Should a “Typical” River-Dominated Delta With a High-Diversity Trace Fossil Assemblage Be Classified as River-Dominated? A Combined Stratigraphic, Architectural and Ichnologic Analysis of the Loyd Sandstone (Late Cretaceous) Near Rangely, Colorado

**Authors (First Name, Last Name):** Timothy Prather¹, Peter P. Flaig¹, Stephen T. Hasiotis²

**Institutions (All):**
1. Jackson School of Geosciences, University of Texas, Austin, TX, United States.
2. Department of Geology, University of Kansas, Lawrence, KS, United States.

**Abstract Body:**

The type locality of the Loyd Sandstone member of the Buck Tongue of the Mancos Shale (Loyd) is located 100 km northeast of Rangely, CO near Hamilton. Subsurface correlations indicate that Loyd-equivalent strata are exposed in outcrops near Rangely. We describe the facies, ichnology, and architecture of the Loyd near Rangley and compare-contrast these with previously identified Cretaceous river-dominated deltas of the Panther Tongue and Ferron Sandstone. This approach reveals that abundant foresets built by traction-dominated underflows (hyperpycnal flows) indicate that the Loyd delta should be classified as river-dominated. An argument can be made, however, that a high abundance and high diversity trace fossil assemblage, deeply penetrating burrows, and flaser-wavy-lenticular bedded mud between foresets is evidence that the delta front experienced recurring, extended periods of slow sedimentation and oxygen-rich marine water influx during which marine fauna flourished and tidal and wave forces dominated.

North of Rangley, the Loyd thickens laterally from a sub-meter scale sand bed to a 20+ m-thick succession. The basal contact of the Loyd is gradational with the underlying Buck Tongue of the Mancos, displaying a classic upward-coarsening succession typical of deltas. Facies include: muddy-siltstones, low-angle planar laminated sandstones interbedded with flaser-wavy-lenticular bedded muds, and gradational to erosively-based trough cross-stratified sands. Interpreted depositional environments include prodelta, delta front, distributary mouth bars, and distributary channels. Low angle planar lamination in delta foresets is the dominant sedimentary structure and mirrors the sequences documented from the Ferron and Panther Tongue. Trough cross-stratified sands the top of the Loyd are interpreted as mouth bars and subaqueous to subaerial distributary channels. The trace fossil assemblage that includes Ophiomorpha, Thalassinoides, Planolites, Schaubcylindrichnus, Palaeophycus, Diplocraterion, Helminthopsis, and Bergaueria is uncharacteristically high in diversity for a delta that sedimentary structures and architectures indicate to be river-dominated.

Although the Loyd has many characteristics typical of a river-dominated delta, care should be taken when assigning this classification. Closer inspection may reveal that much time is recorded by relative quiescence on the delta front, a characteristic not typically associated with river dominance.