

THE ROLE OF AIRBORNE REMOTE SENSING AND GEOPHYSICS IN ACID MINE DRAINAGE ASSESSMENT OF THE LOWER KETTLE CREEK WATERSHED, CLINTON COUNTY, PENNSYLVANIA¹

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Abstract. The Kettle Creek watershed in north central Pennsylvania is home to one of the state's most renowned trout fisheries and has attracted anglers nationwide since the late 1800s. However, historic practices of coal mining have left behind a tragic legacy of acid mine drainage (AMD) emanating from unreclaimed surface mines and abandoned deep mines that pollute over fifteen miles of stream in the lower watershed, leaving them essentially lifeless. Since 1998, Trout Unlimited (TU) has been working through its Home Rivers Initiative to restore and conserve this important coldwater fishery. Kettle Creek is TU's third Home Rivers Initiative project, which are multi-year projects in which significant staff and financial resources are committed to certain watersheds across the country to take a science-oriented, community-based, collaborative approach to river and fishery restoration. Through funding provided by the Pennsylvania Growing Greener Grants Program, TU partnered with the U.S. Department of Energy National Energy Technology Laboratory to conduct an airborne remote sensing and geophysical survey on 80 km² of the lower Kettle Creek watershed. This survey used a combination of thermal infrared (TIR) imagery and helicopter-mounted electromagnetic (HEM) surveys to locate: 1) abandoned deep mine pools, 2) recharge zones for mine pools, 3) contaminated groundwater discharge points, and 4) areas of acid-generating mine spoils. Of the 53 AMD polluted groundwater seeps identified by the TIR imagery, field reconnaissance determined that 26 were known sites and 27 were previously unknown. The HEM survey identified approximately 12 mine pools in shallow underground coal mines and successfully located AMD seeps, acid-generating spoils, and groundwater recharge zones. Overall, TIR and HEM survey data yielded beneficial data for a large area in a short amount of time, thereby significantly reducing costs associated with the typical means of manpower for obtaining the same large-scale data collection.

Additional Key Words: thermal infrared imagery, airborne electromagnetic surveys, watershed assessment, mine drainage remediation.

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