

The Effects of *Castor canadensis* (North American Beaver) Repopulation on a Mine Drainage Impacted Stream¹

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Abstract: An unnamed tributary to Tar Creek (Ottawa County, OK) impacted by metal-laden mine drainage for over 30 years was repopulated by *Castor canadensis* in 2014. By the end of 2014, the majority of the tributary length was transformed into a series of impoundments due to beaver dams. The tributary is one mile long and fed by two continuous mine drainage discharge points and runoff. The first mine drainage source is the headwaters of the stream, discharging ~100 gpm; the second is located 0.4 miles downstream discharging ~160 gpm to the stream. In 2008, a passive treatment system was constructed to treat the second discharge point, improving stream quality for the remaining length of the tributary. This study investigated three aspects: (1) retention of metals due to the presence of dams, (2) metal mobilization during dam destruction creating a high velocity flush and (3) hydrologic and habitat alterations due to the presence of dams using tracer studies and rapid habitat assessments. Metal concentrations decreased at the outflow of the beaver impounded water at all dams compared to the inflow concentrations. The most significant concentration decreases occurred at the dam nearest the headwaters of the tributary (67% Cd, 38% Fe, 17%Pb, and 23% Zn). Metal mobilization occurred when dams were destroyed, showing an increase in concentration of Cd, Fe, Pb, and Zn one hour after dam destruction. Conservative tracer studies showed the presence of beaver dams doubled the mean retention time of water, taking 182 hours compared to a mean retention time of 92 hours without beaver dams.

Additional key words: Tar Creek Superfund Site, passive treatment, tracer study

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