USGS
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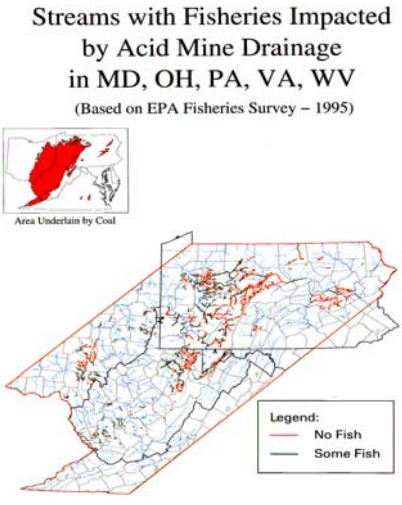
Eastern Region
Leetown Science Center

Restoration Technology Branch

The mission of Leetown Science Center (LSC), Restoration Technology Branch (RTB) is to conduct research needed to restore or protect the chemical, physical and biological integrity of desirable aquatic systems.



Below are significant accomplishments for FY 2007:

Demonstration of pulsed limestone bed technology for the remediation of acid mine drainage from coal and metal mines – Acid mine drainage has adversely impacted thousands of miles of streams in coal and metal mining regions of the world. We recently completed the third year of a cooperative research study funded by the Mine Waste Technology Program of the US EPA for demonstration of our pulsed limestone bed treatment technology. Results showed that the technology offered cost savings over conventional pH adjustment with lime through decreased reagent use as well as a reduction of metal hydroxide sludge volume. A final report containing all of the research products generated over the course of the project was assembled and sent to all project cooperators. Additionally, a journal paper describing the effects of temperature, hydraulic residence time and carbon dioxide partial pressure on process efficiency was published (Water Research (41), 2007) allowing the development and submission of a final report for the NPS NRPP project entitled "Acid Mine Drainage: Refinement of New Treatment Technology" (398 pages).

Removal of phosphorus from agricultural wastewaters using sludge produced by the neutralization of acid mine drainage – The impact of excess nutrients on aquatic organisms is of significant concern, especially in sensitive watersheds such as the Chesapeake Bay. We are continuing development of our process for removing phosphorus from wastewater by sorption on sludges generated by the neutralization of acid mine drainage. We recently received a Notice of Allowance from the US Patent and Trademark Office indicating that a patent on the process will be issued. Field testing of the system is scheduled for the upcoming year with our cooperators in the USFWS at the Northeast Fishery Center in Lamar, Pennsylvania, and has been proposed for large scale use at the Craig Brook National Fish Hatchery in East Orland, Maine.

Pilot scale testing of a fluidized bed reactor at the UFWS Warm Springs Regional Fisheries Center – Spring water used to support propagation of endangered fish species at the Center

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has pH, carbon dioxide, alkalinity and hardness levels that lie outside ranges required for reproduction. We demonstrated that desired shifts in water quality could be established by exposure to limestone sand within proprietary fluidized bed reactors. Specifically, we correlated hydraulic loading rate and bed height with treatment efficiency allowing the engineering of a full scale system currently under construction. Application reduced reagent costs dramatically while decreasing risk of system failure. Our process, established with support of the UFWS, Auburn University and the Conservation Fund, has also been adapted by the State of Pennsylvania's American Shad restoration program following their review of our Final Report submitted on 6/20/07.

Development of environmentally friendly control methods for aquatic invasive species – The invasive New Zealand Mudsnail (NZMS) has spread rapidly from Idaho into 9 other Western States. This species competes with native macro invertebrates for primary production and changes the trophic dynamics of the aquatic communities involved. Infestations of NZMS at fish hatcheries restrict options for stocking given their ability to pass through the digestive tract intact.

This study, funded by the FWS in cooperation with the University of Idaho, has successfully developed and demonstrated a new method for removal of NZMS from spring water supplies based on application of hydrocyclonic separation followed by waste stream carbonation. Both steps are environmentally friendly, have a low risk of failure and require no energy input. Efficiency tests with all life stages of the NZMS were completed this summer at the UFWS Hagerman NFH as part of a MS thesis. Large scale tests are being planned for FY 08.