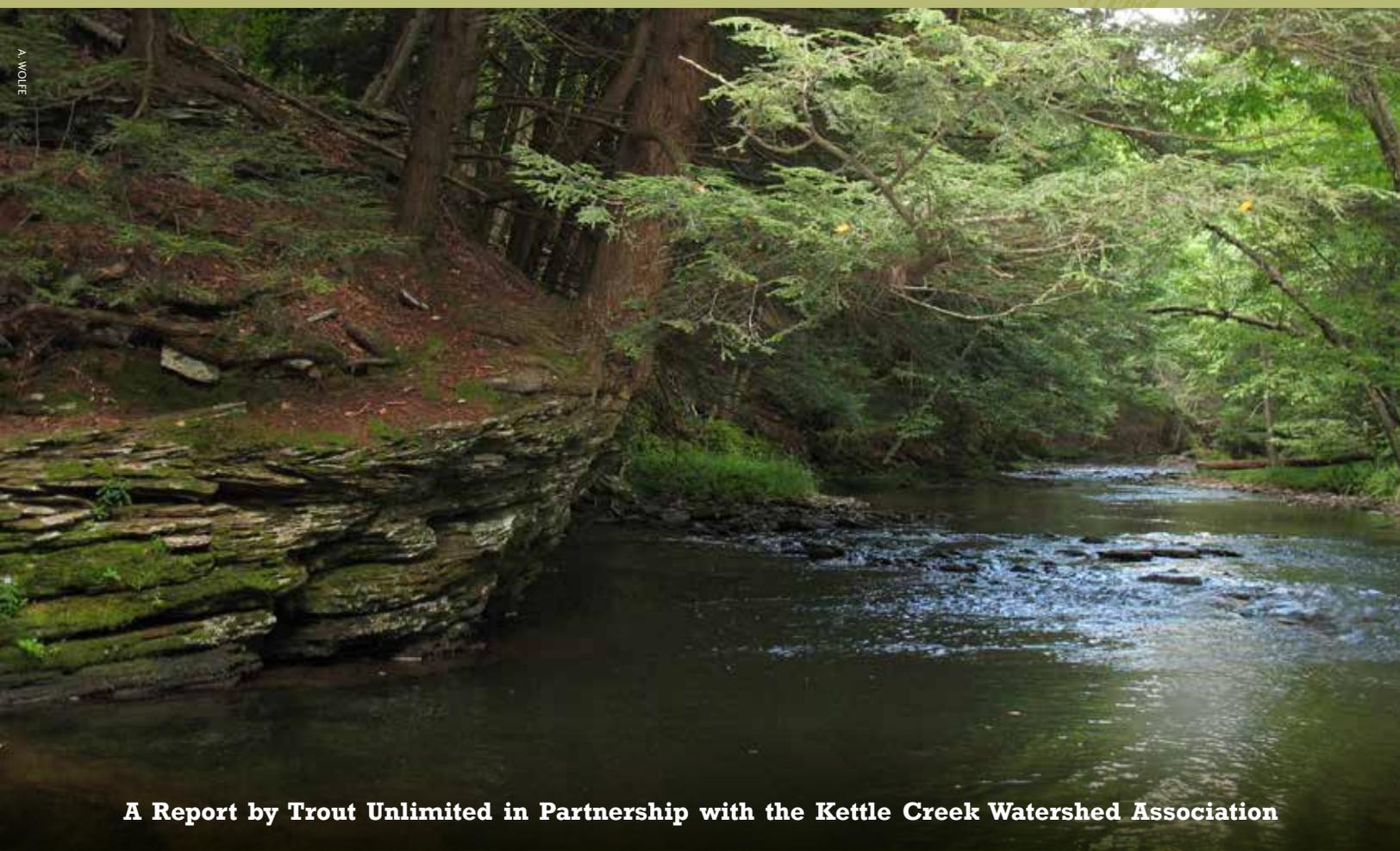


CELEBRATING 15 YEARS OF
RESTORATION IN PENNSYLVANIA'S

Kettle Creek Watershed

1998 - 2013

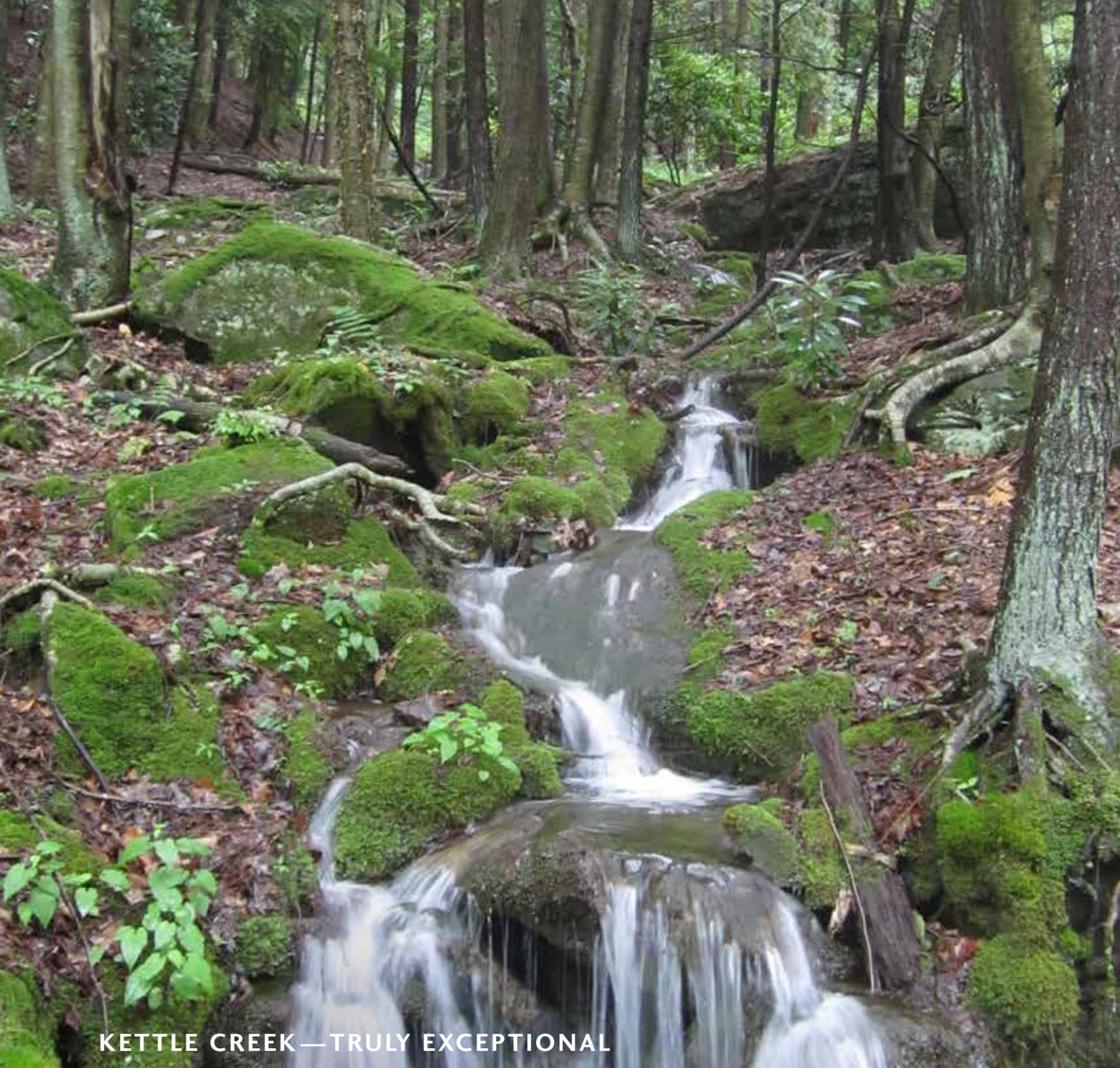


A WOLFE

A Report by Trout Unlimited in Partnership with the Kettle Creek Watershed Association

Kettle Creek
Watershed Association

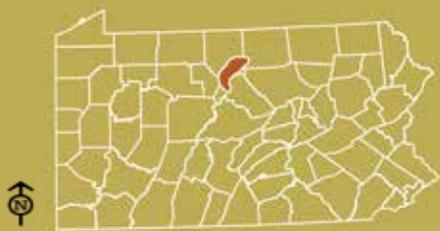




KETTLE CREEK—TRULY EXCEPTIONAL

LEGEND

 Kettle Creek Watershed  PA County Boundaries



The mainstem of Kettle Creek and all other streams within the Kettle Creek watershed above the Alvin R. Bush Dam are designated by the Pennsylvania Department of Environmental Protection as Exceptional Value in water quality, which is the highest water quality classification a body of water can receive. This portion of the Kettle Creek watershed represents the largest contiguous area in Pennsylvania with such a high water quality rating.

