

*This document is based on a email that was sent to the Guardians from Jerry Moore, Ph. D on Thursday, June 14, 2012 at 8:54 pm. Jerry's letter discussed the importance of coffer dams in the West Fork, and the consequences of dam removal on current aquatic biota. He offers his opinions as a stream ecologist who has extensively studied the Monongahela, Tygart, and West Fork rivers of West Virginia.*

My master's thesis at West Virginia University was based on the presence or absence of vascular rooted aquatic plants in the main stem of the Monongahela River, the Tygart Valley River, and West Fork River in West Virginia. Dr. Roy B. Clarkson, Dr. Earl L. Core, and Dr. Robert L. Smith were on my research committee. We researched the presence and/or abundance of rooted aquatic plants and the effect of these on other biota. I had sampling sites on the Mon., the West Fork, and the Tygart Valley River. We covered every square inch of these rivers from the PA line to Elkins, Buckhannon, Jacksons Mill, and above. Many chemical and physical factors were evaluated. I proved beyond a shadow of a doubt at 95% certainty that rooted aquatic plants only grow in stable waters such as natural rock outcrops on the West Fork below and above Clarksburg.

### Presence of the Coffe Dams

The presence of water was 2,000 times more important than the presence of acid mine drainage in the West Fork River and in the Tygart River. Without water, there were no plants nor fish and other aquatic biota. Water velocity was 1,000 times more important than acid mine drainage to the presence or absence of plants. Total acidity was the third most important factor affecting plant presence or absence, after the presence or absence of water and water velocity.

The West Fork River has coffer dams in which ten plant species neutralize total acidity, raising pH to 6-7 and in some cases to pH 8. However, below Clarksburg and down to Worthington, WV, the river has pools and riffles on bare rock and nothing but carp and suckers. The yellow boy (iron hydroxide) coated all living things and prevented their growth and reproduction. At Spelter, there was a rock outcrop which

had rooted plants in the sand and muck that accumulated there. Bass and bluegill lived in these holes. Rooted aquatic plants such as *Eleocharis acicularis* used the hydrogen ions in the acid water to make photosynthesis effective and neutralize water, therefore, where there are rooted plants there are usually fish.

The dam and locks on the Mon. River create stable water where sand, silt, and finer particles pool out in the areas beyond the main dredged channel. In these areas, one can find millions of *Eleocharis acicularis*, which neutralize more acid than other plants. I published this material in the *West Virginia Academy of Science* in 1967 and in 1968. The EPA has cited my work extensively in their book "Going Toward a Cleaner Aquatic Environment", and I have been cited in the U Mass biology department, where myself and Dr. Larson conducted research on the effects of acid mine water on beaver and muskrat fur. Cortex region damage on hairs make them less durable and therefore less valuable. This research was done on Big Bingamon Creek. In the lab, *Eleocharis acicularis* survived until pH levels reached 1.7. Fish are killed at a pH range from 3.2 to 3.4 by a denaturing of the gill protein. Acidic water itself does not control the distribution or abundance of water in the Mon., West Fork, or Tygart Valley Rivers in West Virginia, and therefore, it does not primarily control the presence or absence of aquatic plants.

Removing coffer dams, whether they have been there for 100 years or less than 10 years, will definitely completely change the biota from what currently exists in the West Fork. It will especially change populations of game fish, the head of the biological food chain in the water.

My research has included, "The Potomac as a Model Estuary for the Nation", "Thepenobscot River Biology", "The Biology of the Great Dismal Swamp in Virginia", "The Ballantine National Sea Shore National Biological Place" and many, many others. I worked with the USDI, USDA, and for the past 22 years with the federal EPA in Washington DC, covering subjects of national and international importance.