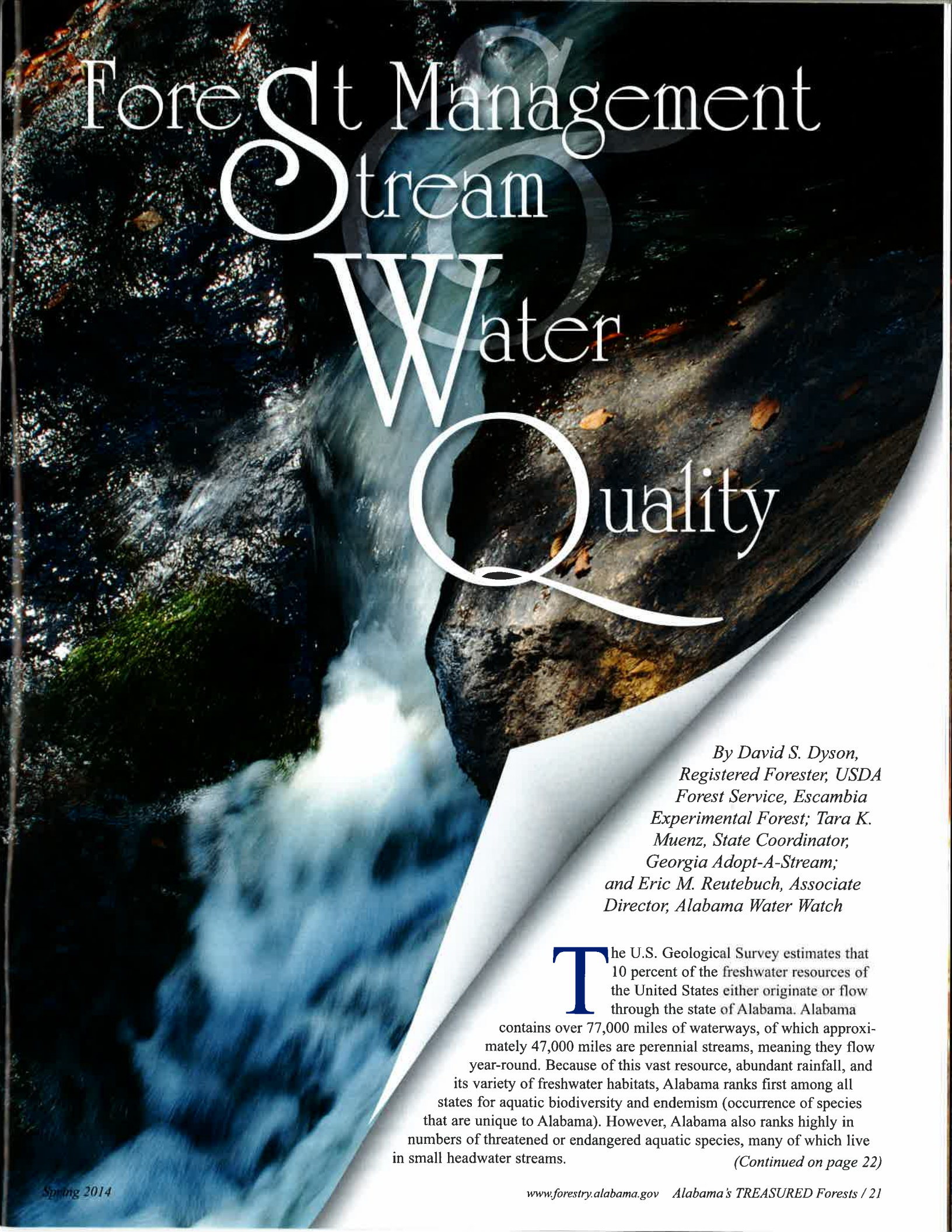

Forest Management Stream Water Quality

By David S. Dyson, Registered Forester, USDA Forest Service, Escambia Experimental Forest; Tara K. Muenz, State Coordinator, Georgia Adopt-A-Stream; and Eric M. Reutebuch, Associate Director, Alabama Water Watch