Introduction

Top-notch trout fishing, pristine mountain streams, large remote tracts of state forest land, and bountiful wildlife — all of these may bring to mind images of the Kettle Creek watershed in northcentral Pennsylvania. The mainstem of Kettle Creek, flowing approximately 43 miles from its headwaters in Tioga County through Potter County and on to where it enters the West Branch Susquehanna River in Clinton County, is fed by more Class A and wild trout streams than any other stream of its size in Pennsylvania. Encompassing nearly 245 square miles of steep-sided mountains and hardwood forests interspersed with dense stands of hemlocks and Eastern pines, the outdoor recreation opportunities are limited only by the imagination in this treasured heartland of Pennsylvania's Appalachian mountains.

Even the most downstream section of the Kettle Creek watershed, which was once rendered almost completely lifeless from historic coal mining that began in the late 1800s, is on the rebound with native brook trout and other aquatic life coming back after more than a decade of abandoned mine drainage (AMD) cleanup work.

In fact, abandoned mine cleanup projects are not the only types of projects that benefited the watershed over the last 15 years. Although fish habitat is pretty good in most of the Kettle Creek watershed — if not outstanding, especially when compared to other streams and watersheds that suffer from poorly planned development or agricultural runoff — habitat degradation is still apparent due in part to the lingering effects of clear-cut logging and stream channelization that was common in the region between 1895 and 1913. Also, unimproved and poorly maintained dirt and gravel roads criss-cross the watershed and contribute



A. DANIEL

excess sediment loading to the streams that impair aquatic habitat, particularly trout spawning habitat. Nevertheless, one only needs to stop by a fish habitat project and observe the improved fishing opportunities to know that progress has been made.

Success Over the Years



IT'S ALL ABOUT PERSISTENCE AND PARTNERSHIPS

The restoration effort in the Kettle Creek watershed was started in the mid-1990s by two people, an avid angler and conservationist and a professional forester who wanted to repair the damage that had been done to the watershed. Surprisingly, these two people were working on the issue separately, unbeknownst to each other. James (Jim) Dubisz, a certified public accountant was an active member of the God's Country Chapter of Trout Unlimited and spent much of his free time fishing throughout the Kettle Creek watershed. Over the years, his passion for fishing merged into a deeper understanding of how conservation and restoration are intricately intertwined and lead to better fishing. Jim subsequently recruited other Trout Unlimited members and some local residents, and together they formed the Kettle Creek Watershed Association in 1997.

Around the same time Jim was putting things in motion with a focus on much of the upper and middle Kettle Creek watershed, Robert (Butch) Davey, who was then the district forester for the Sproul State Forest, had decided that something needed to be done to clean up the abandoned mine drainage pollution – most of which happened to be on state forest land – that had been plaguing the lower watershed for nearly a century. There had been some previous attempts from local citizens to address this AMD in the lower Kettle Creek watershed, but unfortunately those efforts did not materialize into anything tangible. But, Butch saw the potential for a restored lower Kettle Creek watershed and he successfully convinced the Pennsylvania Department of Environmental Protection (DEP) to begin a water quality

monitoring program. He quickly took it upon himself to oversee the water sampling responsibilities for several years until Trout Unlimited hired full-time staff in 1999 and was able to assist with the project. The steps Butch took to get DEP's interest and support and the monitoring program he initiated was the beginning of what would end up being one of the most well-known and successful AMD cleanup efforts in the commonwealth and beyond.

While Jim Dubisz and Butch Davey played major roles in the early days of the Kettle Creek restoration effort, they also inspired and motivated countless other individuals – professionals and volunteers alike – to believe in their visions and join in the effort. Trout Unlimited (TU) partnered with the Kettle Creek

Watershed Association (KCWA) in 1998 as it adopted Kettle Creek as its third Home Rivers Initiative project, a river-based effort that combined applied scientific and economic research, community outreach, on-the-ground restoration and the development of long-term conservation and management strategies and tools. Many other partnerships were created over the years that include government and non-government agencies such as the Pennsylvania Fish and Boat Commission, DEP, the Clinton and Potter County Conservation Districts, National Fish and Wildlife Foundation, U.S. Fish and Wildlife Service, Twomile Rod and Gun Club, and many more. (A complete list of all project partners and funders is included at the end of this report).

