

MASSIVE AMD RELEASE SPARKS COLLABORATIVE APPROACH TO WATERSHED RESTORATION



Figure 1. Left: Acid mine drainage (AMD) discharging from an abandoned mine. Right: Cheat River near Albright, WV.

AN IMPERILED WATERSHED FINDS A FRIEND

In the spring of 1994, an illegally-sealed, major underground coal mine blew out a hillside near Albright, West Virginia, pouring millions of gallons of toxic, acid mine drainage (AMD) into a section of nearby Muddy Creek. The release entered the main stem of the Cheat River turning the river orange for miles. The acidic discharge lowered pH levels in Cheat Lake to 4.5, killing fish for miles downstream and negatively impacting the local recreational economy. A second blowout in 1995 further aggravated the problem and caused American Rivers, Inc., a national river conservation organization, to name the Cheat as one of the nation's ten most endangered rivers. Segments of the lower Cheat watershed are also listed on the State's 303(d) list for impairments related to AMD pollution (pH, dissolved aluminum, iron, and manganese).

In response to the release, a group of concerned citizens and recreational users joined together to form the non-profit group, Friends of the Cheat (FOC). As early founders assessed the extent of the problem and the significant resources needed to address it, they quickly realized the need for collaboration with key stakeholders, including state and federal agencies, industry, and other citizen groups. This led to the formation of the River of Promise (ROP) task force.

UNLIKELY PARTNERS SHARE COMMON GOALS

Over the years, the non-profit worked closely with West Virginia Department of Environmental Protection (WVDEP) to meet project goals, including a 2011 study on in-stream dosing and a 2013 pilot project that allowed FOC to maintain WVDEP treatment systems and monitor water quality. When funding constraints limited progress, WVDEP found a partner in Houston based, Southwestern Energy (SWN), a leading natural gas producer in the region. SWN was committed to meeting its "fresh water neutral" policy where, for each gallon of fresh water used in its fracking operations, they committed to replenishing or offsetting an equivalent amount via conservation and innovation. These unlikely partners shared a common goal; to restore water quality in the lower 3.4 miles of Muddy Creek, an important step in reestablishing biologic connectivity and healthy trout populations within the watershed.



Figure 2 & 3. Left: Lime treatment silo. Right: Part of the DEP project staff discuss monitoring equipment.

AQUA TROLL MULTIPARAMETER SONDE

- Base sensor configuration includes EPA-approved optical RDO, pH/ORP, turbidity, conductivity, temp, & pressure
- Sub-2 inch passive and active antifouling system for all sensors, including cleanable conductivity
- Wireless Bluetooth® connection to the VuSitu Mobile App

EYES ON THE WATERSHED

The Watershed Based Plan for the lower Cheat allows for use of Clean Water Act (CWA), Section 319 funds for cleanup of nonpoint sources, including AMD and sediments that contribute to impairment. Using 319 (and matching) funds, FOC purchased the water quality instruments needed to perform continuous monitoring, a key element of their program. Turbidity, pH, and depth (as a surrogate for flow) are vital indicators of restoration effectiveness in Muddy Creek tributaries and water quality entering the Cheat. pH is an indication of acidic conditions in the stream resulting from AMD pollution. Calculated flow rates are used to determine the relationship between rain events and the transport of precipitated metal solids resulting from different treatment approaches, such as in-stream dosing. These solids also show up as increased turbidity, a measure of clarity in the stream.

While manual sampling is still necessary to understand pollutant concentrations, it provides only a limited snapshot of water quality conditions at a single point in time. Continuous data provides a more comprehensive view of water quality trends and restoration effectiveness. Data from multiparameter sondes

enables FOC to play a more important role in restoration discussions, and provides greater transparency into watershed health.

However, when FOC's restoration Project Manager, David Petry, started with the organization in 2015, he inherited a continuous data logger network that wasn't meeting the organization's needs. The original multimeters had significant shortcomings.

Field technicians had no way of knowing if the batteries had died or whether a log was running. Oftentimes they would come back a month after deploying the instrument only to find that data collection had never been triggered.

All that changed when FOC learned of a multimeter that addressed the shortcomings. The In-Situ Aqua TROLL 600 Multiparameter Sonde included the parameters of interest, as well as a LCD screen with a visual display to show battery life and log status. The instrument also utilizes wireless Bluetooth technology coupled with the VuSitu Mobile App, allowing technicians to share data with the team right from the stream.