The U.S. Geological Survey estimates that 10 percent of the freshwater resources of the United States either originate or flow through the state of Alabama. Alabama contains over 77,000 miles of waterways, of which approximately 47,000 miles are perennial streams, meaning they flow year-round. Because of this vast resource, abundant rainfall, and its variety of freshwater habitats, Alabama ranks first among all states for aquatic biodiversity and endemism (occurrence of species that are unique to Alabama). However, Alabama also ranks highly in numbers of threatened or endangered aquatic species, many of which live in small headwater streams.

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Forest Management

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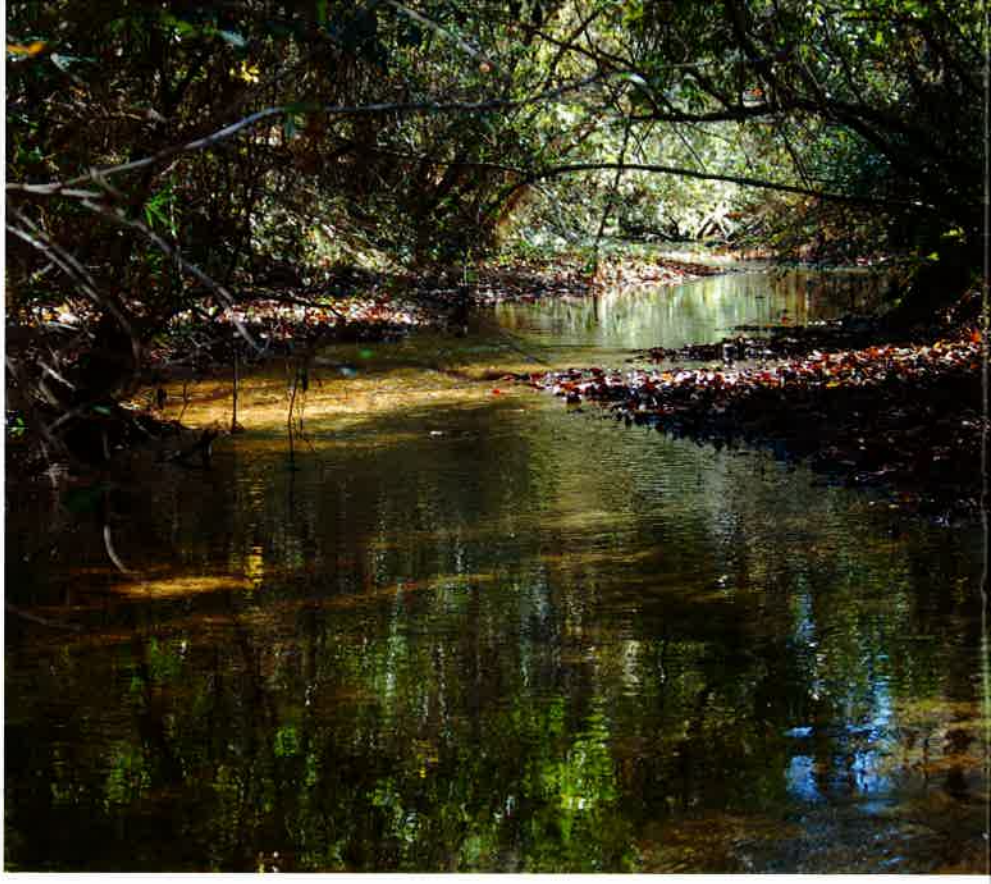


In an effort to preserve and protect Alabama's abundant supply of clean water, Alabama Water Watch (AWW) was founded in 1992, with the mission of improving water quality and water policy through citizen monitoring and action. Housed at Auburn University's Water Resources Center, AWW trains citizen volunteers to collect scientific data on water quality (chemistry, bacteria, and macro-invertebrates) in all of Alabama's major river basins following U.S. Environmental Protection Agency-approved quality assurance plans. These data are available online and periodically analyzed by AWW staff members for use in scientific and outreach presentations and reports aimed at improving water use, management, and policy throughout the state. Citizen-science programs such as Alabama Water Watch are found throughout the United States and fulfill a large role in supporting data collection needs. These data provide a baseline of water quality information for many state agencies, watershed organizations, universities, and local governments for making important water-related decisions.