Over the past 15 years, thousands of water quality samples were taken, numerous scientific assessments and restoration plans were developed, dozens of habitat improvement and AMD cleanup projects

were completed and hundreds of students and adults participated in educational trainings and workshops in the watershed. The Kettle Creek watershed was also the subject of several public television documentaries and was featured on TU's own fly fishing television program that aired on ESPN2 and the Sportsman Channel. Kettle Creek has also gained notoriety through a number of articles in TROUT magazine, other local and statewide newspapers and outdoor magazines, and a first-ever Governor's Award for Watershed Stewardship in 2000. Over the past 15 years, more than \$6.5 million has been spent on Kettle Creek projects through grants and other funds leveraged from government and philanthropy.

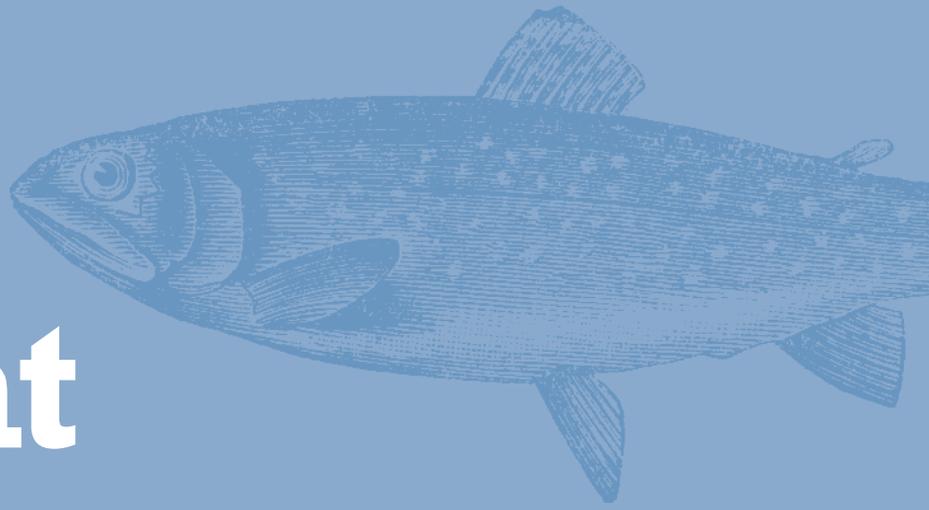
The successful restoration efforts accomplished in the Kettle Creek watershed – and lessons learned along the way – have served as a model of comprehensive watershed planning for TU in expanding its conservation work in Pennsylvania and beyond.

KETTLE CREEK HOME RIVERS INITIATIVE 1998–2007



The Kettle Creek Home Rivers Initiative formally ended in 2007. TU's Home Rivers Initiatives are not meant to last in perpetuity, but rather are meant to jumpstart watershed restoration in partnership with a local sponsor (i.e. KCWA) and then eventually turn the projects over to the local sponsor to continue in the long-term. TU maintains a close relationship with the KCWA and continues to lead the AMD remediation effort in the lower watershed. This continued collaboration was strengthened in 2012 when TU and the KCWA were funded to continue to address fish habitat and sedimentation issues in the Cross Fork Creek subwatershed.

Fish Habitat



While fish habitat across the Kettle Creek watershed is relatively healthy, a few of the early fish habitat projects the KCWA and TU worked on were located along the mainstem of Kettle Creek to address severely eroding streambanks and sections where habitat diversity (i.e. deep pools, alternating riffle and runs) was lacking. Most of these early project sites served as important demonstration projects to showcase how the KCWA, TU, and partners could improve fish habitat and reduce sediment erosion from unstable streambanks. Later on, scientific stream assessments and conservation and restoration plans were used as the basis for focusing much of the fish habitat improvement and bank stabilization efforts on tributary subwatersheds to Kettle Creek.

