



## Geologic Controls on River Morphology and Flooding in the Southeastern Texas Coastal Region

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### ABSTRACT

Large meandering rivers (e.g., Colorado, Brazos, Trinity, and San Jacinto), have broad geomorphic floodplains within wide, incised valleys, thus flooding is largely confined within these geomorphic floodplains. These are the oldest river systems in the region and have been influenced by repeated lowstands and highstands of sea level. Smaller creeks and bayous (e.g., Buffalo and Brays bayous) are much younger features, having formed by the diversion of drainage around large depositional lobes of the Brazos and Trinity rivers during glacial highstands. These smaller streams are locally entrenched and lack the wide geomorphic floodplains typical of the larger rivers, thus flooding is more constrained by relict Pleistocene topography.

During sea-level lowstands, the large rivers formed entrenched valleys that were largely filled during subsequent intervals of rising sea level. Closer to the coast the largest (e.g., Brazos and Colorado) spilled over (onlapped) the adjacent coastal plain, creating a radial pattern of linear distributary meander-belt ridges. These ridges acted as geomorphic dams, diverted south-flowing drainage to form east-flowing bayous and creeks into Galveston Bay. These distributaries were subsequently beheaded during sea-level lowstands.

Successive highstands of sea level resulted in a progressive seaward extension of the coastal plain, thus the diverted streams are younger towards the coast. The meander ridges forming the drainage divides between these smaller watersheds get lower and subtler with time. Thus, the older ridge separating Cypress Creek from the Addicks watershed has become a "leaky" drainage divide, and is overtopped during flooding, spilling water into Addicks reservoir. In addition, the older (inland) streams (e.g., Buffalo Bayou) are more entrenched than their younger counterparts (e.g., Brays Bayou), in part due to regional uplift and tilting, and therefore most flood-

ing occurs within these narrow, incised areas. The younger streams are less entrenched; hence flooding is more widespread and mainly controlled by relict Pleistocene morphology.

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