A strong component of volunteer-based organizations is having effective partnerships. In 2009, Alabama Water Watch partnered with its Georgia equivalent, Georgia Adopt-A-Stream (AAS), which is housed within the Environmental Protection Division of the Georgia Department of Natural Resources. Together, they drafted a Memorandum of Agreement "for the purpose of acknowledging the common elements of both programs. It is an agreement to accept each other's Quality Assurance/Quality Control training, workshops, and data collection methods."

Together, AWW and AAS have trained citizens from both states, supporting each other in shared river basins such as the Chattahoochee, Tallapoosa, and Coosa basins. Both programs have been in existence for over 20 years, successfully certifying thousands of volunteers to monitor the health of their local lakes, streams, coastal estuaries, and freshwater wetlands. Additional partnerships also abound, creating connections with teachers and schools, Extension groups, universities, river keepers, and many more. It is easy for citizens to grasp the content of the training workshops, and many are interested in learning about their water quality through monitoring physical/chemical and biological properties.

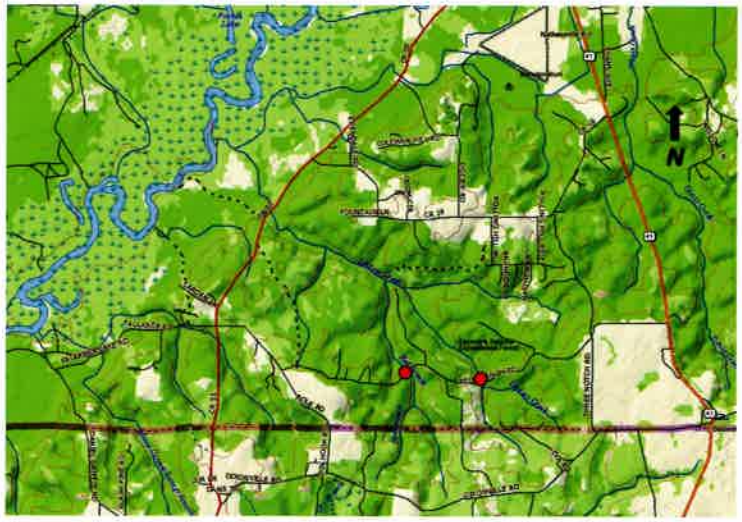
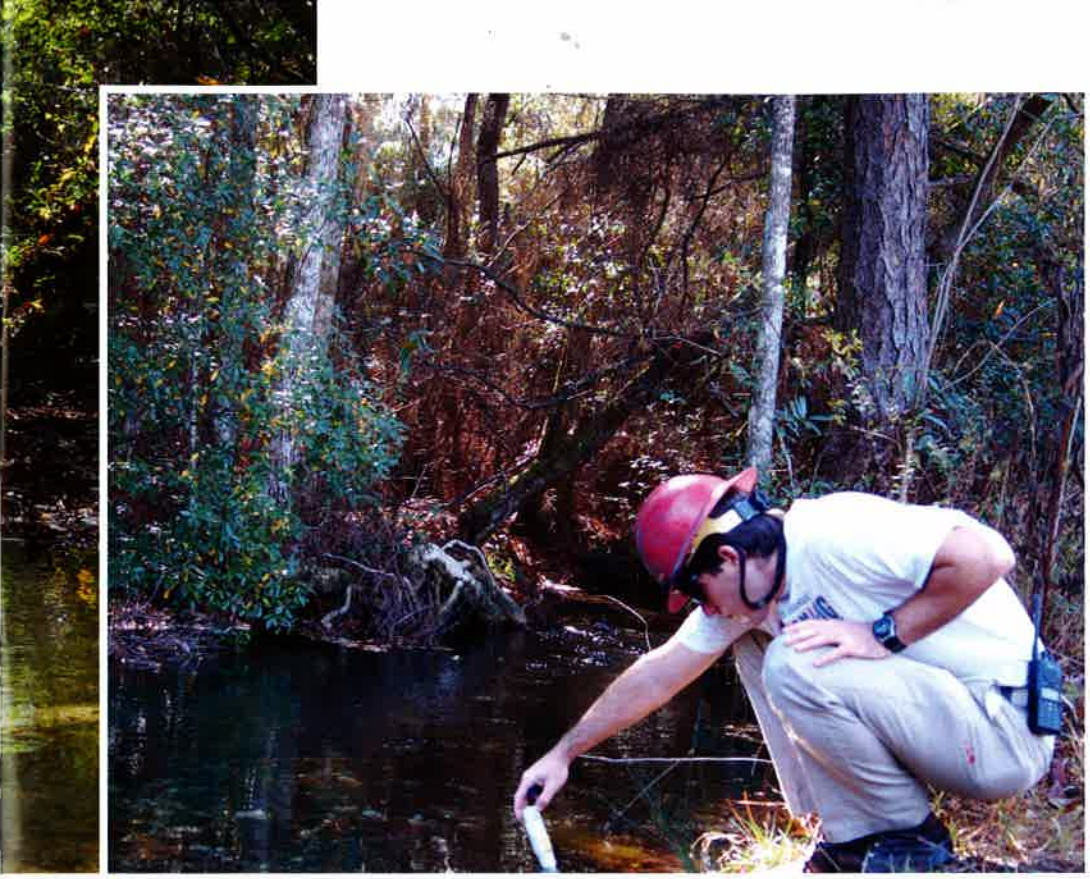


