

# NUITS & BOLTS

BY IAN RACE & GENNY WEST

## Preventing Fish Escapement from the Hatchery

**F**ish escapement from a hatchery is a management issue with important implications. Chief among these are losses from raceways and culture tanks, and the escapement of live fish from the hatchery system through the effluent stream. In either case there is the loss of valuable stock, and in the second there may be some additional environmental implications. We will examine some proven methods to control both of these challenges to a hatchery operation. There are several options for preventing fish from escaping from the rearing tank, and depending on whether the hatchery is an indoor or outdoor facility will determine the best choice for escapement prevention.

### Jump Nets

Jump nets are often thought of as systems for preventing fish escapes from marine net pens, but hatcheries are now using them on rearing tanks and ponds. They are well suited for indoor facilities where predation is not a concern, but where they thwart the fish's attempts to jump out of the tank to short-lived freedom on the hatchery floor.

Jump nets can be made from polyester fabric mesh, shade cloth or solid vinyl or urethane fabric supported by aluminum or stainless steel posts that are securely fastened to the tank flange or wall. The netting or fabric would typically drape down the interior wall of the tank for a few inches so that the fish are sure to re-enter the water. Cable ties or bungee cord can be used to secure the net to the exterior of the tank. At places where regular access to the fish is required, a Velcro™ closure can be used. Such nets or panels range in height from 14-24" (35 - 60 cm) depending on the size of the



Fabric tank cover

fish, and can be installed on virtually any size or shape of tank.

### Fabric Tank Covers

Fabric tank covers are used on larger outdoor rearing tanks and serve a number of functions. They provide shade for fish when made from shade cloth, and are used for photoperiod manipulation when constructed from blackout cloth. Like jump nets, they prevent the fish from leaping out of the tank, but also prevent predators from feasting on an easy catch.

Fabric covers can be manufactured from a variety of materials to fit different size tanks. Some of the more common types incorporate a rigid tubular aluminum frame with several spokes

arching over the tank. The spokes register into a central aluminum hub and have brackets for attachment to the tank wall or flange. The fabric cover is positioned over the frame and secured around the tank using a rope or bungee cord threaded through grommets located at 6 intervals along the bottom edge. This cord is tightened around the tank closing up any holes, but still allows pipes, hoses, feed lines and probe cables to be led underneath. Some fabric covers come with zippered access doors allowing for easy access to the tank.

### Fiberglass Photo Lids

Photo lids are conical-shaped covers that perform the same function as fabric

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Moving screen fish exclusion system



Jump net on circular tank.

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tank covers by completely covering the tank and preventing fish both escapement and predator entry. As the name suggests, they are used also to allow photo period control within the tank, and have a sliding access door to allow entry for feeding fish and cleaning the tank. These doors are sometimes deliberately left open so it's important to cover the opening with some type of netting or shade cloth.

Photo lids are made from fiberglass and are available in a variety of colours. They are typically used on circular rearing tanks up to 12' (3.6 m) in diameter. Larger diameter tanks would require a fabric cover.

## Loss Prevention through the Effluent Stream

There are many different permit requirements for controlling fish hatchery discharges, and all of them require some degree of screening. Often there is a triple screening mandate where the fish culture water must pass through three screening points each with varying pore sizes before being discharged. The primary purpose of multi-screening is to remove any possibility of hatchery fish (live or dead) and gross particulate matter ending up in the natural waterway. Rare is the hatchery that nowadays does not have some sort of screening of its effluent discharge. In a triple screening arrangement, the first screen is typically at the outlet from each tank or raceway, and sized to prevent fish from escaping through the drainage system. The openings should nonetheless be large enough so the trapped solids (including fish) will not clog the screens, and the free flow of water is maintained. The second and third stage screens are usually at the end of the pipeline where it discharges to the waterway. This is a specialty piece of equipment sometimes referred to as a fish exclusion screen.



Fibreglass photo lids.

## Fish Exclusion Screens

One type of fish exclusion screen is a self-cleaning conveyor belt screen that provides complete exclusion of fish and eggs from an aquaculture discharge. The effluent flows horizontally through the inclined screen belt, which removes aquaculture waste as well as any escaped eggs or fish. Particulate matter is screened from the flow via a conveyor belt and collects on the screen filter media, causing the water level within the filter tank on the upstream side of the screen to rise. The rising water triggers an automatic backwash system, which moves the conveyor belt upwards, over the roller, and past the belt scraper and the backwash spray bar. Solids, eggs, and fish are collected in a tray with a screened outlet, allowing backwash water to drain to the outlet side of the filter, while solids are retained within the tray for manual removal.

Drum styles of fish exclusion screens are also available. They work by submerging the drum into the effluent pond with the pond water draining through the screens into the drum and fish-free water leaving via a pipe.

Controlling fish escapement is an important consideration for every hatchery manager. The need to avoid lowered productivity due to loss of fish, and, to protect the environment from unwanted escapement of live fish and eggs, is clear and unarguable. Loss prevention methods continue to evolve to meet current and emerging challenges created by both the industry and the regulatory agencies. The selection of appropriate methods is simply a function of the environment unique to each hatchery.

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