

Abstract

Aquaculture as a Post Mining Land Use in West Virginia

Daniel Miller, Sr. Project Coordinator – Aquaculture, West Virginia University, dmille31@wvu.edu and Kenneth J. Semmens, Extension Specialist – Aquaculture, West Virginia University, Ken.Semmens@mail.wvu.edu.

Use of the mine water resource for production of trout and other species has been identified as an important resource for aquaculture development in West Virginia. Two large commercial production facilities utilizing water originating from coalmines are presently in operation in southern West Virginia. The Aquaculture Food and Marketing Development Project (AFMDP) is working to assess opportunities and strategies for integrating aquaculture with coalmine water resources. Bioassays were conducted at a site in McDowell County, four AMD treatment plants, and one unused AMD treatment plant. The unique nature of each site influences suitability for aquaculture development.

The site in McDowell County had a continuous high volume flow (> 3000 gpm) of water at nearly ideal temperatures (<65 F) for production of trout. The concentration of carbon dioxide in the water exceeded 130 ppm and required removal of CO_2 to approximately 25 ppm before it could be used to grow fish. This is consistent with commercial producers who aerate water drawn from coalmine sources to increase oxygen concentrations, oxidize low concentrations of iron, and remove carbon dioxide.

Rainbow Trout were stocked in cages at polishing ponds at AMD hydrated lime treatment plants to treat acidity and remove dissolved metals. Trout survived in ponds where a steady stream of cool water kept temperatures from exceeding 70 F and pH from exceeding 8.3. The flesh of trout grown at one site for 203 days showed no detectable accumulation of metals (lead, mercury, cadmium, antimony, nickel, beryllium selenium, arsenic, chromium). Water temperatures appear to be limiting if the treatment plant did not pump for extended periods during summer months or if the polishing pond was too large for the flow to maintain temperatures below 70 F. At one AMD treatment plant, managers increased treatment rate to satisfy manganese effluent limits. The increased pH and associated water quality did not permit survival of any rainbow trout.

The unused AMD treatment plant was not ideally suited as a fish production facility because of low production potential; however, the design of the facility is appropriate as a private fishing park. The permit was changed to allow aquaculture as a post mining land use. Bass, catfish, and hybrid bluegill stocked in cages survived and grew in water pumped from a pond through the large concrete vats. Efforts are underway to develop the site for this purpose.

This work supports the concept that the mine water resource is suitable for aquaculture development and that aquaculture has potential as a post mining land use.