Figure 1 - Map of South Fork and Red Branch sampling sites at the Escambia Experimental Forest in Escambia County, Alabama.

One recently-developed partnership is among Alabama Water Watch, Georgia Adopt-A-Stream, and the USDA Forest Service, Southern Research Station. As part of the research program at the Escambia Experimental Forest (EEF) near Brewton, Alabama, scientists were interested in the effects of various types of forest management on stream water quality. The EEF is a 3,000-acre tract managed in cooperation with T. R. Miller Mill Company of Brewton for longleaf pine management research. It is a forested, mesic upland site on the Upper Coastal Plain that receives an average of greater than 60 inches of rainfall per year and is characterized by rolling topography and dendritic drainage.

Since receiving training in chemical monitoring from the Georgia Adopt-A-Stream Program in 2010, Forest Service technicians have collected and submitted data to Alabama Water Watch. Two streams on the EEF are actively monitored: South Fork of Lindsey Creek and Red Branch (Figure 1). South Fork is a third-order stream at the sampling point, and its watershed is approximately 785 acres and contains 140 feet of relief. The stream is primarily fed by groundwater and shows tannins only after large rain events. In contrast, Red Branch is a second-order stream. The watershed above the sampling point is 700 acres with 140 feet of relief. Red Branch consistently shows tannic water, and discharge is more affected by rainfall patterns. Both streams feed



into fourth-order Lindsey Creek, leading to the Conecuh River and eventually Escambia Bay.

Water chemistry monitoring at the EEF includes four tests conducted monthly at baseflow levels: water temperature, pH (acidity), dissolved oxygen, and electrical conductivity (a measure of dissolved minerals present in the water, such as the cations sodium, potassium, calcium, aluminum, etc.). With proper training, such tests are simple to conduct and provide scientists with baseline data about a stream's health. Data from the EEF is especially valuable because it represents near-reference conditions, as the South Fork and Red Branch watersheds are undeveloped and largely forested, representative of over 60 percent of the state of Alabama. Furthermore, these watersheds are actively managed using Alabama's Best Management Practices for forestry (BMPs), so data from these sites demonstrate the effects of using BMPs.

