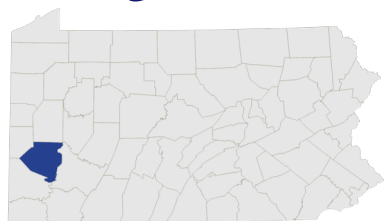


# My Story

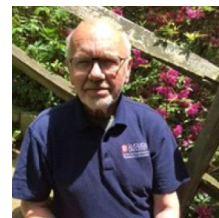


## A Living Laboratory

### Wingfield Pines Conservation Area

By Edward Schroth, Environmental Education Emeritus,  
Duquesne University

*"Wingfield provides students a laboratory for their investigations under the guidance of experienced research scientists and community partners."*



Abandoned mine drainage (AMD) is a serious problem for many areas of the world, but particularly in Pennsylvania, where over 250,000 acres of abandoned coal mines and mine waste containing pyritic rocks leach sulfuric acid into surrounding waters. The combined acidity and metals content of AMD waters pose a serious threat to humans and wildlife. Using currently available treatment technologies, it would cost over \$1.5 billion to remediate the approximately 3,000 miles of streams affected by AMD in Pennsylvania.

Allegheny Land Trust's (ALT) Wingfield Pines Conservation Area is located in the southwest corner of Allegheny County, situated within the floodplain of Chartiers Creek. It was formerly a site plagued by AMD. ALT purchased the 80-acre property in December of 2001. In



**Keystone Fund Investment:** \$225,000

**Total Public/Private Investment:** \$1.2 million

cooperation with ALT staff, environmental engineer Bob Hedin designed and implemented an aesthetically pleasing passive treatment system that students can walk through to watch the water transition from murky orange to natural, clean, clear

water flowing into Chartiers Creek. About 1,800 gallons per minute of mine drainage flows by gravity into a collection basin. Overflow from the basin enters one of four more ponds. Iron oxide settles out in each pond, then passes through a constructed wetland before being discharged into Chartiers Creek.

I have been working with both undergraduate and graduate Duquesne University students at Wingfield Pines for 10 years. This on-site experience provides benefits for the students

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that can't be replicated in a classroom setting: the spontaneity of an evolving ecosystem, of never knowing what might happen while walking from pond to pond. It's a true example of the problem-solving style in science education. The students, along with the teacher, become critical co-investigators in dialogue.



resistance barriers. By the third year, students could calculate correlations between years and witness the resulting biological succession. Each of the five ponds is unique and illustrates biodiversity as a result of the species' adaptations.

Wingfield provides opportunities to pursue procedural options to design and carry out individual experiments in which students learn causes and effect relationships within the system's biological succession. In the Wingfield system each pond has different rates of oxidation each responsive to factors such as pH, depth of each pond, and turbidity. It is a living laboratory that illustrates changes from season to season and year to year. Students are able to analyze data over a period of years. They are able to question, observe, sample, and analyze the scientific phenomena of biological remediation which then stimulates curiosity and creativity in watching the succession of both vegetation and aquatic biota within the flow of the ponds.

We were fortunate in 2009 to be invited by ALT to initiate collecting data at Wingfield. Initially the system was filled with AMD water void of aerobic organisms and early water samples only contained single celled algae. But within the first year, macroinvertebrates, amphibians, and fish appeared, many migrating in from Chartiers Creek. In 2010 macroinvertebrates and fish first entered the lower wetlands, then migrated up through ponds, each with higher tolerance

The students I engage at Wingfield are not just science majors, but represent different disciplines such as economics, philosophy, and the humanities, which often never require students to step outside the walls of the university during their four years of education. A student does not need to be a scientist to observe and record temperatures or seine a fish. This activity connects science to other disciplines. Essentially, field experiences don't just make good scientists, they make good voters and good people, less absorbed in themselves and more aware of the world around them. Wingfield provides students a laboratory for their investigations under the guidance of experienced research scientists and community partners such as ALT which provides space on its website for students to post data and share their story of Wingfield with the public.

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