

Water Quality Report

By Jill Sidebottom

Christmas Tree Farms & Water Quality People don't understand what goes into growing a Christmas tree. We all know that. Unfortunately, we also know that most people think Christmas tree production is bad for the environment, particularly surface water quality. One environmental group even implied that streams were dead below Christmas tree farms!

Because of this interest in water quality among Christmas tree growers and those watching the industry, several county extension agents, Jeff Owen, and I started a water quality survey below Christmas tree farms to determine if problems exist. The project was funded through a water quality grant from NC State University.

The bulk of the project was a survey of benthic macroinvertebrates. These are organisms that live on the bottom of streams (benthic) that are large enough to see with your naked eye (macro) and have no backbone (invertebrates). Most of these are insects, but also include such things as snails, crawdads, and worms. Of course, these make up the diet of trout and other wildlife around creeks.

Macroinvertebrates are good indicators of water quality because many are intolerant to pollution. The groups of primary interest are the EPT's which stands for mayflies (Ephemeroptera), stoneflies (Plecoptera) and caddisflies (Trichoptera). These three orders of insects are often particularly intolerant to pollution. Like the canaries that used to go down into the mines with the coal miners to aid in the detection of toxic gases, the EPT's will be the first victims of any type of pollution in streams. We can detect water quality problems by measuring the relative percentage of EPT's to other macroinvertebrates. Usually if EPT's make up 50% or more of the population, the creek is considered healthy.

How We Did the Survey

The survey we conducted lasted from December 1998 through the present. A Christmas tree farm was chosen in Alleghany, Watauga, Mitchell, Jackson, and Avery Counties. Many samples were taken monthly, with particular interest to monitoring after spring pesticide and fertilizer use. All samples were compared to a reference creek, which may be "above" the trees on the same creek, or a similar, near-by creek in undisturbed woods. This is to take into account changes in the macroinvertebrates due to the time of the year and the weather.



Macroinvertebrates were caught with a kick-net. The rocks on the bottom of the creeks were stirred up by kicking them around, and the aquatic creatures caught in the net. A portion of each sample was taken and all the macroinvertebrates were tallied in the different groups such as mayflies, stoneflies, caddisflies, midges, snails, etc. These counts were converted to a percentage of the total. Steve Fraley, a consultant with the Tennessee Valley Authority, also identified many representative EPT's to species. Even EPT's vary in their tolerance to pollution. By knowing the species, you can identify the presence of the most sensitive.

What We Found Out

The following are some study findings to date:

Below Christmas trees there were statistically fewer stoneflies and more total insects. Most of the sites below Christmas trees no longer had shade on the creek. More sunlight hitting the water increases the capacity of the creek to support life. However, it also increases water temperature and reduces the amount of leaves falling into the creek on which these insects feed. This could explain the reduction in stoneflies. There were also significantly more riffle beetles below Christmas tree farms. Their presence may indicate a prob-

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lem with sediment getting in the water from road or bank erosion, or bare ground from herbicide use around trees. Spring pesticide and fertilizer use in Christmas trees did not affect macroinvertebrate counts in the study sites. The above-mentioned changes were the same no matter what time of year the samples were taken. If pesticides were causing a problem, you'd expect to see a kill after application. The Jackson County site most closely resembled a creek coming out of the woods. In other words, it was the best site. That was because of the good buffer around the creek. The grower left an area of undisturbed woods along the creek so that pesticides, fertilizers, and sediment can't reach the water. Many of the most pollution intolerant species were found below Christmas tree farms at several sites.

This study does indicate a shift in macroinvertebrates below Christmas tree farms, except in the site where there was a very good buffer. However, compared to other land uses in the mountains such as cattle or even houses, these effects are very slight.

What This Means to You

This is good news for the Christmas tree industry. It demonstrates that there is not a significant water quality problem in mountain streams due to Christmas tree production. It's something we'd like to make the public aware of. Jerry Washington presented a display summarizing these results at Christmas in July in Ashe County and the Alleghany County fair. Several local newspaper articles have also been written. These data can

be shown to groups expressing concerns about Christmas tree production.

However, no matter how good you are, you can always get better. Growers should continue to avoid pesticide and fertilizer applications wherever possible. Though most growers have stopped trying to keep the bare ground under their trees thereby reducing erosion, sediment is still getting into the creeks when land is cleared for Christmas tree production, or when farm roads wash. Better buffers along creek banks would help decrease water temperature, add leaf matter that many macroinvertebrates need for food, and keep sediment, pesticides, and fertilizers out of the creek. Grass is one of the worst buffers because it provides no shade and often sloughs off the bank.

Many of these Best Management Practices will be demonstrated through an upcoming EPA 319 grant in the New River watershed starting in July of 2000. This project, under the leadership of Jim Rideout with NC State, will help implement and demonstrate the benefits of many of these practices.

Water quality is important to all of us. To learn more about how to protect creeks on your farm, contact your county extension agent.

Special thanks go to Christy Bredenkamp, Doug Hundley, Jerry Moody, Jeff Owen, Mike Stroot, Jeff Vance, Jerry Washington and all the Christmas tree growers and other landowners who allowed us to come onto their property and sample their creeks.



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