

**downslope fossil contamination: Mammal-bearing fluvial conglomerates and the  
Paleocene–Eocene faunal transition (Willwood Formation, Bighorn Basin,  
Wyoming)**

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**ABSTRACT**

Downslope fossil contamination is the result of erosion and subsequent redeposition of fossil material onto lower stratigraphic horizons. This produces time-averaged and potentially anomalous faunal records. Here, we describe vertebrate concentrations in Bighorn Basin (Wyoming) conglomerates that are early Wasatchian (earliest Eocene) in age (Wa-1) and rest erosionally upon Wa-0 strata; the strata were deposited during the Paleocene–Eocene thermal maximum (PETM). These Wa-1 conglomerates were deposited during river channel migration and sheetflooding onto abandoned parts of an avulsion belt immediately after the PETM. Dark-colored Wa-1 fossil teeth eroding from the conglomerates are now mixed in places with the lighter-colored teeth of Wa-0 mammals. The spatial distribution of the conglomerate fossils and a vertical model of downslope contamination, based on species proportions from overlying stratigraphic intervals, are used to calculate an expected contribution of fossil contaminants to an assemblage. Results of this model are applied to address the principal weakness of the hypothesis that transient decreases in mammalian body size during the PETM were an evolutionary dwarfing response to climate change. Rare occurrences of large taxa with congeners of small size would refute the argument for evolutionary dwarfing, but our results indicate that such rare occurrences can be explained by downslope contamination alone. We conclude more generally that alluvial architecture is important for understanding the potential for downslope fossil contamination and that complications imposed by this type of contamination can be assessed quantitatively.