DEB'S PLACE PROJECT



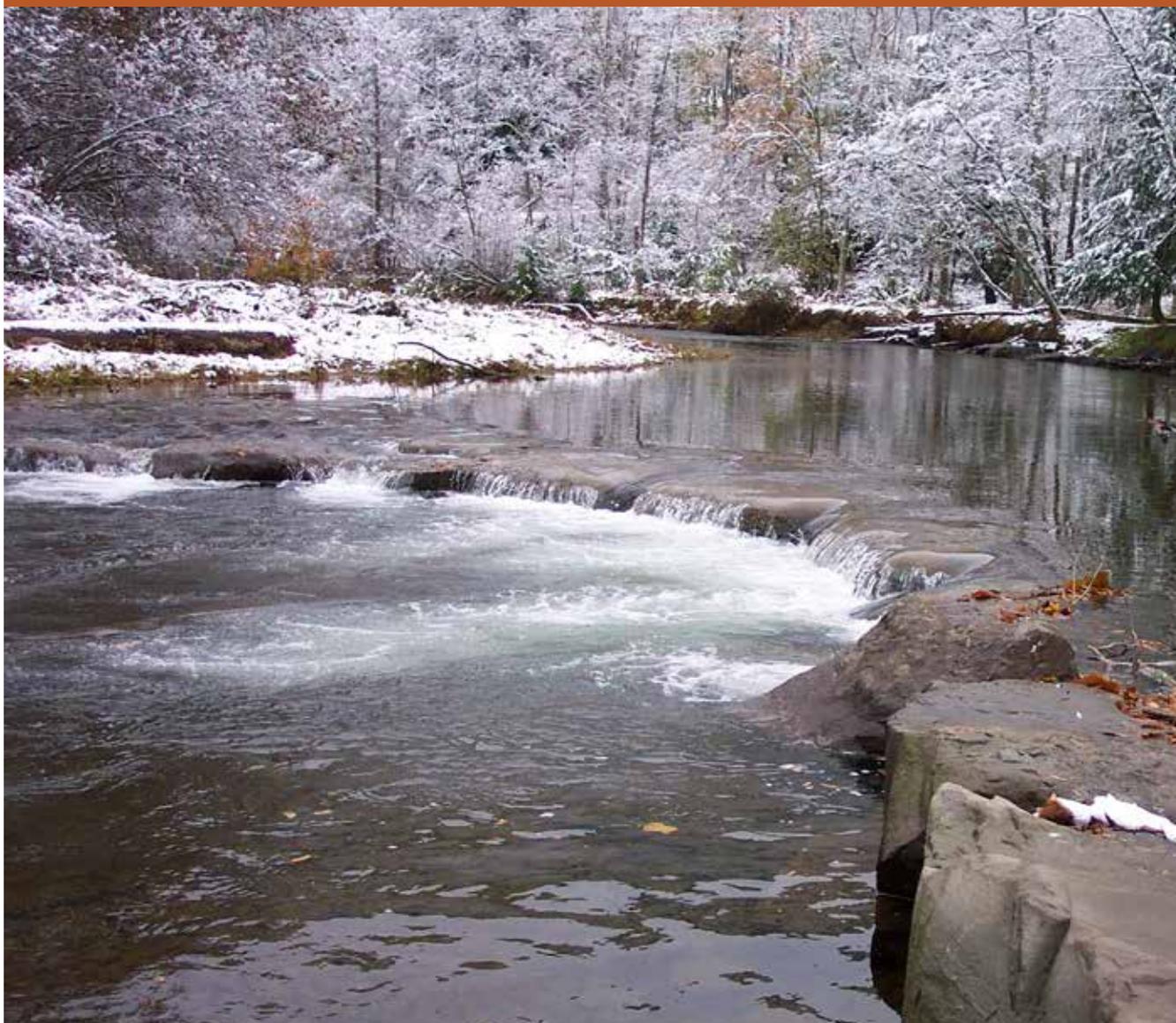
Local anglers will recognize this project on Kettle Creek behind where the original Deb's Place Restaurant once stood. Two rock cross vanes and one J-hook were installed in 2001 to reduce excessive bank erosion and prevent sediment deposition from blocking a thermal refuge (i.e. coldwater habitat) from a spring that flows from the base of the mountain for trout and other fish. Walk-in only fishing is still generously allowed by the private landowner.

