The Effects of Pollution Reduction on a Wild Trout Stream

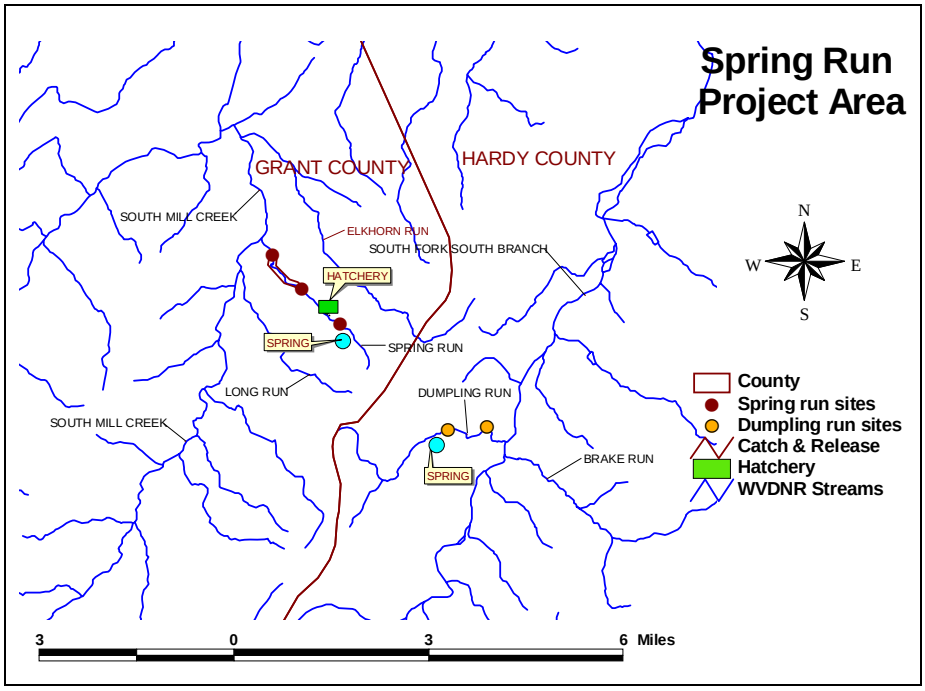
Background

Spring Run is a beautiful and unique headwater stream in the Potomac Highlands of West Virginia. Fed by the largest spring in the region (averaging 3000-3500 gallons per minute), its temperature (~53 °F) and pH (~8) provide aquatic conditions that are ideal for trout and the aquatic invertebrates they eat.

Spring Run is fortunate to have landowners who work to protect it both for fly fishing catch and release recreation by written permit, and for future generations. Since the early 1960's, landowners and other interested parties have installed and maintained various structures to form hiding and feeding habitat for trout on a ¾ mile long section of Spring Run, and managed it for catch-and-release only fly fishing. As a result of their efforts, Spring Run is recognized as one of the best "wild" rainbow trout fisheries in West Virginia. Friends of Springs Run's Wild Trout, was formed in 1996 to restore stream structure to Spring Run following flooding in 1996.

In recent years, fishermen have noted a decline in the fishery. The number of large trout (14" and above) has decreased and trout in the 11-13" range have also declined in abundance. Landowners report that algae growth has become much heavier in the upper reach of the three-forth mile section than in the past. Fly fishermen have reported declines in aquatic insects, especially the "sulfur" mayfly which emerged in late spring and small yellow stoneflies, often called "yellow sallies".

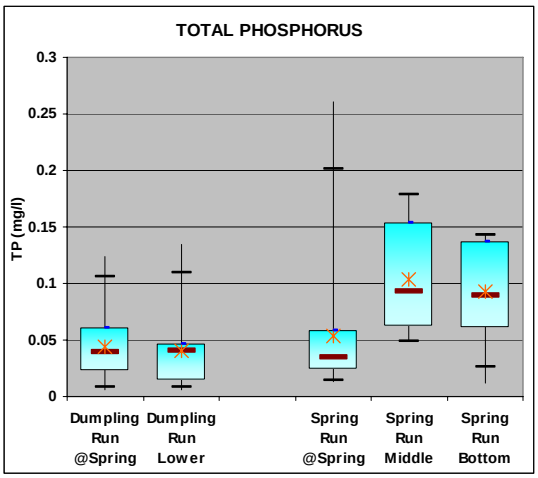
The Spring Run Trout Hatchery (SRH) is located near the spring, about one-half mile upstream of the managed fly fishing section. Much of the spring's output is diverted through the SRH facility before being returned to the stream channel. In recent years SRH (a trout rearing, not spawning, facility) has been producing more rainbow and "golden trout" for stocking West Virginia streams. WVDEP issued a citation for violation of the SRH NPDES permit in January 2004, specifically for discharging excess biochemical oxygen demand (BOD) and total suspended solids (TSS). WVDNR, which operates SRH, is installing an effluent treatment process at the facility to meet their permit requirements. In addition to TSS and BOD, SRH delivers nutrients in its effluent (see results below).