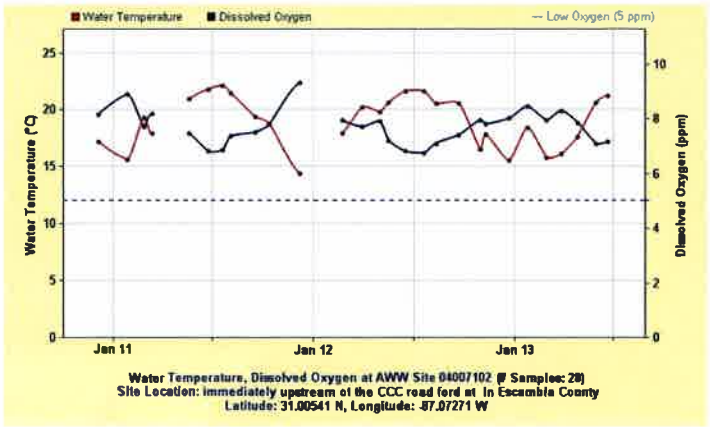
Three years of data show that despite somewhat different ecology, both South Fork and Red Branch consistently exhibit good water quality (Figures 2 and 3). Because their sources are mostly groundwater, stream water temperature varies little throughout the year, but is influenced seasonally. However, pH, dissolved oxygen, and conductivity remain highly consistent throughout the year. Both streams are influenced by rainfall events and surface runoff, but their forested watersheds are quite effective at moderating the effects of storm water. The consistent chemistry of these streams, relative to that of negatively-impacted streams, demonstrates how important intact forest buffers are to our water supply and also shows how proper forest management can have minimal impacts on water quality.

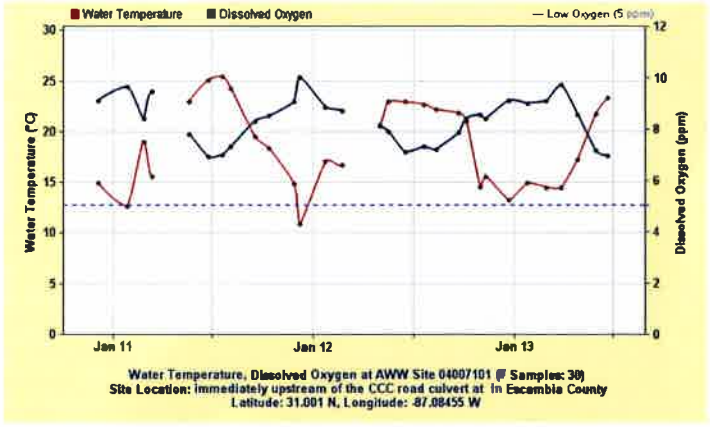
Monitoring surface water conditions is vital to ensuring the health of aquatic ecosystems and providing safe drinking water. Approximately 60 percent of public water supplies in Alabama are from above-ground sources, and these water systems depend on clean, healthy streams to replenish their reservoirs. Active stream monitoring programs such as Alabama Water Watch and Georgia Adopt-A-Stream not only support public water systems by providing an additional layer of water quality testing, but also alert authorities to potential future problems by evaluating long-term water chemistry and biology data. Furthermore, volunteer-led water monitoring programs can quickly identify areas that are not safe for recreation and accelerate steps to rectify problems. By partnering to generate high-quality data, Alabama Water Watch and Georgia Adopt-A-Stream are able to inform policymakers responsible for protecting and managing Alabama and Georgia's water supplies to support public health, recreation, agriculture, industry, and overall quality of life.

For more information, visit:
Alabama Water Watch:
www.alabamawaterwatch.org

Georgia Adopt-A-Stream:
www.georgiaadoptastream.org

Escambia Experimental Forest:
www.srs.fs.usda.gov/longleaf/forests/escambia.html





Figures 2 & 3 - Temperature and dissolved oxygen data from South Fork and Red Branch exhibit the classic inverse relationship of healthy streams.