HEADGATE PROJECT



A. WOLFE

Now one of the most popular fishing stretches along Kettle Creek, this area features six J-hooks, six cross vanes, a mud sill and numerous additional habitat enhancement features that were constructed in 2002 on this 3/4 mile section upstream from the village of Cross Fork. Although some maintenance has been necessary due to continued bank erosion around the “S-bend” opposite the road, the structures have worked well to provide an abundance of deep pool habitat and prevent the stream from continuing its migration toward the road.



N. WOLFE

CROSS FORK CREEK PROJECT



J. MCCARTNEY

One of the priorities that came out of the habitat and conservation plan was the need to address excess sedimentation and high water temperatures in the Cross Fork Creek subwatershed. At approximately 50 square miles, Cross Fork Creek is the largest tributary subwatershed to Kettle Creek. During 2006 and 2007, five habitat enhancement projects were completed along Cross Fork Creek between the confluences of Yochum Run and Windfall Run. A total of 16 log vanes and two modified bank cribbing structures, similar to mud sills, were installed to improve habitat with a targeted focus on the native brook trout population. Native trees and shrubs were planted to help with bank stabilization at habitat project sites and other sections of stream. New project designs for bank stabilization and fish habitat are underway, as are plans to improve sediment drainage and fish passage through road culverts throughout the Cross Fork Creek subwatershed.

The 2004 Upper Kettle Creek Fish Habitat and Conservation Plan and 2006 Tributaries Addendum were developed for the entire main-stem of Kettle Creek above the Alvin R. Bush Dam and six of its tributaries: Beaverdam Run, Trout Run, Hammersley Fork, Cross Fork, Little Kettle Creek, and the Upper Kettle Creek (designated as the stream upstream from the confluence with Little Kettle Creek). Every foot of these streams was walked by professional scientists, and measurements

to document conditions such as channel stability, instream habitat and tree canopy were recorded. An aerial survey was also conducted for Kettle Creek's largest tributary watershed, Cross Fork Creek, to help further understand past and current land use, floodplain connectivity and overall canopy cover. This science-based habitat and conservation plan has provided important guidance to the KCWA and TU in the efforts to improve fish habitat throughout the watershed.

TREE PLANTING PROJECT



A. WOLFE

Over the past 15 years, more than 5,000 trees and shrubs have been planted along the mainstem of Kettle Creek and many of its tributaries along eight miles of stream. Native tree species such as Eastern white pine and sycamore are commonly used in these areas. All tree planting to date has been accomplished by volunteers, including residents, seasonal residents, school children and individuals who have a vested interest in the Kettle Creek area.



A. DANIEL



Abandoned Mine Drainage

Coal mining that began in the late 1800s in the lower Kettle Creek watershed, as well as larger-scale surface mining that occurred through the early 1970s, was conducted with little to no regulation that required miners to restore the land and water when mining was completed. In the aftermath of mining, over 1,000 acres of scarred mine lands and approximately 12 miles of Kettle Creek and its tributaries were riddled with acidity and metals such as iron and aluminum that are toxic to fish and other aquatic life. Because the mining companies that once created this pollution no longer exist, the mines are considered “abandoned” and the cleanup is left to the commonwealth of Pennsylvania and others to voluntarily restore the impaired land and water.

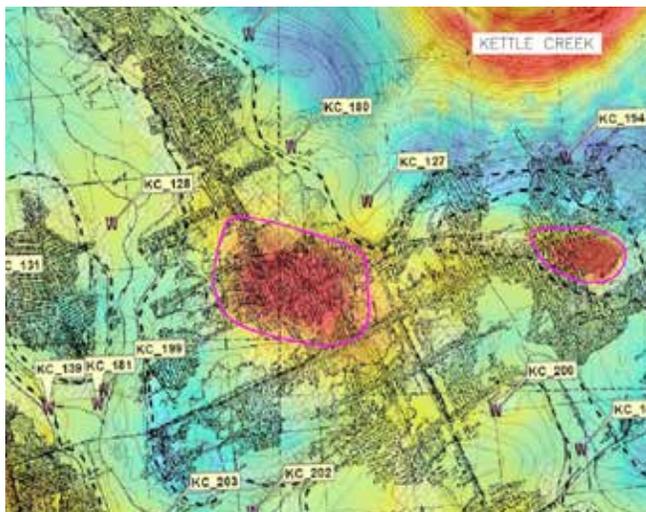
TWOMILE RUN LAND RECLAMATION PROJECT

Completed in 2005, this project addressed 57-acres of abandoned mine lands to augment surface water drainage and promote runoff. The resulting new landscape and vegetation allows precipitation to quickly drain from the site and inhibits the precipitation from infiltrating into the coal spoil and subsequently creating acidity. The project helped to significantly reduce the overall flow of AMD from this site and improved the water chemistry of the remaining AMD flows into Twomile Run.