Another important consideration was the unit's wiper. Precipitates in the stream caused major sensor fouling with other loggers.

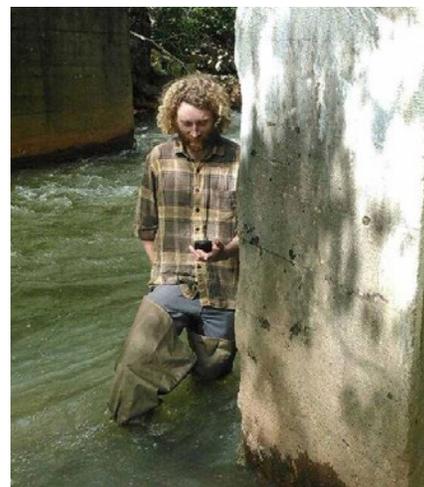


Figure 4. Bluetooth-enabled data sharing from the field.

Field Technicians were bringing the units back to the office every two weeks to clean them and conduct other maintenance functions. The Aqua TROLL 600's unique wiper and flat-faced sensor design minimizes maintenance requirements allowing for longer deployments.

The technological advancements of the Aqua TROLL 600 took the program to a new level that wasn't possible before. Turbidity, pH, depth, dissolved oxygen, conductivity, and temperature readings are recorded every 15 minutes and averaged hourly. As a result, the monitoring program is now more regimented, and FOC gets consistent water quality data to inform decisions.

“Before installing the Aqua TROLL 600, we were losing a month’s worth of data at a time, and I wasn’t satisfied.”

- David Petry, Project Manager

PROGRESS IN ACHIEVING HEALTHY WATERS

Since 1995, FOC, with its partners, have implemented 17 acid mine drainage treatment systems on abandoned mine lands using both passive and active treatment systems. WVDEP is currently constructing an \$8 million innovative treatment facility at the former T&T mine site where the original blowout occurred. The facility, due to go live in January of 2018, will have state-of-the-art telemetry sensors that monitor water quality and adjust chemical dosing in real-time.



Figure 5. Aqua TROLL 600 deployed in a stilling well at the mouth of Muddy Creek.

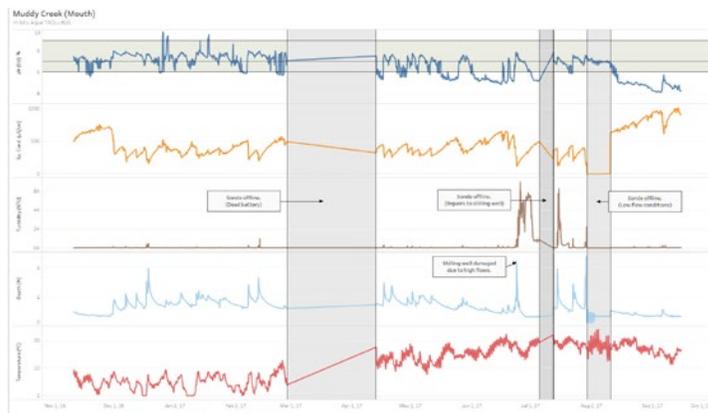


Figure 6. Continuous water quality data from the Aqua TROLL 600 Multiparameter Sonde.

For their part, SWN is funding a 9,000-linear foot pipeline to convey AMD contaminated water from the headwaters of Muddy Creek to the treatment plant. While the new treatment operation will address AMD in the lower Muddy Creek, there remains significant mine water contamination in other portions of the Muddy Creek watershed. To address these sites, WVDEP is also utilizing a unique, instream lime dosing treatment approach to restore healthy pH levels and precipitate out toxic metals.

“We’re not done, but collectively, we’ve restored the Cheat River mainstem,”

said Amanda Pitzer, executive director of Friends of the Cheat.

As the new treatment plant comes online, continuous monitoring of pH, turbidity, flow and other key parameters will remain important measures of success in the watershed, along with flourishing fish populations and whitewater recreational opportunities.

RESOURCES:

YouTube: [Muddy Creek Blowout Part 1](#)

YouTube: [Muddy Creek Blowout Part 2](#)

YouTube: [Muddy Creek Blowout Part 3](#)

[Friends of the Cheat](#)

[USGS Acid Mine Drainage Publication, New Hope for Acid Streams](#)

[WV DEP: Watershed Based Plan for the Lower Cheat River Watershed](#)

[EPA: Rebirth of the Cheat River](#)

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