INSIGHTS FROM LONG-TERM RESEARCH ON THE FERNOW EXPERIMENTAL FOREST

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In 1951, five weirs were constructed in the mixed hardwood forests of the Fernow Experimental Forest and watershed research began. Specializing in long-term watershed scale manipulations, researchers at the Fernow have evaluated effects of various silvicultural practices on water yield, seasonal flow patterns, water quality and on ecosystem processes and ecosystem services. Experiments with fairly narrow initial hypotheses have attracted researchers from around the world to address issues far removed from timber harvesting and forest management. Considerable research has been dedicated to understanding the effects of air pollution, particularly acidic deposition, on forest ecosystems. This research has led to detailed studies on biogeochemical cycling in mixed species forests. New issues which have arisen and been added to the research portfolio are soil acidification, nitrogen saturation, base cation depletion, climate change, and severe storm effects. The Fernow is unusual because of the variability in nitrogen retention among its gaged watersheds. In particular, research on cycling of nitrogen in forested watersheds has been ongoing for many years at the Fernow. In the early years (1970s and early 1980s), fertilization studies suggested that nitrogen was limiting tree growth. Later watershed research documented that nitrogen appeared to be available in excess of biotic demand, suggesting that some stands on the Fernow were nitrogen-saturated. Long-term documentation of high rates of nitrogen (and sulfur) deposition, along with parallel monitoring of stream water chemistry from several gauged headwater streams, has revealed high rates of nitrate export, along with some of the lowest rates of nitrogen retention in the eastern U.S. The Fernow Watershed Acidification Study and the Fork Mountain Long Term Productivity Study have both evaluated the effects of elevated nitrogen additions on nutrient cycling, tree growth, soil chemistry, and a variety of other parameters. Still, there are interesting gaps in our understanding of ecosystem processes, such as nutrient cycling, that suggest additional research topics.

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Citation for proceedings: Stringer, Christina E.; Krauss, Ken W.; Latimer, James S., eds. 2016. Headwaters to estuaries: advances in watershed science and management—Proceedings of the Fifth Interagency Conference on Research in the Watersheds. March 2-5, 2015, North Charleston, South Carolina. e-Gen. Tech. Rep. SRS-211. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 302 p.