

# NUTS & BOLTS

By IAN RACE

## Counting Fish around the Hatchery

**C**ounting fish and moving them around the hatchery can be one of the most labour intensive and stressful operations for both employees and the fish. Fortunately, recent advancements in the technology for moving and counting fish are proving to be valuable assets for hatchery employees. In this issue we will discuss counting equipment and in a future issue will focus on the equipment and techniques for moving fish safely and speedily.

### Counting Fish

Knowing how many fish are in any particular tank or raceway is vital when determining feed requirements, medical dosages, biomass calculations, and mortality rates. Counting methods range from traditional displacement weighing to high-speed counters that make use of video cameras. This technology has developed over the last few years, keeping pace with pump capacities, and providing very accurate inventory records. More and more commercial hatcheries are relying on counters to help improve the bottom line.

### Displacement Counting

Still used by many enhancement hatcheries, and commonly used when transporting fish by truck, displacement counting is the most labor intensive and least accurate counting method currently in use. A known number of fish are placed in a pre-measured amount of water. The volume of water that is displaced is divided by the number of fish, and from this the average weight of each fish can be calculated. The fish from the tank or raceway are then pumped over a dewatering system or transferred by dip-net directly into the transport truck or tank that contains a known volume of water. Once the water level on the truck or tank reaches the desired level the difference in volume is divided by the average fish weight to calculate the approximate number of fish transferred. This system requires the fish to be completely dewatered before they enter the truck or tank and is only able to provide an estimated number, which often proves to be inaccurate.



*Infrared fish counter, the workhorse of the industry*

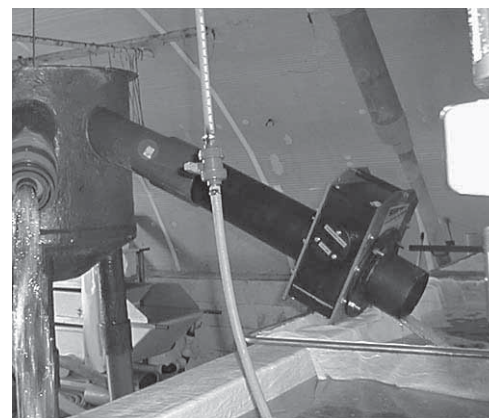
### Infrared Counters

Many hatchery operators are familiar with and are still using this type of 'V' channel counter. They count fish one at a time as they pass over the infrared scanner.

The data are relayed to a control unit that displays how many fish have been counted. Infrared counters are available as single or multiple channel systems and can accurately count fish ranging from 3g up to about 750g in size. They are ideally suited for use with grading machines and vaccination stations where a simple numerical count is required of relatively low throughput over short time spans. This technology has proven to be very economical for hatcheries.

### Optical Sensor Counters

These counters were developed to gently count small fish between 0.5g and 6g in size, and do not require the fish to be taken from the water. They are commonly used with graders and for splitting, and are easily attached to the side of a rearing tank. The fish enter the counter and are in water all the time as they pass under a bridge that houses an optical sensor. This type of counter is a favorite of hatchery employees due to their small size, portability, and easy set-up on a variety of tank flange styles. They are battery operated and only provide the operator with a total number of fish. They have limited capacity and are restricted to counting small fish, so the use of high capacity fish pumps may overwhelm the counter.



*Pipe Digital Counter*

### Pipe Digital Camera Counters

This system is specifically designed for counting fish being transported in pipes. The fish pass a camera, which measures the size and speed of each fish. This information is then sent to the control unit, which stores the total number of fish and estimates their weight. Some counters even have the option of downloading the data to a computer so it can be printed in report format. They are ideal for use with graders and can accurately count large numbers of fish being delivered rapidly from a fish pump. Most systems will count fish from about 10g in size. They are very accurate, but do not provide a record of each fish that can be verified in case of discrepancies in the count. The counting surface

must be kept clean to prevent interference, and be shaded from direct light.



*Line Scanning Video Counter*

### Line Scanning Video Camera Counters

Line scanning video camera counters have become very popular with commercial hatcheries due to their accuracy, high speed counting capability and ability to verify the counting data. A line scanning video camera sees each fish as it passes over the counting surface and this image is stored in a computer so that the results can be checked for accuracy at a later date. This feature can be very useful if discrepancies in the number of fish counted and the number delivered are suspected. The computer software estimates the size of the fish counted and also calculates the rate that fish were counted so crowding systems can be improved. They can be used with grading machines and are available with multiple counting channels to simultaneously count fish after they have been graded. Fish from 0.2g up to 400g in size can be counted with over 98% accuracy. Capable of counting over 200,000 smolts per hour, these counters are ideal for high speed counting of fry and smolts for transport. The systems can be quite bulky requiring two employees to move into position, and the high capital cost may deter smaller operations.

As increasing pressure is placed on hatchery managers to help improve the company's bottom line, maintaining accurate inventory records is critical. Determining what information is needed is important when selecting the most appropriate technology. With the variety of high quality counting systems available on the market, there is a counter for almost every application and size of fish in the hatchery.

Next time we will look at recent developments in actually moving the fish from place to place in the hatchery.

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