

One of the best known activities of the Pennsylvania Fish & Boat Commission (PFBC) is the hatchery stocking program. Each year, the great white fleet travels the highways and byways of the Commonwealth delivering millions of trout and other fish species to lakes, rivers and streams. Most anglers recognize the efforts put forth by hatcheries to improve fishing success, but few are aware of the efforts to protect the quality of our waters downstream from the hatcheries.

Pennsylvania state fish hatcheries (SFH) are a unique form of specialized farming. Instead of producing typical farm animals, they produce trout, walleye, catfish, muskellunge, striped bass and other fish species. Like other kinds of farming, hatcheries must feed their animals and manage the wastes produced. Fish are highly efficient at converting feed into flesh and do a better job at this than

However, a few of the receiving streams have some degree of biological impairment. This has been determined from sampling of the benthic macroinvertebrate communities. A basic explanation of this process involves determining the diversity and number of macroinvertebrate species present and comparing the pollution tolerant versus intolerant species to come up with a biological condition score. This score represents how healthy or unhealthy a stream may be. In

photo-PFBC Division of Environmental Services



**An example of benthic macroinvertebrates found in stream bottom sampling.**



## Fish Hatcheries as Good Stewards, New Microscreen Filters *by Brian Wisner, Director, Fish Production*

most farm animals. A typical feed conversion rate (pounds of feed fed: pounds of fish weight gained) for hatchery trout is about 1.3:1. Most terrestrial animal (poultry, pork and beef) feed conversion rates are much higher and range from 3:1 to 8:1. Still, a portion of the feed is not used for growth and passes through the fish as waste. Hatcheries are making improvements in the way they treat their effluent (discharge water) that contains these waste products.

In the early days of hatcheries, fish waste in the effluent was not a major concern. As knowledge increased about the detrimental effects of untreated hatchery effluent on the environment, the PFBC took action to improve the quality of the water being discharged by the hatcheries. Some of these improvements included higher quality feeds to reduce waste, oxygenation systems to improve fish health, better management practices, clarifiers and settling ponds.

As water travels through raceways, heavier solids, including fish feces, settle out near the downstream end of the raceways. A cleanout drain is opened and directs these solids to a clarifier (large concrete tank) that holds the waste and prevents it from entering the streams. Fish waste and suspended solids not trapped in the clarifier continue to move through the hatchery water system and enter a settling pond. The pond gives these smaller less dense solids a chance to settle out in the pond before the final discharge into the receiving streams. At most of the hatcheries, the solids are removed from the clarifiers and ponds and deposited on agricultural fields under a nutrient management plan.

certain streams, this score was lower than desired downstream from the hatchery and effluent quality needed to be improved. New technology was needed to improve the capture and removal of wastes from hatchery effluent to address the problem.

Each hatchery has a National Pollutant Discharge Elimination System (NPDES) permit that regulates the discharge of the hatchery to the receiving waters. One of the primary parameters of these permits is total suspended solids (TSS). Most of the trout hatcheries have monthly average TSS permit limits of about 6 milligrams per liter in their effluent. This limit is being met by the current waste



**Pleasant Gap State Fish Hatchery.**

photo-Spring Gearhart

**The Pennsylvania Fish & Boat Commission has taken the lead among resource agencies nationally by incorporating twenty micron screens in hatchery effluent management.**

*Bellefonte State Fish Hatchery.*



*Photo-Spring Gearhart*

***This new equipment was made possible by Growing Greener II funding, a voter-approved plan that has invested millions in environmental programs throughout Pennsylvania. The Pennsylvania Fish & Boat Commission has put the focus of these funds on waste management upgrades and will continue by renovating four other trout hatcheries.***

management system of clarifiers and settling ponds. Some of the more recent NPDES permits retain this monthly average TSS limit, but also require that the hatcheries stay below a maximum annual poundage of TSS. In order to meet these new requirements, the PFBC is employing state-of-the-art technology in fish farming waste management equipment in the form of microscreen filtration.

These microscreen filters have been installed at the Tylersville and Pleasant Gap SFHs and have been operating since early 2007. After water leaves the settling pond at these hatcheries, it travels into the microscreen filtration building and must pass through a twenty micron mesh filter before leaving the building and being discharged. The filters are composed of rotating disks that allow the water to gravity feed into the filter and pass through the disks. As the disks get dirty or clogged, an automatic backwash system activates and sprays the disk filters to remove the debris. This debris travels through the plumbing system to the hatchery clarifier where it's stored until it is disposed. The PFBC has taken the lead among resource agencies nationally by incorporating twenty micron screens in hatchery effluent management. Along with the microscreen filters, new waste storage tanks capable of holding over 200,000 gallons were installed to hold the fish waste during the winter months, so the clarifiers could be cleaned regularly when access to agricultural fields is limited.

Both Tylersville and Pleasant Gap SFH microscreen filters have been successful at reducing the TSS waste exiting the hatcheries. This new technology has reduced the total amount of TSS being discharged from these two facilities by 55-65% as compared to the previous five years.

This new equipment was made possible by Growing Greener II funding, a voter-approved plan that has invested millions in environmental programs throughout Pennsylvania. These types of infrastructure upgrades are not possible without such funding sources, which are separate from fishing license revenues. The PFBC has put the focus of these funds on waste management upgrades and will continue by renovating four other trout hatcheries. Bellefonte, Benner Spring and Huntsdale SFHs will have microscreen filter systems installed along with upgrades to settling ponds, clarifiers and waste storage tanks, depending on the need of the hatchery. Reynoldsdale SFH is being re-designed as a partial water recirculation system with circular tanks, microscreens and biological filtration. □

*Bellefonte State Fish Hatchery.*



*Photo-Spring Gearhart*

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