

Land Cover Change Impacts on Stream Channel Loss in Central Oklahoma from 1874 to 2010

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Central Oklahoma has undergone substantial land cover changes since the 1800's. Accordingly, regional watersheds have been covered by impervious surfaces, peripheral agricultural areas have been subdivided or intensified, and large reservoirs have been constructed. Here, we present how land cover changes have impacted the stream channel network of the 666 km² Lake Thunderbird watershed, which drains parts of four major cities in central Oklahoma. Our timeline begins in 1874 when the watershed was dominated by forest and mixed prairie, and ends in 2010 when the watershed was covered by 17% Urban, 43% Agriculture, and 5% Water, with virtually all water attributed to impounded reservoirs or farm ponds. Over this period, these land cover changes have resulted in hundreds of kilometers of lost stream channels in the watershed and decreased drainage density by 25%. Land cover change to Urban led to channels lost in short, fragmented segments. Agriculture resulted in losses of typically longer segments, while reservoirs replaced segments several km long. This widespread channels loss from landscape-scale drivers has implications for stream ecosystems by decreasing watershed connectivity and changing nutrient dynamics.