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Bioassessment of the Rio Grande Upstream and Downstream of Los Alamos National Laboratory, New Mexico, USA

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ABSTRACT

Benthic macroinvertebrates (aquatic insects) were collected from the Rio Grande upstream and downstream of Los Alamos Canyon (LAC), a major drainage that crosses Los Alamos National Laboratory (LANL) lands in northern New Mexico, USA. LAC contains legacy waste, including radionuclides and polychlorinated biphenyls, and occasionally discharges storm water and snowmelt flows to the Rio Grande. The Rio Grande is the major waterway that flows southward across the state. In 2009, rock baskets were placed in waters 61- to 76-cm-deep within each reach (five per reach), and, after approximately 6 weeks of colonization, the rock baskets were retrieved. All samples were sorted completely and organisms were identified to the lowest possible taxonomic level. Both reaches in 2009 were dominated by the collector filtering net-spinning caddisfly, *Hydropsyche occidentalis*. In 2011, benthic macroinvertebrates were collected using D kick nets from shallow riffle locations (15- to 31-cm depth) from each reach (six per reach). These samples were collected after post- (Las Conchas) fire flooding events moved sediment and ash through the two study areas—the downstream reach, however, was affected by higher flows and greater number of flooding events than those affecting the upstream reach. Each kick net sample consisted of ten 1-m (kick) samples. The 10 subsamples were composited and organisms were picked from randomly selected cells in a sorting pan until 500 organisms had been identified to the lowest possible taxonomic level. Both reaches in 2011 were dominated by the collector-gathering mayfly, *Baetis tricaudatus*. A bioassessment of the downstream reach compared with the upstream (reference) reach was conducted by scoring 10 metrics related to the structure and function of the benthic macroinvertebrate community. While 2009 ranked at the highest level (nonimpaired), 2011 ranked a level lower (slightly impaired). The slightly lower bioassessment score of the downstream reach in 2011 may be a result of flooding impacts following the Las Conchas fire rather than of LANL operations. Overall, based on the similarity of benthic macroinvertebrate metrics between reaches and the composition of benthic macroinvertebrates favoring pollution intolerant taxa, LANL influences, if any, via the LAC system to the Rio Grande are not significantly impacting water quality of the Rio Grande.

KEYWORDS

Benthic Macroinvertebrates; Water Quality; Radionuclides; Polychlorinated Biphenyls; Mercury; Rio Grande; Monitoring

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