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AIRBORNE REMOTE SENSING SURVEY



In 2001 and 2002, KCWA and TU worked with the Department of Energy's National Energy Technology Lab to conduct an airborne remote sensing survey of the AMD in the lower Kettle Creek watershed. The study used infrared and geophysical instruments to gather data on the location of abandoned mine drainage. The data collected using this cutting-edge technology provided useful information for selecting and prioritizing mine drainage treatment alternatives.

MIDDLE BRANCH PASSIVE TREATMENT SYSTEM PROJECT



In 2007, the KCWA and TU rehabilitated a passive treatment system that was originally constructed in 2000. Since the rehabilitation was completed, aquatic insects and native brook trout have returned to the entire length of Middle Branch and all age classes of these fish can be found in the stream. The stream is currently being monitored and is being considered for removal from the federal list of impaired streams.

Since the KCWA and TU joined forces in 1998 to restore the lower watershed from AMD, more than \$3 million in grants from government, non-government and philanthropic programs was spent to evaluate, plan and construct AMD projects. Over a dozen projects have been completed to date that include construction of AMD collection systems, drilling and installation of groundwater monitoring wells, mine pool stabilization, land

reclamation and passive treatment systems. In late 2013, construction began on a 100-acre land reclamation project, funded by a \$12.2 million contract from the Pennsylvania Department of Environmental Protection. This project is a first major step in the last phase of AMD cleanup, which is land reclamation, that will ultimately lead to the full recovery of the lower Kettle Creek watershed.

Collectively, these projects have helped to improve water quality so that native brook trout are now returning and thriving in once-dead sections of stream. Water that had a pH of 2.5 flowing from abandoned mines is now being treated to a pH of 7.0 and high concentrations of iron and aluminum (above 50 mg/L at many sites) is being reduced down to less than 0.5 mg/L. To date, nearly seven

miles of coldwater streams have been restored and reconnected in the Twomile Run subwatershed in lower Kettle Creek. The mainstem of Kettle Creek is on the brink of full recovery. Its water quality is fair, but still needs that last boost of water quality improvement to benefit the low numbers of various species of fish that are living there, in the acidic, metal-laden water.

MINE POOL STABILIZATION PROJECT



R. WYKOFF

The airborne remote sensing study paved the way for a more targeted hydrogeological investigation of AMD pollution sources that was completed by Hedin Environmental in 2007. The most important finding was the identification of the potential for a disastrous mine blowout from the Kettle No. 1 Mine, which is estimated to hold up to 38 million gallons of severely polluted AMD. Mine blowouts can be devastating and can occur with virtually no warning. To address this, KCWA and TU excavated the collapsed mine entries and constructed five collection trenches to facilitate free drainage from the mine to prevent the buildup of water within the deep mine pool.

The project was completed in December 2010. In the following spring, flows from the deep mine were more than five times higher than previously recorded flows—the project there may very well have prevented a disaster from occurring. While it can never be known for certain that the project prevented a catastrophic mine blowout, the conditions that spring were representative of those that could have caused a mine blowout.

Education and Outreach

Over the past 15 years, KCWA and TU have made a conscientious effort to reach out to landowners, youth and the general public to provide them with opportunities to learn first-hand about watershed restoration and conservation. Landowners were specifically targeted through hands-on workshops and the Kettle Creek Watershed Conservation Guide: A Landowner's Handbook that was developed to provide information for maintaining healthy stream channel corridors and planting native trees and shrubs. Youth from the local schools were involved in classroom and field education programs, such as the Kettle Creek Trout in the Classroom Discovery Program with 5th grade students at the Renovo Elementary School. Finally, the general public was educated and kept informed of watershed restoration projects through newsletters, the KCWA's website at www.kettlecreek.org, annual public meetings, magazine and newspaper articles and several television programs and documentaries.