Baseline Study Components

The prospect of new effluent treatment at SRH provided a unique opportunity to address a number of important questions. For example, how will Spring Run's periphyton (attached algae), benthic invertebrates, and rainbow trout respond to changes in water quality following the hatchery upgrades? With funding from the Chesapeake Bay Program, the Spring Run environmental study began in 2005. Two years of baseline data have been collected. The design of this project includes an upstream & downstream component in Spring Run, and a treatment & control component comparing Spring Run and nearby Dumpling Run. Both streams are spring fed and have their origins in the same limestone and sandstone geology. This approach allows both within stream and between stream comparisons.

The study parameters are: field chemistries (pH, temperature, dissolved oxygen, conductivity); laboratory chemistries (total phosphorus, various species of nitrogen, TSS, and BOD5); and biological (benthic macroinvertebrates, periphyton, fish – by WVDNR and fisherman catch records by section, and stream flow.

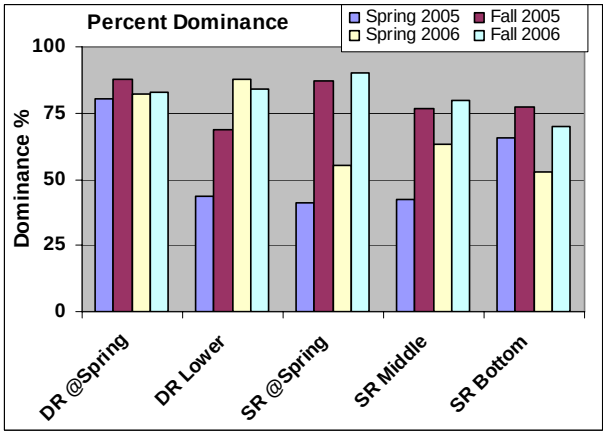


Baseline Data Summary

Chemistry. The spring source water for the two streams has similar pH, conductivity, dissolved oxygen, TSS, and phosphorus. Source water in Dumpling Run tends to have less nitrate, and total N than Spring Run, and higher BOD5. Conductivity and pH tend to increase or not change in a downstream direction in Dumpling Run, and tend to decrease in a downstream direction in Spring Run. Nutrients and TSS are generally similar in the two Dumpling Run sites, and were higher downstream of SRH in Spring Run – phosphorus in particular (figure at left).

Benthic Macroinvertebrates. Dominance, often extreme, was the benthic macroinvertebrate story at all sampling sites (figure below). Amphipods were dominant at four of the five sites and midge larvae (Chironomidae) at one – Spring Run Middle (SR Middle on graph), the site closest to the SRH outfall. Amphipods are often abundant in limestone spring fed streams, and their dominance was not a surprise. Dominance by midges is characteristic of streams with organic pollution.

Fish. Fisherman catch records indicate that rainbow trout increase in abundance and size from the lower to the upper end of the managed catch and release section of Spring Run. Fish surveys by WVDNR indicate that the fish population near the middle of the managed section is characterized by very low diversity, with extreme dominance by rainbow trout. A survey near the confluence of Spring Run with South Mill Creek found greater diversity, including several abundant non-trout species, but still distinctly lower diversity than was observed in a similar survey in 1978.



Education and Outreach

Education and outreach are important components of this project. Friends of Spring Run's Wild Trout, have cooperated with project partners, in hosting annual one-day stream monitoring workshops on Spring Run. The benthic workshops bring together a diverse group of individuals ranging from students; fly-fisherman, environmental professional and community leaders to better understand freshwater ecology. A display with a comprehensive overview of the study has been shown at several conferences, including 2005 WV Watershed Celebration Day and the recent Volunteer Monitoring in the Mid-Atlantic Conference held in Canaan Valley. In addition, local newspapers have published articles about the program

Partners: Friends of Spring Run's Wild Trout, WV Conservation Agency; WV Department of Agriculture; WV Division of Natural Resources; WV Department of Environmental Protection; Cacapon Institute; Chesapeake Bay Program; and Freshwater Institute

Contact info- website

Copies of the Baseline Studies Report: 2006 can be found as a downloadable PDF file at http://www.wvca.us/wvwrc/spring_run_study.cfm and as a html document readable on-line at www.cacaponinstitute.org/Spring%20Run/SpringRunReport2006.htm

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