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Lead Contamination from Historical Trapshooting at a Prairie Restoration Site in Washington State, USA

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This study investigates the distribution of lead (Pb) resulting from historical trapshooting activities at a prairie restoration site in eastern Washington state, USA. Trapshooting is a sport in which participants fire shotguns at clay targets launched into the air. For decades, Pb shot ammunition was commonly used and preferred due to its availability, high density, and energy retention. The study site is a 50-hectare plot undergoing conversion from farmland to native prairie landscape. It is located on the edge of a university campus in Cheney, Washington, where the rolling hills of loess provide a backstop. Trapshooting occurred on a portion of this site between ~1980 to ~2000 as part of an outdoor recreation course and intramural club activities. Although Pb is relatively immobile in these soils, periodic tilling during the years of trapshooting likely homogenized soil to depths of 15-25 cm. To establish baseline Pb concentrations associated with natural background and agricultural use, the upper 5 cm of soils were sampled at 20 locations across the 50-hectare restoration area. More intensive sampling was conducted at the former trapshooting range, where soils were collected at 20 m intervals along three 100-m transects. Soils were leached with 1 M nitric acid at room temperature. Leachates were filtered through Whatman 41 filter paper and analyzed for major cations, Pb, and Si using inductively coupled plasma optical emission spectrometry (ICP-OES). Baseline Pb concentrations ranged from 3-10 mg/kg, whereas concentrations at the trapshooting site were as high as 600 mg/kg. For comparison, the US Environmental Protection Agency’s screening level for residential soil is 200 mg/kg. The highest Pb levels corresponded to the primary shot fall zone. Preliminary results also indicate Pb uptake by both native and invasive plant species.