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The abundance and importance of wood in dryland ephemeral streams across the southwestern United States

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The majority of river networks globally are expected to go dry for at least part of the year, and the number and frequency of ephemeral and intermittent rivers are projected to increase with a changing climate. Understanding drivers of morphology and diversity in temporary rivers is therefore crucial to managing current and future watersheds. Large wood (LW) and coarse particulate organic matter (CPOM) were historically more abundant in dryland river corridors, but reduction in forested riparian and upland areas as well as targeted removal of wood have decreased wood loads, potentially leading to unintended geomorphic, hydrologic, and ecologic consequences. However, studies of LW and CPOM in ephemeral and intermittent rivers are lacking compared to perennial counterparts, which limits the ability to understand the importance of woody material in dryland watersheds. Questions remain such as: how do woody abundance and volumes vary spatially across and within watersheds, and do LW abundance and distribution in ephemeral streams correlate to increased geomorphic heterogeneity, as they do in perennial rivers? Wood loads were quantified in 37 total reaches (including the channel and floodplain) across six dryland ephemeral watersheds in the southwestern United States using field surveys and aerial imagery. The location and size of LW and CPOM accumulations (termed jams) were noted, and in places where field mapping was conducted, individual logs were measured and included in wood load totals. Jam spatial densities were compared to metrics of heterogeneity, such as sinuosity and braiding index, as well as vegetation density within each surveyed reach. Jam spatial densities ranged from less than 5 jams per kilometer of stream channel to approximately 150 jams per kilometer of stream channel, exceeding previous reported jam densities on temporary rivers. Jam spatial density positively correlates with sinuosity and vegetation cover, highlighting potential positive feedbacks between jam occurrence and increased complexity, which in turn creates additional trapping mechanisms for future wood. Results indicate that wood and organic material are a natural part of ephemeral river systems, and that natural and engineered jams could be used to restore geomorphic processes and heterogeneity in temporary rivers globally.