

SPATIAL AND TEMPORAL PATTERNS OF MINING-RELATED SEDIMENT CONTAMINATION IN AND NEAR THE TRI-STATE MINING DISTRICT

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Historical mining activity in the Tri-State Mining District of southeast Kansas, southwest Missouri, and northeast Oklahoma, which ended in the 1970s, continues to be a substantial source of lead and zinc to the environment. To assess the magnitude and spatial and temporal patterns of mining-related contamination, streambed sediments and flood-plain soils in Cherokee County, Kansas, and bottom sediments in Empire Lake, Kansas, and Grand Lake O' the Cherokees, Oklahoma, were sampled and chemically analyzed. Lead and zinc concentrations in the bed sediment of streams draining mining-affected areas typically were at least one to two orders of magnitude larger than background concentrations. In Cherokee County, contributions of mining-contaminated sediment from tributaries increased streambed sediment concentrations of lead and zinc in the Spring River by 7 and 17 times, respectively. However, flood-plain soils along the Spring River in Cherokee County typically were uncontaminated. In the bottom sediment of Empire Lake, lead and zinc concentrations typically were at least an order of magnitude larger than background concentrations. Downstream at Grand Lake O' the Cherokees, lead and zinc concentrations in the bottom sediment were several times smaller compared to concentrations in Empire Lake, but still were several times larger than background concentrations. Lead and zinc concentrations in the sediments of mining-affected streams and Empire Lake frequently exceeded probable-effects guidelines, which represent the concentrations above which toxic biological effects usually or frequently occur. Sediment cores from Empire Lake indicated that lead and zinc concentrations have declined over time but remain persistently above the probable-effects guidelines.