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Planning for the Future

After 15 years of hard work and accomplishments — what does the future hold for restoration of the Kettle Creek watershed?



A. WOLFE

With more than \$6.5 million invested through grants obtained by KCWA and TU to improve and restore the watershed, the continued upkeep and maintenance of these projects will be critical to the longevity of the habitat and water quality improvements. Rock and wood devices that were installed to improve streambank stabilization and fish habitat should be periodically inspected and maintained. Similarly, water quality should be monitored on at least a quarterly basis at the AMD treatment systems so that necessary maintenance activities can be planned in advance to ensure the continued performance of the projects. Even the trees that are planted along the banks of Kettle Creek and other streams in the watershed should be regularly inspected, removing tree tubes when necessary, and controlling invasive vegetation to promote the growth and survival of the trees.

The work in the Kettle Creek watershed is not finished though. The fish habitat and mine drainage

restoration plans have identified specific sites and types of projects that still need to be addressed. For instance, numerous sections of Kettle Creek and its tributaries still exhibit overwide, shallow channels that lack proper habitat diversity. And the land reclamation, which should be the last phase in recovery of the mine drainage impaired lower watershed, is really only just beginning with the project that is currently underway. Lastly, keeping landowners, youth, and the general public engaged and supportive of watershed restoration projects will be important to sustaining this work well into the future.

Beyond maintaining past projects and completing new ones, perhaps most important is simply ensuring that Kettle Creek stays the special place that it is today. The Kettle Creek watershed is one of the few remaining areas on the East Coast where brook trout populations still thrive in their historic habitat. And where they have disappeared as a result of AMD pollution, successful remediation projects are changing that. Brook trout are recovering. Thus, protecting the last of this best existing habitat should be a top priority for this area. With 92% of the watershed in state forest and state park lands and a sheer abundance of streams with exceptional water quality and Class A native brook trout populations, the fishing experiences and overall quality of outdoor recreation in the Kettle Creek watershed are unparalleled.

Partners and Funders

Abbott Township
Canaan Valley Institute
Clinton County Conservation District
Coldwater Heritage Partnership Program
Cross Fork Sportsmen's Association
Department of Community and
Economic Development
Department of Energy National Energy
Technology Laboratory
Dominion Foundation
Dominion Transmission, Inc.
E.M. Brown Construction
Eastern Brook Trout Joint Venture
Federation of Fly Fishers
Fish America Foundation
Foundation for Pennsylvania Watersheds
Gannett Fleming
Headwaters Resource Conservation
and Development Council
Hedin Environmental
Kettle Creek Screaming Maggots

Larson Design Group
Leidy Township
Let George Do It
Lock Haven University
Mansfield University
National Fish & Wildlife Foundation
Natural Resources Conservation Service
Noyes Township
Office of Surface Mining Reclamation
and Enforcement
PA Association of
Conservation Districts
PA Council of Trout Unlimited
and Chapters
PA Department of Community and
Economic Development
PA Department of Conservation
and Natural Resources
PA Department of Environmental
Protection
PA Department of Transportation

PA Fish and Boat Commission
Pennsylvania State University Center
for Dirt and Gravel Road Studies
Pennsylvania State University Center
for Watershed Stewardship
Potter County Conservation District
Potter County Probation Department
Quehanna Boot Camp
Richard King Mellon Foundation
Skelly and Loy, Inc.
Smith Excavating and Construction LLC
Stewardson Township
Trout and Salmon Foundation
Twomile Rod and Gun Club
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Geological Survey
Western PA Coalition for Abandoned
Mine Reclamation
Western PA Conservancy
Wildlife Forever

KCWA Board Members and Officers

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Tim Bizzarro
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James Dubisz
David Flack

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Thomas Roberts
Charles Rosamilia
Jim Toth
Richard Sodergren
John Wasserman



The mission of the Kettle Creek Watershed Association is to monitor, maintain, protect and improve the entire Kettle Creek Watershed in Potter, Tioga and Clinton Counties.

The mission of Trout Unlimited is to conserve, protect and restore North America's coldwater fisheries and their watersheds.

More information on projects in the Kettle Creek watershed can be found at:

www.kettlecreek.org
www.tu.org

Contact Amy Wolfe at Trout Unlimited by emailing awolfe@tu.org
