Analyzing the Effects of Spruce Beetles on Aquatic Ecosystems through Macroinvertebrate and Water Quality Sampling in Conejos County, Colorado

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In North America, the spruce beetle (Dendroctonus rufipennis) has killed more spruce trees than any other natural cause (Colorado State Forest Service, 2020). The purpose of this research project was to analyze the impacts of spruce beetles on water quality and macroinvertebrates in southwest Colorado. Four types of tree stands were identified near the selected streams: newly growing (sapling) forests, mature healthy forests, logged forests, and standing dead forests. Each of the streams were analyzed on their chemical, physical, and biological health using an integrated monitoring technique. Water quality and macroinvertebrate samples were taken in each stream and analyzed statistically. There were significant differences between the mature healthy forest and those affected severely with beetle kill. The mature healthy forest had significantly more sensitive macroinvertebrate families, more macroinvertebrate families, and more individual macroinvertebrates than all of the other streams. The healthy forest stream also had healthier physical and chemical characteristics. The results of this project will inform land managers of the effects of spruce beetles, not only on our terrestrial ecosystems but also on our aquatic ecosystems. This study demonstrates these primary effects on our ecosystems, as well as the significant power of climate change and thermal pollution. Since the recovery of logged and dead forests varies, the impacts of beetle kill could affect stream health for multiple years. As beetle kill affects the majority of spruce forests, the Rio Grande Cutthroat Trout and other sensitive and threatened species are fighting to adjust to these changing conditions.

Awards Won:
Fourth Award of $500