring board
8. Ruler for measuring flows

## **Nursery Biosecurity Protocols**

### **Nursery Set-up**

- *Water Sources* – Cover and fence water sources and raceways, if possible. This lessens the risk of disease transmission from birds and also reduces predation. Where practical

it is also advisable to remove any stray fish from water sources. This is generally only possible in spring sources or collection basins

- *Holdovers* – Holdovers are fish kept in the raceway for longer than one year. Yearling fish are those received at the nursery as fingerlings and stocked the following spring. The CNU does not recommend keeping holdover fish, but many clubs do this to provide larger fish for the children’s fishing derbies. Holdover fish can serve as reservoirs or carriers of various bacterial and viral diseases, which can be transmitted to the yearling fish, causing increased mortalities. These mature fish are also susceptible to losses from contagious fungal infections due to spawning stress, which can also be passed to the yearlings. If holdovers are kept, they should be placed at the most downstream part of the nursery, using separate nets and brushes for daily maintenance. This will decrease the possibility of disease transfer to the more vulnerable yearling fish.
  
- *Cleaning/Mortalities* - Always work from the most upstream portion of the nursery downstream when cleaning or removing mortalities. This will help prevent bringing parasites or diseases upstream from below. Dead fish harbor pathogens and should be removed daily. *See “Equipment” section for more on the tools used in everyday nursery maintenance.*
  
- *Fish Transfers* – The CNU does not recommend the transfer of fish from one nursery to another, due to the increased risk of spreading pathogens. However, if a transfer is necessary, the CNU must be consulted prior to the move. No fish will be transferred without a completed *“Intra-nursery Request for Fish Transfer”* authorization, approved by both the CNU Leader and the Fish Health Unit Leader. All fish transferred should be relocated to the most downstream portion of the receiving nursery. Additionally, every effort should be made not to move fish between the raceways of nurseries containing separate raceway water flows, (see *“Equipment/Nets”*).
  
- *Raceway Cleaning*- Frequent cleaning is essential for minimizing parasite, bacterial, and fungal infections in fish of all year classes. Routine removal of fish waste and excess feed is the best way to reduce the available nutrient rich environment where infectious pathogens thrive. Try to remove small amounts of waste daily or every other day, rather than let the material accumulate to the point where dirty water passes over the fish for extended periods of time. The motto should be that *“a clean raceway is a healthy raceway.”*

## Equipment

- *General*- Disinfection of any equipment should begin with the removal of excess material or debris. The disinfection process is much more effective, when the chemical is allowed to contact the actual surface material of the equipment.
- *Nets/Brushes*- Separate nets and cleaning brushes should be used for separate water sources or flows. If possible, separate nets and brushes should be maintained for each species of fish and crossover should be avoided. Ideally, it is best to have separate nets and brushes for each raceway section... again, crossover should be avoided. Nets used for stocking should not be used for nursery work. Nursery nets should be disinfected daily and stocking nets should be disinfected prior to and after stocking. Avoid the use of wooden handled nets, because they absorb water and are difficult to dry, thus prolonging the opportunity for disease transfer. Net handles made of fiberglass or plastic are more desirable because they dry more efficiently. Color-coding, numbering, and labeling equipment to match individual species, raceway section, or specific use is the most effective way of preventing cross-contamination.
- *Boots*- Maintain separate boots for nursery work and stocking. If not possible, boots should be disinfected or thoroughly dried (see “*Disinfection Procedures*” below).
- *Stocking Trucks/Tanks*-When possible, use nursery water to fill stocking tanks. If this is not possible, stocking tank water should be drained at stocking site before returning to the nursery. If non-nursery water is used, (see “*Disinfection Procedures*” below).

## Disinfection Procedures

- *Nets/Brushes*- For daily disinfection of nets used in the nursery, a 250 ppm **Iodophor** solution is sufficient. This solution works best as 2 or 3 gallons of mixture in a 5 gallon bucket, where the nets can be placed after each use. An easily obtainable form of this Iodophor is Udder –Dyne, 1% active iodine liquid, which is used in the dairy industry and is readily available at agriculture supply stores (feed mills). In order for proper disinfection, the nets must be in contact with the iodophor for 10 minutes. Wear rubber gloves when mixing or spraying Iodopdor and stay upwind of spray.

Another option for disinfection is **Virkon® Aquatic**, a powder disinfectant that is very effective. Virkon® Aquatic is available from Western Chemical (800-283-5292) [www.wchemical.com](http://www.wchemical.com). Wear a dust mask, rubber gloves, and eye protection when

mixing Virkon® Aquatic powder. The proper contact time for Virkon® Aquatic is 20-30 minutes. The table below lists the amount of chemical required to obtain the proper concentration for one, two, and five gallon solutions.

<b>Chemical</b>	<b>1 gallon</b>	<b>2 gallon</b>	<b>5 gallon</b>
250 ppm Iodophor	95 ml or 3.3 oz	190 ml or 6.7 oz	475 ml or 16.6 oz
Virkon® Aquatic 1%	38 grams	76 grams	190 grams

Both disinfectants can also be used in a spray bottle, easily taken into the field and used to disinfect equipment while stocking. The application rates and contact times are the same for spray application as for bucket dip. For both the dip bucket and spray bottle applications, these disinfectant solutions have an effective lifespan of about 1 week. Virkon® Aquatic is 99.9% biodegradable and breaks down to water and oxygen and can be disposed of by pouring on the ground away from surface water sources. Iodophor may be disposed of in the same manner.

- *Boots/Gloves* – Spray bottle application at the same concentrations and contact times as above will work for the disinfection of rubber gloves and boots. Make sure to rinse these items with clean water after the appropriate contact time as these disinfectants can be corrosive if left un-rinsed. Steam cleaning is also a good option for disinfecting boots and gloves, but in order to be effective the temperature must be at or near 212°F. The contact time for this method of disinfecting is only a few seconds.
  
- *Stocking Trucks/Tanks* – Any of the above methods will work well for disinfection of a stocking truck or tank. Special care must be taken to properly rinse with clean water and to be mindful of where the rinse water drains as these disinfectants can be harmful to fish and other aquatic life at the concentrations used. If these methods cannot be used, thoroughly inspect the tank/truck for any aquatic vegetation or debris and **REMOVE** it, **DRAIN** all the water from the tanks, **WASH** them with clean water and allow the entire tank to **DRY COMPLETELY**, preferably in direct sunlight.